A STUDY OF SUSTAINABLE COMPOST MICRO-ENTERPRISES IN CHIMALTENANGO, GUATEMALA: EMPLOYEE CHARACTERISTICS AND PROFITABILITY

A Thesis

by

TIMOTHY ROBERT SILBERG

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

December 2011

Major Subject: Agricultural Leadership, Education, and Communications

A Study of Sustainable Compost Micro-enterprises in Chimaltenango, Guatemala:

Employee Characteristics and Profitability

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Approved by:

Chair of Committee,	Theresa Pesl Murphrey
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ABSTRACT

A Study of Sustainable Compost Micro-enterprises in Chimaltenango, Guatemala: Profitability and Employee Characteristics. (December 2011)

Timothy Robert Silberg, B.S., The Pennsylvania State University

Chair of Advisory Committee: Dr. Theresa Pesl Murphrey

Over 13 million people live in Guatemala, and among this population more than 50% live below the poverty line. One proposed solution to mitigate the large percentage of poverty in the country is micro-entrepreneurship. A compost micro-enterprise is a small business, which collects organic raw material and processes it into stable humus material for the purpose of applying to soils to increase crop yields. Developing such micro-enterprises could not only indirectly improve current soil nutrient deficiencies specific to the region, but also provide alternative incomes for the already agriculturally involved community.

The success or failure of enterprises practicing composting may be measured by a plethora of figures or outcomes. Employee characteristics are one variable that should be taken into consideration when estimating the efficiency of an agricultural enterprise's operations and productivity. While a variable, such as an employee characteristic, may not be able to be quantified exactly it should be argued that this variable can have a structural impact on productivity. Another crucial variable considered when developing such a micro-enterprise is accounting for its input and output**.** It is explained the issue of costs within micro-enterprises is complex and should be considered not only in terms of

fees but also in terms of payments in any kind, such as entry and exit presence, and the duration of the apprenticeship. When an enterprise has failed to account for its various inputs and consequent output, it has become unsustainable because it has not satisfied basic economic, social and security needs presently and for its future. This study identified and described employee characteristics and documented the inputs and outputs of compost micro-enterprises in Chimaltenango, Guatemala.

The study found that employee characteristics, particularly gender, age, and occupation affected a micro-enterprise's access to markets as well raw materials, and how efficiently tasks were completed. Costs of labor, raw material, transport, packaging, energy and the location the micro-enterprise itself heavily influenced profitability. The production of any product on a large scale must anticipate how positive financial outcomes will occur because profitability may not arrive as planned. If the revenue cannot be determined and/or made, compost micro-enterprise may fail to be a sustainable, much less a viable option for alternative income streams.

DEDICATION

This document is dedicated to all the individuals who were affiliated with the compost micro-enterprises studied in some shape or form. Your stories of aspiration and progress were something I hope international developers, agricultural professors, and others feel within their own pursuits. Continue to develop your operations and extend to others your lessons of sustainability, but more so your inspiration.

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INTRODUCTION

Overview

Over 13 million people live in Guatemala, and among this population 56% live below the poverty line (Kiser, Trevino, & McVicker, 2009). Multiple efforts have been initiated to mitigate the growing problem of poverty. One proposed solution is micro-entrepreneurship. "Micro-enterprises have been viewed as a way to offer financial assistance to help the poor and vulnerable groups increase their income and ultimately break the cycle of poverty" (Vargas, 2000, p. 11).

In the 21st century, 60% of Latin American rural households have relied upon agriculture as their main source of income (Zezza, Carletto, Davis, Kostas, & Winters, 2008). In an effort to utilize micro-entrepreneurship as well as Guatemala's agricultural focus, a development effort centered around compost micro-entrepreneurship has been touted as one possible resolution to alleviate destitution in this country.

Composting generally refers to "the controlled decomposition of organic (or carbon-containing) matter by micro-organisms (mainly bacteria and fungi) into stable humus material that is dark brown and has an earthly smell" (United States Environmental Protection Agency, 1995, p. 1). This practice, accompanied by training

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This thesis follows the style of the *Journal of International Agricultural and Extension Education.*

and education, can allow its entrepreneurs to obtain bio-organic waste and process it for a profitable return.

The field of compost entrepreneurship has an increased chance of success when accurate information about the decomposition process of specific raw materials is available (Vukobratović, Lončarić, Vukobratović, Lončarić, & Čivić, 2008). Research must be conducted to document rural enterprises' current inputs and projected output as well as its employee characteristics in order to facilitate understanding and awareness of the nuances of compost entrepreneurship. This study sought to describe the employee traits that permitted a respectable outcome of financial success, types and amounts of inputs incurred by compost micro-enterprises, and the relative output based on those inputs. Individuals may be able to use findings from this study in their effort to determine if compost entrepreneurship is a viable alternative income stream for sustainable international development in their context.

Literature Review and Conceptual Framework

The majority of diffusion-adoption research has been concerned with the process of initial adoption or rejection of a particular innovation (Miller & Mariola, 2009). The innovation of compost entrepreneurship has been investigated to a limited degree, especially amidst topics of total input inventory and resulting output (Lutz, 1993), or the impact that employee characteristics can have on output (Hynes, Edwards, & Murphrey, 2009). Furthermore, many studies involving compost adoption have not included the enterprise development (as opposed to the practice) among non-farming occupational populations. Understanding enterprise development first requires an understanding of the determinants affecting a population's perception of the micro-enterprise's practice or product.

Adopters of an agricultural technology often display certain characteristics that can influence their use of an innovation (e.g., compost). Rogers (1995) drew from voluminous literature three generalized characteristics each adopter embodied: (1) socioeconomic status, (2) personality values, and (3) communication behavior. Each characteristic influenced the adoption and use of an innovation by an individual. Different levels of different characteristics either negatively or positively shaped an adopter's future practice with an innovation. Although the role characteristics play among adopters is acknowledged as an integral part of innovation adoption in the literature, research lacked investigation into the specific characteristics possessed by adopters within a compost micro-enterprise.

Common characteristics such as education and farming experience have been found among compost adopters. These characteristics were illustrated by education

regarding decomposition of organic material from workshops conducted by extension and incomes received from agricultural employment (Somda, Nianogo, Nassa, & Sanou, 2002). Gender studies of these enterprises suggested that favorable outcomes occurred when women managed the micro-enterprise, especially if they were deemed as the head of their household (Kiser, Trevino, & McVicker, 2009). Kiser et al. (2009) concluded in their studies that women had free access to family labor and that compost adopters had more access, compared to non-adopters, to extension services and less labor-intensive compost material (e.g., manure). Further characteristics included the perception and awareness of compost micro-enterprise members.

A primary perception held among micro-enterprise members was their view of the enhanced yield performance of crops after using natural fertilizer (i.e., compost) as compared to conventional fertilizers. Typically, participants of composting were aware of one, among many, of compost's large array of effects, including the impact on soil fertility conservation and water retention (Somda et al., 2002). Another study reported that composting participants would not have lacked awareness about the existence of soil improvement and/or would have heard of success resulting from compost application (Drechsel & Kunze, 2001).

Several of these characteristics were described further with regard to how an adopter could practice composting more easily and effectively. Drechsel and Kunze (2001) described how an adopter's education of relevant agriculture practices, afforded him or her relative advantage as compared to an adopter with no agricultural background. Effective practice did not occur if there was a lack of awareness about methods, training, detailed instructions, application methods and rates, and/or proof of success (Dreschel &

Kunze, 2001). In addition, it was explained that an adopter's potential success with this innovation was influenced by their awareness of cost and time of transporting compost to crops and knowledge about immediate and long-term yields from applying it to soil. Socioeconomic status and agroecological location were other major components that revealed a potential adopter's success when using an agricultural innovation such as compost (Sseguya, Semana, & Bekunda, 1999). These two factors illustrated an adopter's access to financial and material resources to begin composting. Sseguya et al. (1999) also added supply of credit, information, and input were major requisites for soil fertility practices such as composting. In essence, a detailed review of the explanations can determine a person's advantages and disadvantages if they were to practice composting.

Among Rogers' (1995) five attributes of an innovation, the relative advantage of a compost micro-enterprise can be described by its economic profitability. First, "if there is no market for it, it can be valued at zero…[in addition] there is…another dimension to productivity –one that is related to inputs and circumstances" (Lutz, 1993, p. 47). Those necessary inputs entail raw materials needed to produce compost (Miller & Jones, 1995) as well as the circumstantial availability of labor and transport needed for compost distribution (Kumar, 1973). Output is finally measured and compared to input to elucidate profit. "Profit is the difference between the total gross income from a venture and how much it has cost to market and produce that product" (Lutz, 1993, p. 19). By comparing the total amount of inputs put forth to produce total output, the margin of net profit is revealed, concluding if financial success was attained or failure resulted (Wen, Chen, & Chen, 2008).

To ensure an enterprise has sustainable revenue to distribute salaries and invest further in necessary materials, a detailed assessment of inputs and projected profit is crucial to its success (Wen et al., 2008). Moreover, a thorough review of the individuals who are engaged in utilizing the innovation and their related outcomes must be understood (Rogers, 1995). Both authors proposed that if an enterprise did not consider its future financial outcome and the impact its employees have upon this outcome, profitability cannot be documented, and thus success of the innovation cannot be determined.

Statement of Problem

Sixty-percent of Latin American rural households rely upon agriculture as their main source of income (Zezza et al., 2008). Efforts to sustain and improve the sector's agricultural productivity are therefore crucial to the region's economic development and the welfare of its people (Lutz, Pagiola, & Raiche, 1994). Lutz et al. (1994) explained that land degradation poses a severe threat to the sustainability of agricultural production. Soil degradation, "…is common in developing countries. A history of Mayan agricultural practices has led to …rapid soil nutrient depletion and declining crop yields" (Deevey, Rice, Rice, Vaughan, Brenner, & Flannery, 1979, p. 298); furthermore, it is estimated that up to 40% of Guatemala's agricultural land has lost its productive capacity (O'Kane, 2006). In general, these practices resulted in rapid environmental deterioration and subsequent unsustainable development.

In response to nominal production levels among developing countries such as Guatemala, research centers have developed technology packages to overcome the decline in soil fertility. Solutions must deliver a process of raising awareness,

transferring technological knowledge, and removing or alleviating the constraints on its practice (Napier & Sommers, 1993). To accomplish these challenges, strategies must be curtailed to the employees' traits that affect the operation. Many aid projects have failed in soil fertility technological diffusion because participants were viewed as passive recipients in their own development projects (Whyte, 1981). When compost enterprise projects solely presented potential benefits that resulted from application, but neglected to educate participants regarding profit from investment, participants did not adopt for fear of unknown costs (Eriksen-Hamel & Danso, 2009).

Context

Research was specifically conducted within Chimaltenango communities where the "Agriculture in Guatemala: Technology, Education, and Commercialization (AGTEC)" program had been delivering composting technology programs. This study sought to determine micro-enterprise employee dynamics and profitability in order to support effective training programs.

Purpose

The purpose of this study was to investigate compost micro-enterprise sustainability among the population of Chimaltenango, Guatemala. The study examined the impact employee characteristics had on the enterprise itself and the profitability of compost micro-enterprises.

Research Objectives

The following objectives guided the study:

1. Identify and describe employee characteristics within compost micro-enterprises,

2. Evaluate the employee characteristics that positively impact a compost micro-enterprise, and
3. Document inputs and outputs of compost micro-enterprises in order to describe profitability.

Methodology

Design

The researcher identified compost micro-enterprise adopters of the Chimaltenango region where AGTEC had implemented compost development projects. The study was conducted to provide a thorough evaluation about compost micro-enterprise employee structure and characteristics as well as the inputs and outputs of a micro-enterprise. Institutional review board approval was received. Data were collected from six focus groups conducted with three micro-enterprises to collect detailed descriptive and numerical data. Focus groups first began by discussing the roles and characteristics of the employees. Following the discussions, six group interviews were conducted to collect the total inputs incurred by a micro-enterprise and its subsequent output over a six-week time period. Three individual interviews were conducted outside the focus groups and group interviews. These interviews were based on individual request and availability. The interview were conducted primarily with high position (e.g., Presidents) employees because of their in depth knowledge about labor and other costs. Private interview data did not supercede other data given by participants of the same micro-enterprise, but guided questions before group interview with that enterprise were conducted. More rich descriptions of compost operations could be collected when prior information was given to the researcher. Interviews between the AGTEC Director and

micro-enterprise allowed the researcher to account for all investment in developing each business venture. "Investment is the total cost associated with generation of the Return, i.e. the Total Cost" (Lutz, 1993, p. 50). These investments were calculated in two separate forms: first being the economic cost (e.g., labor, materials, transport), and the second being the physical cost (e.g., time, pounds of material). The Gross income was calculated similar to investments, where the total amount of the compost produced and sold was summed. By calculating the difference between the investment and the gross income, the profitability of the enterprise was determined. This process or instrumentation was known as a profit input margin.

Population

The representative population of interest was the compost micro-enterprises of Guatemala. The study sampled three micro-enterprises. The focus groups included approximately five to twelve participants each. The following group interviews included approximately five to twelve participants each time. Three individual interviews were conducted with two individual from the first enterprise and one individual from the second enterprise. Individual interviews included one to two members from each micro-enterprise at a time. The total sample included twenty-four Guatemalans from the Chimaltenango region.

Data Collection

Instrumentation - Employee Characteristics

Qualitative methods were used to inquire about member characteristics. "Qualitative research places an emphasis on the dynamics between the researcher and the topic of study" (Kiser et al., 2009, p. 121). Seeing that the researcher was privy to the

enterprise's employees' contributions, a qualitative discussion was conducted for the purpose of identifying group members' roles, characteristics, and contributions. Employee skills were also discussed. Gatekeepers were informed of discussion topics the week before focus groups were conducted. Names and responses were coded to ensure the confidentiality of the participants.

Instrumentation - Micro-Enterprise Profitability

Case study methodology was used to investigate compost micro-enterprise profitability. An interview protocol included a series of 13 questions regarding the business venture that were developed from the literature review. The questions first entailed an inquiry of the types of inputs required to produce compost. The group interviews asked about the amount of each input and its cost and how much output were produced from these inputs within a six-week period. The group interviews aimed to account for the initial input of construction, compost material, and salaries as well as the financial profit made by the micro-enterprises. Inputs and outputs were measured physically (e.g., pounds of organic fertilizer derived in six weeks from a micro-enterprise) and financially (e.g., cost per sack) through inquiry of the manager/employees, the AGTEC Director and AGTEC staff. Direct observations allowed triangulation of the information. Credibility was established through member checking. Focus group participants were provided the opportunity to hear an overview of the information collected during the original group interview sessions and provide input as to the accuracy of the information. "It is this step that the members of the setting being studied have a chance to indicate whether the reconstruction of the inquirer are

recognizable" (Erlandson et al., 1993, p. 142). Names of enterprises and their locations were coded to ensure the confidentiality of their employees.

Collection and Analysis- Employee Characteristics

To enhance the range of information and emerging themes (Erlandson et. al., 1993), managers of each micro-enterprise were contacted by the researcher requesting permission to collect data about employee roles and contributions. Prior to the project proposal, the AGTEC Director confirmed with the researcher leaders of each micro-enterprise group had been identified. The Director identified these managers, rather gatekeepers, based on previous group interviews inquiring about the person who was accountable for salary distribution, profit monitoring, and task delegation. "The keys to access any setting are in the hands of certain gatekeepers, or those who have the authority to allow one to enter their world" (Erlandson Harris, Skipper, & Allen, 1993, p. 139). The researcher sought cooperation from the gatekeeper to conduct focus groups among each identified cluster. The person was selected as the gatekeeper because they served as a mediator that could encourage participation (Berg, 2001).

Emerging themes and anomalies were identified following the discussion. The researcher recognized and stated any similarities and differences among the three micro-enterprises.

Collection and Analysis- Micro-Enterprise Profitability

Individual interviews and group interviews were carried out between the researcher and micro-enterprises and AGTEC staff to determine input and output figures. All financial costs were determined first by asking the type and amount of expenditure spent during operations. The "issue of costs within micro-enterprises is complex and

should be considered not only in terms of fees but also in terms of payments in any kind, such as entry and exit presence, and the duration of the apprenticeship" (Birks, Fluitman, Oudin, & Sinclair, 2004, p. 1). Then, types and amounts of raw materials were inquired about to determine the amount of physical input (i.e., the sum of green material, dry material and manure) needed to produce a given output. Finally, enterprises were asked of the amount produced from these inputs and by what price their compost sacks were sold. This calculation revealed the gross profit which could be subtracted by the total costs incurred during a six-week cycle therefore indicating a clear profit input margin. A profit input margin afforded the conclusion of whether or not a micro-enterprise could continue current operations (Bititci, 1994) based on its six-week conditions.

Anomalies and differing geographic conditions were identified following the collection of all necessary input and output information. The researcher recognized and stated the reasoning for similar and different production and profit among the three micro-enterprises.

Procedures

Each micro-enterprise was asked first a series of questions regarding employee characteristics. After the discussion was completed, all inputs and output were gathered from a directed set of questions. The group interviews took no longer than two hours. The individual interviews inquired only about profitability and lasted no longer than an hour.

Definition of Terms

The following is a list of terms utilized throughout this study.

- Adoption - the decision to make full use of an innovation as the best course of action available (Rogers, 1995, p. 177).

- Coefficient (one unit of energy) - the measured amount of factor input per unit of gross output; the labor and capital requirements embodied in the commodity; the input requirements per unit of commodity, directly or indirectly through the production of the commodity inputs. A measurement of the required amount of some input per unit of some output.
- Composting - the controlled decomposition of organic (or carbon-containing) matter by micro-organisms (mainly bacteria and fungi) into stable humus material that is dark brown and has an earthly smell (United States Environmental Protection Agency, 1995, p. 1).
- Cost of Goods Sold (COGS) - the total of all the direct costs for a particular product or service.
- Dry Material - a type of raw material used for composting that provides microbes to decompose organic waste.
- Green Material - a type of raw material used for composting consisting of heavy nitrogen content. These materials may include green plant cuttings.
- Gross Profit - the outcome of subtracting the cost of sales from sales revenue for all products and services sold.
- Micro-enterprise - a very small enterprise owned and operated by poor people, usually in the informal sector (United States Agency for International Development, 2008, p. 1).
- Net Profit - the sum of all revenue made from sales (gross profit) subtracted by total overhead.

- Profit - the difference between the total gross income from a venture and how much it has cost to market and produce that product (Lutz, 1993, p. 19).
- Sustainable Practices – practices that seek to ensure the future of agriculture by promoting environmental stewardship, generating an acceptable level of income, and maintaining stable farm families and communities (Sustainable Agriculture Research and Education, 2002, p. 1).
- Total Cost - the sum of the cost of goods used and overhead used to produce a product or conduct a service.

AN EXAMINATION OF EMPLOYEE CHARACTERISTICS WITHIN COMPOST MICRO-ENTERPISES IN CHIMALTENANGO, GUATEMALA: FACTORS THAT FACILITATE SUCCESS

Introduction

The success or failure of an enterprise may be measured by a plethora of figures or outcomes. For example, the achievement of a small farmer's operations may be measured in terms of profit (Hernandez & Place, 2004). Additionally, the profit may be affected by a number of factors, one being productivity. The employees who contribute to these operations of productivity should be taken into consideration as well (Ndlela & Toit, 2001). An employee's contributions may be attributed to a number of traits or characteristics he or she possesses. These traits are expressed and illustrated by an employee in a number of ways. For example, Sseguya et al. (1999) posited that a person's socioeconomic status and agroecological location were two major components that revealed their ability to retain successful financial and input-material gains. However, it depends upon the leader "…to examine how to develop and exploit these …characteristics…to gain a competitive advantage (Ndlela & Toit, 2001, p. 1). While a variable, such as an employee characteristic, may not be able to be quantified exactly, "…it should be argued that this variable can…have a structural impact on productivity" (Zwick, 2004).

Statement of Problem

Employee characteristics often impact the success or failure of a compost micro-enterprise's daily operations. An understanding of these specific characteristics can

enable strategies to be put in place to facilitate success. Compost micro-enterprises are faced with daily challenges in obtaining, processing and vending organic raw materials. These challenges may be mitigated by technology (e.g., dry material cut by a gas powered grinder); however, capitals of Guatemalan rural enterprises tend to be small and as a consequence, may not be able to afford such technologies. Thus, the production of a rural micro-enterprise is dependent upon its employees and their contributing traits. This study examined the challenges faced by compost micro-enterprises in obtaining input and producing a significant output in order to document the characteristics that could lead to success.

Conceptual Framework

Employees of micro-enterprises are defined by countless characteristics and traits. Common traits can be found within the literature about employees within compost micro-enterprises and more specifically, ones that affected the daily operations of an enterprise. There were three primary traits found in the literature mentioned as determinants that impeded or enabled success of a compost enterprise: gender, age and occupation (Mayoux, 1995; Delve & Roothaert, 2004; Rojas & Siga, 2009; Stofella & Kahn, 2001; Elliot & Foster, 2004; Burton, 2006; Lutz, 1993; and Oleas, Dooley, Shinn, & Guisti, 2010). The conceptual framework for this study was built around these three constructs.

Gender

In rural developing nations, gender dictated to a certain degree the careers that were available to a person, the access they had to economic opportunities, individual control of profits, and the managed a micro-enterprise (Mayoux, 1995; Mayoux, 2000; and Rojaz & Siga, 2009).

Literature revealed that gender was a characteristic that enabled or restrained the type of occupation individuals could fulfill in some instances. Mayoux (1995) expressed how various constraints of poverty, inequality, and chosen occupations negatively affected women working among micro-enterprises. The researcher's study examined how women in developing countries were restrained by their cultural norms to a small number of careers. Subsequently, gender-associated careers limited a woman's ability to broaden her professional endeavors. Mayoux (1995) explicated that the skills associated with traditional careers in certain countries affected women's abilities to work within agricultural industries such as compost micro-enterprises because their typical career either lacked agricultural practice or involvement with farmer market communications. In contrary, men were found to be advantageous employees within micro-enterprises because of their agronomic skills and privileged access to larger labor pools from their previous working relationships and other social networks.

Additionally, Mayoux (2000) unveiled the highly unequal policies and micro-finance services (e.g., credit) women received in developing nations. In the paper entitled "Micro-finance and empowerment of women: a review of key issues" (2000), a barrier was discussed where women experienced minimal access to necessary capital to begin their micro-enterprise operations. As observed in Bangladesh and India, women experienced barriers to obtain loans from micro-finance institutions as well as control over their own profits in their personal household. Men in contrast were able to establish enterprises partly due to their various sources of household income. It was concluded that in societies where men controlled household finances, female profitability did not translate into returned investment to economically sustain a future micro-enterprise.

Other research explored gender and its association with entrepreneurial success. Rojas and Siga (2009) described the risk-adverse nature of entrepreneurs based on a combination of characteristics, such as education, age, and gender. Rojas and Siga (2009) made a compelling argument that actions within a household structure based on gender, transcended into the market environment. Gender and household hierarchy indicated that females were more prone to utilizing employees in their enterprises because of their access to inexpensive labor from family members.

Mayoux's (1995) research compared how gender-related careers and financial control limited women from developing successful compost micro-enterprises. The affect gender had on an employee's ability to develop professional skills (e.g., composting) or control their profits was important to acknowledge as well (Mayoux, 2000). Most studies involved with the practice of composting have primarily included men (Rojas & Siga, 2009). Furthermore, research studying the affects of gender in a rural working environment for women concentrated on the limiting factors associated with this gender as opposed to the benefits it may offer. Within the recommendations of the reviewed literature, further studies involving rural entrepreneurship were advised to be cognizant of the opportunities gender may have negatively impacted relative to a region and its culture. Additionally, it was recommended that further research was needed about advantages employee traits could have on entrepreneurships between both genders.

Occupation

Aside from gender, other characteristics of employees within compost micro-enterprises were found to impact success as well. For example, agronomic skill was one of the many commonalities found among composting employees. This occupational trait

was illustrated by a number of activities, including labor experience in farming practices, participation in Extension Compost Workshops, ownership of draft animals or any other species of ruminant livestock, and having received an annual income that was derived from selling crops (Somda et al., 2002). Among the several occupations composting employees either currently or previously fulfilled, frequent outcomes were expressed in the literature regarding an employee's previous or related field including, the understanding of a new innovation, access to previous consumer markets, and receiving assistance from vendor networks (Delve & Roothaert, 2004; Stofella & Kahn, 2001; Hinrichs, Gulepsie and Feenstra 2009; Oleas et al., 2010).

Previous or current occupations of individuals afforded them knowledge to develop new innovations similar to their professions (Delve & Roothaert, 2004). Delve and Roothaert (2004) conducted research involving farmers' research and technical capabilities during compost operations. Typically, rural farmers lacked skills for adding value to their products (e.g., crops) and lacked marketing skills from a history of being undercut by middlemen. For example, adding value to a product may have involved processing strawberry into jam, or attempts to heighten bargaining power may entail accessing market networks to understand a product's fluctuating price domestically or internationally. It was concluded that this shortfall expressed with farmers perpetuated poor bargaining power, resulting in poor marketing of additional agricultural products such as compost.

Similar literature was found in a book written by Stofella and Kahn's (2001), explaining the skills associated with an individual's occupation. The researchers observed persons with increased interest in composting and evaluated the skills needed to manage

a commercial or individual composting operation. A significant argument was made that if prospective compost employees were not technically versed in raw-material composition, production practices, and operational expenses relative to composting, the result of their final product would not be of high quality. Elliot and Foster (2004) underlined this argument when they articulated the importance of a person having applied biological systems competencies and agricultural industry skills if they desired to venture into composting.

Occupations related to farming within enterprise development were further explained by Hinrichs et al. (2009). The researchers reviewed farmers' abilities to promote small business entrepreneurship through social learning and engagement of their fellow agricultural vendors and customers. In their study, they stressed the advantage of having social interactions among persons (e.g., farmers) with similar occupations. These interactions were deemed of high value because those individuals were able to circulate knowledge to develop or vend new products, such as compost. This argument was emphasized further by Oleas et al. (2010) when she discussed the horizontal communication networks among Guatemalans involved in rural agricultural communities. It was noted that communication networks not only occurred between persons with similar farming backgrounds but with similar social and economic statuses.

Employees' occupations appeared in the literature as an additional critical trait to evaluate. Delve and Roothaert's (2004) studies primarily observed how various occupations lead to disadvantages in the composting business. On the other hand, Delve and Roothaert (2004) and Stofella and Kahn (2001) felt it was quintessential to inquire about an employee's agronomic occupational skills and to what extent they gave access

to beneficial social networks. Extension research has been limited to observation of farmers practicing composting because agro-extension agents have been primarily involved with assisting farmers. Non-farming consumer knowledge and communication networks associated with aiding compost micro-enterprises with their marketing procedures have not been explored extensively. An investigation of different skills associated with employee occupations is substantive to an understanding of contributions affecting compost micro-enterprise.

Age

Gender and occupation were revealed in the literature as considerable characteristics of concern; however, one pertinent trait remained: age. Age was of particular concern because of its large subset of attributes affecting entrepreneurial success (Burton, 2006). These attributes included managerial styles, physical strength, and practical experience.

Burton (2006) elaborated how age was a principal determinant for an assortment of structural and managerial styles among farmers. The researcher made a significant finding when age was mentioned by the participants of the study as an indicator for a farmer's practical experience, especially with business. As such, practical experience was presented as an instrument to measure and interpret how a micro-enterprise would be managed. The article also made note of the strenuous physical demands agriculture put upon its employees; thus, age was used as a measurement to assess the amount of tasks that could be completed. Hynes, Edwards, and Murphrey, (2009) also pointed out in his findings that "…it is important to recognize the impact manual labor can have on the

health of the individual" (p. 1). While age cannot be completely equated to practical experience or physical strength, it does influence the two.

Lutz (1993) also made mention of a person's practical experience in their field of work related to age. Economic awareness, such as financial return, was one of the many cognitive skills perceived from a farmer's age and practical experience. It was proposed hypothetically, that if a farming enterprise did not possess an individual who had these competent abilities, profitability could not be determined.

Physical stamina, as it related to age, was cited in the literature as a pertinent determinant for the completion of farm tasks (Burton, 2006). Furthermore, research mentioned how the age and gender of an employee (e.g., a manager) affected their managing behavior. Much composting research lacked information about how particular composting tasks were specifically affected by a participant's attributes related to age (e.g., practical education, managerial style). Minimal research had has attempted to explain the reasoning (e.g., age, education) for election of an employee to higher positions. Lutz (1993) used methods to investigate practical levels of education associated with age among enterprise employees for the purpose of evaluating innovation use. However, his studies fell short in describing the decisions made by employees to elect a colleague for a higher position (i.e., president, vice president). Much literature reported for future studies of a similar nature to observe how efficiently certain tasks are completed and decisions are made based on age.

By observing the themes among entrepreneurial employee characteristics, many variables are seen as determinants of success within the compost production sector. Different combinations of these characteristics, among an employee population, imply a

number of actions resulting in some level of operational effectiveness. There are a number of qualitative variables the research stresses to account for when evaluating if an employee characteristic enables a compost micro-enterprise for economic success. Three topics associated with successful economic outcomes were made evident in the literature: gender, occupation, and age.

Context of the Study

Geographically, the operations of compost micro-enterprises will utilize different resources and services based on their availability within their specific region. As such, the compost micro-enterprises of Chimaltenango demand a dynamic list of tangible and intangible inputs.

To begin, the necessary raw material to produce compost must be available in ample amounts and at affordable costs. Guatemalan micro-enterprises generally segregate these materials into three categories: green material (e.g., corn leaves), dry material (e.g., aged corn cane) and manure (e.g., horse droppings, cow droppings). Field tools, such as machetes and flat head shovels, used in the population's daily practices are utilized to facilitate the production of compost. These apparatuses are used for the necessary steps of cutting, grinding, and carrying of compost material. To maximize production, the region's micro-enterprises use either donated effective microorganisms (EMO's) from an international organization or purchase them to expedite the decomposition of raw material. If trained, employees will harvest EMO's from their forests. Commonly, the decomposition process is completed upon a concrete foundation with a roof. This is completed for the purpose of protecting the enterprise's raw and processed material from its country's climatic elements (e.g., rain). Furthermore, a solid service does not allow

EMO's to escape. Lastly, the operational grounds are walled or gated for security purposes.

In Chimaltenango, a micro-enterprise uses a number of professions and services to establish and maintain a compost micro-enterprise. Many micro-enterprises do not possess the skilled labor and/or economic means to provide an industrial unit, access to inexpensive raw material, and/or transport for these materials. A large employee population can mitigate these costs through cooperative funding or requesting subsidized loans from their local governments. The required skills, among many, include carpentry, agronomy and agricultural business. The specialized occupations and necessary capital grant the ability to construct a composting structure, afford land and vehicular transport to gather/deliver material for decomposition, information of the region's raw material to formulate a composting-recipe, and finally vending experience to market the product. If the occupations and/or material are not found within the enterprise they are solicited within their local communities and typically render pay.

The micro-enterprises reside in rural locations where the population participates in several occupations. The education sector is divided among men and women, but men dominate mechanical and agricultural occupations. Women assume positions as textile producers, bakers, or domestic housewives. While occupations, such as farming, are not completely exclusive, participation from a gender not according to the cultural norms is minimal. These occupations demand and create a number of skills within their own respect and related fields.

Purpose and Objectives

The purpose of this study was to analyze employee characteristics that positively impacted compost micro-enterprises in Chimaltenango, Guatemala. The specific objectives were as follows:

(a) explore employee characteristics among compost micro-enterprises,

(b) identify characteristics of employees fulfilling various positions within a compost micro-enterprise and,

(c) analyze employee characteristics that positively impacted a compost micro-enterprise.

Methods

A thorough literature review allowed the principle researcher to understand common characteristics found among compost micro-enterprise employees. A review of multiple sources aided the development of instruments and advised the researcher to explore topics needing further investigation.

Instrument Development

Qualitative research was used because it "places an emphasis on the dynamics between the researcher and the topic of study" (Kiser et al., 2009, p. 121). Qualitative methods (i.e., interviews, focus groups, and participant observation) were used first to gather individuals' discernments about personal traits that may benefit a compost enterprise. Then, these methods were used to draw out discussions of how the traits mentioned impacted an enterprise positively and, finally, to what extent, if any, employees exemplified these traits. The research conducted was defined as comparative

case study, or rather at multisite case study. A multisite case study is described as research that gathers and examines data from several cases with the intention to uncover a phenomenon expressed by common members of a group (Merriam, 2009). Case studies are argued as the best reporting form for evaluations (Guba & Lincoln, 1981). A case study provides "…thick description, is grounded, is holistic and lifelike, simplifies data to be considered by the reader, illuminates meaning, and can communicate tacit knowledge" (Merriam, 2009, p. 49).

Procedures

Field research was carried out over a one-month period (July 2011) to allow extended meetings to be conducted directly with the micro-enterprises. The data were gathered in the local language, Spanish, translated into English by the researcher and an executive secretary of the Panamanian consulate. The principal researcher is an intermediate Spanish speaker and was accompanied by native speakers from the staff of Texas A&M University's Norman E. Borlaug Institute to ensure reliability of translation. The study focused on employees of the compost-enterprise within a specific region of Guatemala. More specifically enterprises were included that had participated in compost training activities funded by the United States Department of Agriculture (USDA).

Participants

Micro-enterprise participants were coded (Table 1) according to the name of their enterprise, a randomly assigned number according to their position, and the collection method used to gather information from them. The three enterprises were coded as A, B, and C to divide them based on their location. The set of randomly selected numbers ranged one through ten because the largest focus group contained ten participants. The

numbers also signified the position an employee held. They were as follows: 1-President, 2-Vice-President, 3-Secretary, and 4-Treasurer. All other numbers were randomly assigned to employees from each micro-enterprise. The collection method codes assigned to participants were FG and SI signifying focus group (FG) or semi-structured interview (SI). The principal investigator assigned all codes and random numbers to ensure confidentiality.

Table 1
Enterprise Affiliation and Respondent Codes

Enterprise	**Respondents**
A	A1-SI, A4-FG, A5-FG, A6-SI, A7-FG, A8-FG, A9-FG, A10-FG, A11-FG, A12-FG
B	B1-SI, B2-FG, B3-FG, B4-FG, B5-FG, B6-FG, B7-FG, B8-FG, B9-FG
C	C2-FG, C3-FG, C4-FG, C5-FG, C6-FG

*Note- Individuals were coded with numbers according to their position, letters according to their enterprise, and the data collection method
*Coding- 1=President, 2=Vice President, 3=Treasurer, 4=Secretary, SI=Individual Structured Interview, and FG=Focus Group

Detailed notes were recorded reporting the hierarchy that participated in the study. They included: Presidents from micro-enterprise A and B, the Vice-Presidents and Secretary from micro-enterprises B and C, Treasurers from all three micro-enterprises and the Speakers from micro-enterprise B. The Presidents were coded as A1-SI and B1-SI, the Vice-Presidents as B2-FG and C2-FG, the Secretaries as B3-FG and C3-FG, the

Treasurers as A4-FG, B4-FG and C4-FG and the Speakers as B5-FG, B6-FG and B7-FG. Positions' responsibilities and the employees who fulfill them will be discussed later.

Individuals and their micro-enterprises who were selected to participate were identified by a Texas A&M University organization (i.e., AGTEC), which was funded by a USDA grant. This type of selection afforded the researcher to meet with the entire population of the enterprise and its hierarchy officials (e.g., President, Vice President, Treasurer, Secretary, etc.) so that ample information could be provided about their micro-enterprise's employee population and their beneficial characteristics. Consequently, a representative and purposive sample consisting of three micro-enterprises were identified. The population, location, and gender proportion of each micro-enterprise varied.

The twenty-four selected participants were identified and interviewed because of their continuous membership and participation in their respected micro-enterprises. The information collected by the researcher was not solely from one employee but given and reconfirmed by many, if not all, employees in that enterprise. By looking at a range of akin and differing cases, findings from a single case are grounded by specifying how, where and why they have occurred against other cases (Merriam, 2009). The principal researcher acted as an interviewer gathering information about the enterprise's operations and how they functioned efficiently based on employee skills and contributions.

Data Collection and Coding

Information was collected from micro-enterprises separately. No two micro-enterprises, or members from either enterprise, were present at the same time in one focus group or semi-structured interview. "The reason for this is mainly that doing more than one site at a time can get confusing. There are too many names to remember, too much

diverse data to manage. After you finish your first faces, you will find that in multicase studies subsequent cases are easier…the first case study will have provided a focus to define the parameters of the others" (Bogdan & Biklen, 2007, p. 70). The findings from the entire 24 participants were grouped together for analysis at the conclusion of the study.

The three enterprises were classified as Enterprise A, Enterprise B, and Enterprise C. Enterprise A and B participated in focus groups with their entire staff present. The first focus group with Enterprise A was held with ten participants. One individual from Enterprise A's focus group was interviewed apart form the group. The following focus group was conducted upon Enterprise B comprising of nine participants. Enterprise B participated in two focus groups. One participant from Enterprise B was interviewed individually. The final focus group collected information from Enterprise C. The focus group included five participants, three enterprise members representing Enterprise C's fifty members, and two of their workers. There were a total of 24 participants included in the study. All 24 participants' names were coded next to their responses for ease of locating information and to ensure confidentiality.

Instrumentation

Data were collected through semi-structured interviews and focus groups with individuals from the micro-enterprises. An open-ended interview protocol was developed that included fourteen guiding questions. Questions were arranged to gather details and enable an understanding about entrepreneurial operations and challenges, impacts made by employees upon these operations (e.g., access to input, market knowledge, efficient

production operations, etc.) and if these impacts were positive outcomes as a result of employee characteristics.

During the interviews and focus groups the researcher inquired about the enterprise's employees' contributions for the purpose of identifying group members' roles, characteristics, and contributions. For example, the researcher wanted to understand the hierarchy within a micro-enterprise. This information was extracted from a discussion to have employees discuss what characteristics they thought they had because of their selection, and how these traits or skills might assist the micro-enterprise.

Reliability and validity of this study were monitored through several methods, including member checking, triangulation, peer reviews, and prolonged engagement in data collection. "We can strengthen the decision, the validity, and the stability of the findings" (Miles & Huberman, 1994, p. 29) with these methods. Reconfirming information with all respondents in their focus group, repeated visits, and reviewing similar categories within the principal researcher's documents among all micro-enterprises ensured triangulation. Through triangulation, the validity of specific claims made by the researcher are argued to be more robust (Marshall & Rossman, 2011). Member checking invited "…participants [to] correct the researcher's (perhaps not quite accurate) representations of their worlds" (p. 42). Qualitative data about group structure, interpretation of employee contributions and characteristics, and advantageous skills associated with the needs of compost micro-enterprises were discussed with respected colleagues to confirm legitimacy.

Observations

Observation served a critical role in data collection. The principal researcher viewed multiple composting sites to observe similar themes and individual characteristics illustrated by micro-enterprise employees. The observations took place over a month during which interviews of participants were conducted.

Findings

Each focus group and/or interview explored employee structure and responsibilities to unveil characteristics that fulfilled those positions or impacted success. It is important to note that during conversations with participants, categories emerged that complimented the conceptual framework. The four categories included: 1) *Employee Structure.* 2) *Gender*, 3) *Occupation,* including subcategories of agronomic and non-agronomic jobs, and 4) *Age*. Representative quotes, accompanied by the use of audit trails to match their distinctive identifiers, provided validation back to the raw data sources. A description of the employee structure and each category was discussed under its respected sub-heading.

Employee Structure

Participants were asked what they believed each role's responsibilities were and what traits an employee needed to fulfill their positions. When employees were asked about the roles needed to be established for a micro-enterprise to produce compost, all enterprises mentioned they elected a President and a Treasurer. The Vice-President and Secretary positions were evident only in enterprise B and C. Speaker positions were found in enterprise B.

All employees elected to their respected positions were done so through a democratic election when the micro-enterprise was first initiated. The responsibilities of each position, along with characteristics of the person holding that position varied. The role as President was to act as the head of the micro-enterprise and to raise major issues (e.g., financial) to their employees for a vote (A1-SI, C4-FG).

The Presidents of Enterprise A and B both operated meetings and operations from their home and property. When employees were asked why they thought that person was elected for that specific position, several (A6-FG, B8-FG, C4-FG, C5-FG) mentioned they were already respected leaders in their communities who owned small businesses of their own. Presidential roles were explained as the people having organizational traits and being well-educated (B7-FG). Presidents found that their traits afforded them the ability to assign labor tasks for all of the employees and "to attend compost-training sessions so later [they] can train [their] employees about the topic" (A1-SI).

A Vice-President assumed the same roles of the President in the case he or she was not present (C3-FG). The Treasurer of each enterprise monitored all expenses and sales made by the micro-enterprise (C4-FG, A4-FG, B4-FG). When fellow employees were asked why they thought the person was elected for Treasurer, many responded that those people had writing and arithmetic attributes (A10-FG, B2-FG). The Speakers identified in Enterprise B believed their role was to make all their fellow employees aware of daily meeting times, changes in the work schedule, or if an extension agent was visiting (B5-FG).

Regardless of position, all employees from Enterprise A and B completed the same type and amount of physical labor throughout the entire compost process (A1-SI, B5-FG). Enterprise C hired four workers to complete the physical labor.

Gender

After employees described the positions established and fulfilled among their micro-enterprise, they were asked if they considered themselves or fellow employees of having any characteristics that benefited the compost micro-enterprise. As part of the process to uncover these characteristics, one of the questions inquired if an employee's characteristic gave them preferential access to markets. And if so, how? The President of one enterprise mentioned how, as a woman, she sought a niche market from her female counterparts in her community (A1-SI). When asked to elaborate about the market's development, she explained that her gender afforded her the keenness of how housewives generally had minimal funds to purchase fertilizer. Although they had a desire to grow vegetables and flowers, they needed cheaper prices for fertilizer and potting mixes. The President raised this information to her coworkers and they decided to vend smaller amounts allowing for their product to have an additional market from the typical 100-pound sack sold to farmers.

In two enterprises, several employees stressed the difficulty of gaining trust from consumers that were men. At the closing of the discussions, employees were asked to "Please describe the access (type of relations, amount sold, etc.)." Employees elaborated that the majority of their consumers were farmers that were men (B2-FG, A4-FG); however, one enterprise indicated the advantage of having an employee that was a man. When asked why they considered this employee's gender as being advantageous, they

pointed out that many of their on-site purchases were conducted on his behalf (A6-FG, A7-FG). While the enterprise had supporting literature to advertise about compost, many of the employees mentioned consumers that were men trusted purchasing the product from a fellow male (A6-FG, A8-FG).

Occupation

Gender was not a sole emerging characteristic viewed as beneficial, but an employee's working traits associated with their previous and current occupations also emerged. The researcher inquired if there was a belief that an employee characteristic was associated with advantageous access to ample amounts of raw material. Participants responded to the question by pointing out skills few employees had rather than all (A5-FG, B3-FG. C4-FG).

Agronomic Background

Each enterprise had one, if not more, employees that practiced agriculture in some shape or form. Participants made note that their connection to this occupation sometimes granted them access to certain amounts of green material (B7-FG, C2-FG). One employee was a strawberry farmer whom had many relatives cultivating the similar crop. She believed this occupation was beneficial because it allowed her access to numerous farm's dead leaf material after harvests (B7-FG). One enterprise had its entire employees involved with the cultivation of coffee (coffee cooperative), giving them access to discarded mucilage from the harvested coffee seed (C2-FG). Respondents believed these traits were valuable for the reason that it eliminated the cost of one type of raw materials (C2-FG, C4-FG).

Additionally, the coffee cooperative made note of their current network of farmers (C4-FG, C5-FG, C6-FG). When asked about their future consumers, they stated their production of 180 sacks were marginal to the demand they had from each of the 50 farmers' networks of consumers (C4-FG).

Non-Agronomic Background

Other occupational skills were mentioned as traits that limited the cost of inputs. This theme unveiled itself when all enterprises stated their ownership of a machine (donated by an international organization) to grind dry and green material. When the principal researcher inquired about these characteristics, one enterprise's employees pointed out the benefits of having an employee to repair their machine if needed (A7-FG). Other enterprises stated their fears of future mechanical problems with the machine and the costs associated with them (C3-FG). After these fears were mentioned, the researcher asked if employees believed having an employee with a mechanical background could prevent future mechanical costs. One employee contended that if their machine broke down, they would be fortunate because they had an employee who was a mechanic (B6-FG).

The principal researcher asked if employees thought there were any further non-agronomic traits beneficial to their micro-enterprise. Enterprise C stated two of their employees were carpenters. When the researcher asked how the traits of a carpenter benefited the micro-enterprise, all participants in the focus group stated that they had these two employees construct the structure where the compost operations were held (C2-FG through C6-FG). This construction price was heavily subsidized (C4-FG). The two

other enterprises had their structure built by contracted carpenters and were still paying off from loans (A1-SI, B1-SI).

Age

A third characteristic emerged as a benefit to the micro-enterprise when the researcher asked his final question. Employees proposed many characteristics when the researcher asked "If they believed there were any skills not mentioned during the focus group's entirety?" Many enterprises, such as Enterprise B, stressed the importance of "having employees with strong work ethics because of the strenuous tasks composting operations demand" (B1-SI). Enterprise A concurred with this statement, especially "when collecting and carrying sacks of manure" (A1-SI). Following these statements, the researcher asked participants if they thought any employee[s] mitigated the labor and if so, how? Respondents from both of these enterprises answered no because they agreed all work was completed equally (A1-SI, A4-FG, B6-FG, B9-FG). However as the researcher asked further about mitigating labor, employees remarked that several of their fellow employees quit because of the arduous work (A10-FG, A11-FG, B9-FG). Most of the employees who resigned were elderly (B9-FG). Both enterprises expressed that by having a greater number of younger employees, tasks of "moving piles and lifting the grinding machine could be completed with less employees" (B8-FG, B9-FG). When asked "How did age help with these tasks?" it was stated that it could expedite production (B9-FG).

Enterprise C included four young male workers to complete their production operations as compared to Enterprise A and B's work force comprised of many middle aged and elderly women. The researcher asked if they were certain if their ages allowed them to complete the work more quickly, they disagreed (C5-FG, C6-FG). It should be

noted the researcher observed all micro-enterprise operations under similar conditions (e.g., all raw material, tools, and machinery present). Enterprise C produced more compost with more raw material by having its employees work two days a week as opposed to Enterprise A and B who worked 4-5 times a week.

Conclusions

Compost micro-enterprises benefited in numerous ways from the contributions made on behalf of an employee characteristic. All enterprises in the study were comprised of a set of employees assuming distinct characteristics, but three common traits were observed as having the largest influence upon economic success. Each trait affected a micro-enterprise accordingly based on the degrees employees utilized that characteristic to their advantage and the concentration of employees which had that specific characteristic.

Gender

Mayoux (1995) findings about gender-associated careers and the benefits associated with male occupations were confirmed from the findings found in two enterprises. One benefit was denoted as access to previous social networks to aid in marketing products. Enterprises B expressed the advantage they had by having a man as an employee to vend their compost and utilize his farmer network to verbally advertise about compost. Other findings disagreed with Mayoux's (2000) assertions that women had limited access to financial opportunities and institutions to begin micro-enterprises. The enterprises comprised primarily of women made note of the loans they obtained from their local ministries and financial institutions. Furthermore, the data found in two enterprises, women employees held and controlled the profits made from composting.

These observations did not necessarily contrast with the argument that rural women in developing countries tended to have little control over their household income, but that they had control over a type of income nonetheless. Rojas and Siga (2009) claimed women-headed households benefited from utilizing their family labor. While this point is valid, the women did not hire entirely free labor from family members, but solicited the help of male relatives who could assist with lifting machinery.

Occupation

Occupation was not proven as a characteristic granting better formula production methods because of previous skills or experience in an agriculturally related field (Stofella and Kahn, 2001). Enterprise C was comprised of the most farming employees and received the most profit from its operations. Whether these profits were made on behalf of effective management acquired from agro-industry skills (Elliot & Foster, 2004) is uncertain.

Agronomic Background

Findings from the principle researcher's study reaffirmed the social networks farmers previously had access to, assisted them with developing and marketing new products (Hinrichs et. al 2009; Oleas et al., 2010). A previous strawberry farmer from Enterprise B utilized her farmer network to gain access to free green material. Coffee cultivators took advantage of their own credibility as farmers and vended compost to colleagues who grew coffee and various crops.

Non-agronomic Background

An argument made by Delve and Roothaert (2004) mentioned that employees who were farmers lacked bargaining skills. Additionally it was said these skills deficient

because of a farmer's inability to add value to his or her products. These findings could not be completely refuted because bargaining was not observed among employees. However, non-farming employees in Enterprise B sought to modify their raw material formulas to retain favorable pH levels for consumers. Added to which, a non-farming employee from Enterprise A vended compost in smaller amounts to appeal for household potting mixes.

Age

Burton (2006) concluded an employee's age afforded him or her more practical and marketing experience within the agricultural field. While this statement may be true, the principle researcher's study found that younger employees from all enterprise were elected to managerial positions because of bettering schooling and awareness of new technology. For example, Enterprise C elected a relatively young employee among its entire employees because of the public school education and understanding about fluctuating coffee prices across the global market. This study may imply younger generations in Guatemala are receiving better education than previous age groups. Burton (2006) highlighted the physical activities agriculture requires its employees to undertake. Hynes et al. (2009) added that age affected the amount of work completed by an employee. The principle researcher's findings were congruent with both statements. Enterprises A and B spent more time completing their production tasks with more employees than Enterprise C's younger staff. Not to mention, several elder employees from Enterprise A and B terminated their working contracts because of the arduous work.

Implications and Recommendations

The study sought to understand the types of characteristics employees possessed

that baring economic success for a compost micro-enterprise. Implications were inferred by the observations of enterprise operations and responses collected from participants of the study.

The gender of an employee could be used to the micro-enterprise's advantage. Women may reach more consumers than the typical farmer. By modifying the amount of compost sold to other women who may only have need compost for home gardening. Additionally, if a female headed her household, inexpensive labor could be sourced from family members to run operations. Men, who typically have occupations involved with agriculture, should be viewed as a key asset and a credible source for potential buyers to confirm the efficacy of compost.

Different occupations offer different benefits to micro-enterprises. Non-agricultural occupations such as carpentry and mechanics are beneficial to a micro-enterprise. With these occupations and their skills, costs may be mitigated to construct a micro-enterprise's operational grounds and machinery can be service and repaired. An agronomic background may admit an employee to collect raw material from a colleague's farm or offer insight of other free available inexpensive material. Additionally, an employee who was a farmer could relate to consumers who may purchase compost. Their previous experience with fertilizers grants them insight about consumer fears and desires.

An employee's age is crucial if it correlates to their physical health. Employees with limited physical capabilities may only deter production of compost rather than help it. While many employees may want to participate during the physical operations of compost, it is younger and able-bodied laborers must be used and be left uninterrupted by slower labor.

A critical understanding of how each characteristic affects a micro-enterprise will allow extension agents to advise and orient a labor force for a micro-enterprise more effectively. Readily available skills must be assessed prior to initiation of operations. The benefits offered by certain characteristics should be informed to all employees to determine if they themselves are aware of the potential they could offer to a compost micro-enterprise. Inquiry and evaluation of all traits present among employees should bring about the possible realization that financial opportunities, ample and free raw materials, and potential markets are available based on these traits.

EXPLORING PROFITABILITY OF COMPOST MICRO-ENTERPRISES IN CHIMALTENANGO, GUATEMALA: A STRAGEGY FOR INTERNATIONAL DEVELOPMENT

Introduction

Micro-entrepreneurship has been used by international organizations as an extension tool to provide alternative incomes for poor and economically vulnerable populations (Vargas, 2000). When any practice is applied to a micro-enterprise, such as composting, the success of that enterprise lies in accounting for the various inputs needed to operate its production. In the field of composting, close attention must be paid to inputs involving organic raw material which decomposes in such a way to produce natural fertilizer (United States Environmental Protection Agency, 1995). Traditionally, high-level business performance measures such as profit, growth and a large range of other financial measures supported return on investment (Bititci, 1994). Birks, Fluitman, Oudin, & Sinclair (1994) explained the "issue of costs within micro-enterprises is complex and should be considered not only in terms of fees but also in terms of payments in any kind, such as entry and exit presents, and the duration of the apprenticeship" (p., 1). When an enterprise has failed to account for its various inputs and consequent output, it has become unsustainable because it has not satisfied (Environmental Protection Agency, 2011) basic economic, social and security needs presently and for its future.

Statement of the Problem

The capability of a micro-enterprise to obtain profit relies upon the pivotal step of understanding its necessary inputs. Accounting for these costs allows entrepreneurs to

realize whether or not they possess sufficient funds to operate their enterprise. Additionally, these funds must be determined if they will produce enough output to return a significant income for their livelihood and future investments into that same enterprise. Compost micro-enterprises are a unique business in that their formula and array of materials, as well as their operational grounds, determine their profitability. This study examined compost micro-enterprises of the Chimaltenango, Guatemala region and their total inputs and outputs in an effort to document raw material, labor, energy, transport and packaging costs.

Literature Review

Investigating the economic viability of a compost micro-enterprise requires first a versed knowledge of the economic and scientific terms involved with agricultural entrepreneurship. Within this understanding of terms accompanied by a thorough literary review, three pertinent subjects become apparent. Three obstacles must be accounted for before a micro-enterprise is able to project its costs, revenue and net profit: a) access to affordable labor and market awareness, b) raw material costs, use, and its projected output and, c) the operational costs to convert these inputs into profitable returns.

Affordable Labor and Market Availability

The first subject a micro-enterprise must account for is the availability of labor and markets. A number of barriers can and do thwart a compost micro-enterprise's ability to obtain ample and affordable laborers as well as entrée to a copious quantity of consumers. The consequences of these barriers are indicated in a micro-enterprise's quantifiable losses (i.e., negative profit). While micro-enterprises may have access to

material for production or available space for these operations, these enterprises are still faced with potential high labor costs and minimal markets for their product.

Labor Cost Barriers

Haggblade, Gelson, and Tembo explored the financial detriments affecting returns from soil fertility technologies such as composting. The study first collected data about the amounts of labor and time put forth to produce and distribute compost over crops. This significant input was stated by Haggblade et al. (2004) as a barrier to farmers who wanted to use such a technology because they suffered high labor costs for adopting such practices. On several farms in Benin, a farmer's entire labor force was needed to disperse 2000 kg of compost, only to find their maize yields increased by 1% initially. Essentially, a farmer's failure to determine overhead costs associated with using this type (i.e., manual labor) of overhead, lead to financial losses and the inability to invest further in such technologies.

In a similar study, O'Brian, O'Donovan, Gleeson and Dermot (2004) compared different dairy farms' profitability based on to their level of production and labor supplied. O'Brian et al. (2004) presented certain cases of highly productive agricultural enterprises suffered large overhead costs associated with labor use. For example, "While New Zealand farmers produce[d] three times more milk per hour than Hungarian farmers…the labour costs per kg of milk [were] similar in both countries due to the low wage rates for farm labour in Hungary" (p. 2). Even though labor may be more productive, its high cost cancels out profits.

Consumer Market Knowledge

In addition to labor costs, it is critical that non-local market demand of a micro-enterprise's product be understood. Alam, Hossain, and Zaman (2010) explained prevailing factors affecting a micro-enterprise from becoming profitable and sustainable. One of the sections in this article stressed the importance of micro-enterprises being educated about the amounts their foreign markets purchased from them. In a similar study, Orr and Orr (2002) continued by explaining how non-governmental organizations sought to disseminate market knowledge to micro-enterprises so they could determine their wholesale turnovers in foreign markets. Orr and Orr (2002) calculated that foreign markets accounted for 30-50% of the wholesale turnover in Malawi's southern region. This region was heavily populated by micro-enterprises; thus, much of a Malawi's micro-enterprise's income was received by a foreign market. While micro-enterprises were not aware of the location where their large portion of returns resided, the authors felt it was important for micro-enterprise to understand the amount of products these markets purchased. "Through awareness…" and "…sound business plans…" (Alam et al., 2010, p. 5) products can be curtailed to consumers from these purchasing markets.

Raw Materials Used and Their Output Profitability

After analyzing the financial barriers that a compost micro-enterprise could face, a more complete understanding must be gained regarding the types of inputs (i.e., raw material) and their relative costs used to ensure its sustainable output and financial return (Vukobratović et al., 2008). A thorough assessment of raw material used for compost production entails summing the financial costs of each raw material, the amounts needed

to generate a quality product, and their yielded output after decomposition. Fundamentally, the quantity of compost yielded by production will assess the gross profit. As a final note, the types and amounts of the raw materials used for compost can result in its efficacy when applied to crops; thus, impacting the number of purchases for that product based on the level of quality (i.e., macronutrient levels).

In a composting study, Vukobratović et al., (2008) evaluatedthe quality of compost was measured against different amounts and combinations of raw materials and effective microorganisms (e.g., straw and manure versus straw, manure, and effective microorganisms) used. The decomposition processes varied depending on the time necessary for raw material to decay, pile size and application of water (Vukobratović, 2008). The researchers determined the efficacy of a raw material-formula and the decomposition process administrated by its yielded physical, chemical and biological composition (e.g., percent vigor, percent respiration rate). In conclusion, a cost-benefit analysis inferred it was economically more viable to add or use more expensive raw materials (i.e., manure) because it compensated for a higher quality product and possibly a wider range of crops.

Several studies reported the cost of raw material was of minimal concern due to its abundance; however, the type of raw material used occasionally affected the views of a micro-enterprise's product negatively (Zurbrugg, Drescher, Patel, & Sharatchandra, 2004). As experienced in the rural villages of India, compost micro-enterprises flourished from the need to aid sanitary dilemmas in the country, but the abundant free raw material tainted the views of a product because of its inconsistent outcomes (Zurbrugg et al., 2004). This study compiled labor group populations (i.e., number of households)

participating in composting cooperatives and the decomposition times (i.e., weeks) administered upon urban waste. Many financial advantages for compost micro-enterprises arose in India because of minimal overhead (i.e., large community involvement, free raw material), but the raw material used decreased consumer purchases.

Operation Costs of Those Inputs

The final aspect that must be considered in a compost micro-entrepreneurship is the operational expenditure required to produce and transport compost.

In an article entitled "Composting in the Philippines" (1996), a development project emerged when a large-scale enterprise needed assistance from micro-enterprises to aid in the sorting of refuse. Micro-enterprises were permitted to enter a waste site to collect any organic material they desired for composting (Lapid, Ancheta, & Villareal, 1996). The micro-enterprises in turn benefited by eliminating the operational expense of raw material delivery. Also, Okorley, Zinnah, Kwarteng, and Owens (2001) reported how transportation costs significantly affected other rural persons conducting their micro-enterprises. An "…important constraint mentioned [by entrepreneurs] were the high costs of…transportation…" (p. 1).

The Philippines was not the sole region that used compost micro-enterprises as a public works management tool, but nations all across Africa have implemented similar programs. Flury and Geiser (2002) described the role of managing operational costs by African community development organizations that promoted sustainable natural resource management. The study noted how operational costs increased dramatically for micro-enterprises when the mode of transport (i.e., hand-drawn carts) used for collecting

and delivering material were poorly constructed for the type of work/terrain and overlapped during their collection routes. In an agricultural rehabilitation project funded by the World Bank, Achuonjei and Jose Da Cruz (2003) also stressed the financial importance of having functioning roads that facilitated transportation to and from market places.

Much compost micro-entrepreneurial research has been published about the Southern Asian regions. The majority of these countries sought solutions to assist with their waste management challenges. Additionally the majority of studies located in this region examined the practice of composting itself and its returns on farmland, not in a production operations such as micro-enterprises. Furthermore, these studies typically involved extension agents sampling farmers as their participants. Minimal literature can be found analyzing non-farmers involved with compost micro-enterprises, especially in Central America. While literature notes micro-enterprises cover the region of Latin America, marginal works can be found about compost micro-enterprises in Guatemala and more so, in the region of Chimaltenango.

Theoretical Framework

The theoretical framework was based upon inputs and outputs associated with compost micro-enterprise operations. The literature revealed numerous physical and financial costs, obvious or unseen, faced by compost micro-enterprises. Each study justified the reasoning for quantifying the variables it did for the purpose of determining if a micro-enterprise's operations were profitable. There are a number of quantifiable variables the research stresses to account for when determining the economic sustainability of a compost micro-enterprise. "It is therefore, obvious that the social

climate and agricultural support activities such as access to credit, production loans, favourable tenure system, availability of markets, farmer resource centers and many more production factors could play a vital role in agricultural productivity…" (Nompozolo & Igodan, 2002) such as composting. The variables this study used to determine the economic sustainability of a micro-enterprise were labor, operational and raw material costs. After amounts of raw material needed for a specific formula are found, the input costs are multiplied by the quantity and summed to determine the total cost spent by a micro-enterprise. An integral part of determining an enterprise's profit is to project output (Alam et al., 2010).

Labor Cost

An important aspect of compost entrepreneurial research and its capital expenses are the labor costs that are incurred during its operations. "The level of capital costs required is dependent on the farming system and the climate" (O'Brian et al., 2004). Haggblade et al. (2004) and O'Brian et al. (2004) explored returns on investment when highly productive or protracted manual labor was used. Neither investigation, as most research involving compost entrepreneurship has illustrated, had analyzed the productivity of laborer who were not farmers or the cost mitigated by using machinery. Nevertheless literature advised further studies to present the costs of using manual labor considering, much of the prospective rural enterprises will not have funds to afford technology to replace it.

Operation Costs

The literature also made evident that capital costs, such as labor, were heavily affected by the tasks they conducted. Lapid et al. (1996) organized production activity

costs with compost into three processes entailing; the sorting process, the composting process and the refining process. The expenditure of labor and time spent to complete each specific task has little been explored among small-scale enterprises. Not to mention, minimal analysis has been conducted about costs associated with each process including transport of input and output (i.e., sorting process), energy cost for transport and machinery use (i.e., composting process), and the packaging of products (i.e., refining process). Accounting for these costs was argued as of great importance, especially if this type of entrepreneurship were to be established in areas that did not have an efficient transport infrastructure for raw materials to be collected or products to be delivered to markets (Flury & Guiser, 2002).

Raw Material Cost

The types of inputs that were processed by the labor to make compost were illuminated as well. Vukobratović et al. (2008) conducted a cost-benefit analysis when various types of raw material were used. Additionally, Zurbrugg's et al. (2004) recorded specific quantities of raw material (i.e., kg/day or week) used to produce compost and the quality it yielded (i.e., physical and biological components). A thorough examination of the physical or biological components of a micro-enterprise's finished product is important when determining the consumers' views of compost's relative advantage (Rogers, 1995). From an economic stand point; the variable of relative advantage influences the amount of sales that will be made. Before this evaluation occurs, however, output should be determined to measure differing amounts of compost yielded based on the amounts of raw materials used. It is necessary to put forth effort in quantifying specific amounts of output produced from specific amounts of input to present the

financial efficacy of different formulas.

Gaps of the Literature/Need for Study

The literature revealed that composting has become a practical development solution for alternative income streams in Southeast Asia and Africa. The collection of literature involving compost entrepreneurship has been dominated by these specific regions and purposes. This study attempted to sample compost micro-enterprise groups that were not funded for sanitary purposes and found it vital to fill the gap of research that has yet to investigate Central American regions. It was found necessary to gauge input costs based on the raw materials used for composting within Guatemala's agroecological location.

This study observed and analyzed all inputs associated with compost micro-enterprises to identify their costs. The employees were asked about the types and amounts of inputs used in addition to the compost produced from them.

Context of Study

Guatemala is separated into twenty-two administrative districts known as *Departamentos*. The *Departamento* of Chimaltenango is located east of the *Departemento* of *Guatemala*, home of Guatemala City. Over 400,000 persons populate Chimaltenango. A large fraction of the population is involved with the practice of agriculture for employment and sustenance. The typical farmer in the region intercrops corn and bean varieties for their own consumption. Additionally, farmers cultivate cabbage, broccoli, strawberries and snow peas to generate a supplementary income. While yields have visibly fallen, little education is present among the community about the dangers of the overuse of pesticides and chemical fertilizers, as well as their

subsequent effects on soil-bioactivity. Consequently, the benefits of high soil-bioactivity through the use of compost are minimally recognized and/or overshadowed by the overwhelming marketing of synthetic fertilizer.

Compost micro-entrepreneurship, much less the concept of organic fertilizer, is a relatively new income stream brought to the Chimaltenango region several years ago by international development organizations. Education of the innovation's practice and its business model were assisted through governmental, non-governmental and agricultural extension entities. Information of the innovation's educating parties and its profitability were mainly diffused through female social networks and later by agricultural (primarily coffee growers) and political networks. These types of micro-enterprises are formed in rural villages by independent associations (e.g., occupational housewives) as well as by coffee cooperatives. These associations and cooperatives benefit by producing larger volumes of compost than they would individually. They receive funding and technical assistance once officially established as a micro-enterprise, from governmental and international organizations to improve their level of production.

The international organization named AGTEC offers financial and training assistance to interested agencies desiring to establish a compost micro-enterprise. The training assistance involves field workshops entailing strategies to select and process organic raw material into compost. The administered regimen AGTEC teaches its micro-enterprises to use in order to produce compost is as follows: a 2:1 pound ratio- two pounds of green or dry material applied for every pound of manure are applied. A solution of microorganisms and water (1:5 Liters) should be applied to the piles to assist in the decomposition process. By adhering to this formula and the practices extended by

AGTEC staff, an effective organic fertilizer is made for commercial use.

The fertilizer market of the region is very dynamic because of the types of fertilizers sold and the types of farmers purchasing them. International synthetic producers dominate Chimaltenango's fertilizer market. These fertilizers are referred to as chemical fertilizers. One 100-pound sack of synthetic fertilizer is priced between 230 and 300 quetzals ($30.66US to $40.00US) as compared to the organic fertilizer sold by micro-enterprises, which is priced between 40 to 45 quetzals ($5.33US to $6.00US). Synthetic fertilizers are typically sold by large agricultural depots and governmental extension agents can be influenced by chemical companies that are affiliated with the government. Compost, or, as it is called by the population, organic fertilizer, is either sold locally from its operational grounds or in its business's local farming markets. Synthetic fertilizers are the preferred choice for the reason that benefits are promptly visible and primary nutrient composition (i.e., nitrogen, phosphorus, potassium) is denoted. This type of input makes up a large cost for a farmer's budget because it is needed to produce significant yields in nutrient-deficient land.

Purpose and Objectives

The purpose of this case study was to analyze all necessary inputs of compost micro-enterprises and their relative output within the region of Chimaltenango, Guatemala in order to determine profitability. The specific objectives were as follows:

(a) Quantify all costs associated with different types and amounts of inputs required for a compost micro-enterprise as well as their outputs,

(b) Calculate amounts of raw material and total cost required to produce one sack of compost from a micro-enterprise,

(c) Evaluate the economic sustainability of a micro-enterprise concerning its costs of production and output through various production methods administered.

Methods

Design

Case study research was used in this study to identify and quantify variables of input and calculate their resulting output. “The purpose of a case report is not to represent the world, but to represent the case” (Stake, 2005, p. 460). Numerical data was collected via structured oral interviews, individually and in groups, to gather the total cost and amounts of inputs used to produce a reported amount of compost. These costs were monitored within a single six-week regiment to allow the necessary time for decomposition to occur and all processes to be conducted. The costs included types and amounts of raw material (i.e., green, dry, manure) and capital (i.e., labor, transport, energy, and packaging) used to produce compost. The group interview protocol was developed based on the literature to account for all potential costs to be incurred during a micro-enterprise’s operations.

Population

Individuals and their micro-enterprises included in the sample were identified by the Texas A&M University Organization (AGTEC), which was funded by a USDA grant. This type of sampling afforded the researcher to meet not only entrepreneurs, but presidents, secretaries and treasurers of these enterprises that were able to provide ample information about their micro-enterprise’s revenue and inventory records. Consequently, a purposive sample consisting of three micro-enterprises were identified. Information regarding the population of laborers used, size of operation grounds to conduct

production, sexes of participants, and ages of the employees in each micro-enterprise were collected. Micro-enterprises were coded according to their location, Micro-enterprise A, Micro-enterprise B, and Micro-enterprise C. The principal investigator assigned respondents with a random number with their enterprise code to ensure confidentiality.

The 24 selected participants were identified and interviewed because of their continuous membership and participation in their respected micro-enterprises. The information collected by the researcher was not solely from one enterprise employee but rather information collected from multiple individuals and reconfirmed by many, if not all, employees in that enterprise. The principal researcher acted as an interviewer gathering information about the enterprises operations.

Data Collection

The fieldwork was conducted over a one-month period during July 2011. The data were gathered in the local language, Spanish, translated into English by the researcher and the Executive Secretary for Trinidad's designated Consulate for Panama. The Executive Secretary had an Associate's Degree of Spanish from the University of the West Indies and taught secondary Spanish as well. The principal researcher was an intermediate Spanish speaker and was accompanied by native speakers from the staff of the Texas A&M University to ensure reliability of translation. The study focused on citizens of a specific region (Chimaltenango, Guatemala) and more specifically employees of the enterprise who participated in compost training activities funded by the United States Department of Agriculture (USDA).

Data were collected through structured oral interviews of individuals and groups. These interviews were directed by a set of 13 questions in a specific order. Questions assisted the principal researcher to gather information first, about the number and type of raw materials used in a 6-week cycle and their quantities (e.g., number of 100-pound sacks of manure used). Second, the total capital spent on infrastructure (i.e., building the operational grounds) and the amount of overhead (i.e., days of labor spent by each laborer, cost of transport, gallons of energy and costs of sacks for packaging) required to process raw material was recorded within one six-week cycle. An inquiry was made regarding how each overhead variable was purchased (e.g., if labor wages were paid by the day, manure was purchased by the truck bed load). The total overhead costs could be determined by the quantity multiplied by the price information ascertained in this set of questions. Third, the total amount of production by an enterprise (i.e., 100-pound sacks of compost) was confirmed by the researcher through verbal responses and visual representation of total sacks produced by one six-week cycle. The price for one sack of compost was collected as well. Finally, the revenue was calculated by multiplying the price of one sack by the quantity of sacks produced by that enterprise. As a final note, all costs were recorded in Guatemalan currency (i.e., Quetzals). The currency transaction during July of 2011 for one US dollar was between 6.5 and 7.5 Quetzals. The Guatemalan currency was used when calculating costs and profits in the study.

Two enterprises (A & B) engaged in the oral structured interviews with their entire staff present. The first group-interview (Enterprise A) held was made up of ten employees. One individual from Enterprise A was interviewed on a one-to-one basis. The following group interview was conducted with Enterprise B comprising of nine

employees. One individual from Enterprise B was interviewed on a one-to-one basis. The final group interview collected information from the employees of Enterprise C. This group interview included five individuals (i.e., three employee and two hired laborers), representing a farmers' organization tandem compost micro-enterprise of 50 members. There were a total of 24 participants sampled as part of three micro-enterprises.

Multiple composting sites and methods of production were observed in the region for one month where the researcher interviewed participants, interned in rural communities, and observed their daily composting operations. Financial documents given to him by the international organization AGTEC were reviewed to document funds allocated to micro-enterprises for the purpose of erecting structures operate under, application of micro-organisms, and tools/machinery to conduct operations. After a thorough data collection, revenue was calculated to determine if economic sustainability was present in a compost micro-enterprise.

Data Analysis

Numerical data was utilized to determine the total cost accrued by a micro-enterprise to produce its given amount of compost. Its gross profit was determined by multiplying the total number of sacks (i.e., 100-pounds/sack) a micro-enterprise produced after six weeks by their sale's price. Third, net profit was calculated. "Net Profit is the difference between the total gross income from a venture and how much it has cost ('Total Cost') to market and produce that product (Lutz, 1993, p. 19). Total amount of raw material required to produce one sack of compost was ascertained by dividing the total amount of raw material-sacks ('Quantity') by total sacks produced ('Output'). Finally, Total Cost divided by Output calculated the total cost required to produce one

sack of compost. These last two calculations were compared to determine optimum operations and inputs used.

Observation of each micro-enterprise's actual operations and records from developmental organization (AGTEC) were collected to support the calculation of profitability. Observation by the principal researcher provided amounts and costs micro-enterprises did not explicitly state, but when asked, were confirmed.

Reliability and validity of this study were monitored through several methods, including member checking, triangulation, peer reviews, and prolonged engagement in data collection. Reconfirming information with all respondents in their group interviews, repeated visits, and reviewing similar categories within the principal researcher's documents among all micro-enterprises ensured triangulation. Raw data of amounts, interpretation of measurements and categories of materials were discussed with respected colleagues to confirm legitimacy.

Findings

Context

The output produced individually and total costs paid for individually by each micro-enterprise within a 6-week production cycle was recorded. All micro-enterprises under investigation were provided tools, molasses and effective microorganisms, and machinery on behalf of the international organization AGTEC. The tools included shovels, hoes, machetes, spades, latex gloves, rakes, backpack manual sprayers and wheel-barrels. Their amounts and costs varied. Each micro-enterprise was given a machine to grind raw material used to make compost. The molasses and effective microorganisms were used to break down raw material quicker than without their

presence. The machines donated to each micro-enterprise were Penagos Model TP-24: Grinders powered by Honda 13HP 3600RPM Motors for the purpose of grinding material. This expedited decomposition as well.

It is important to note all calculations made to quantify inputs in terms of 100-pound sacks are estimates at best. These figures must not be interpreted as exact numbers. The researcher was able to deduce the amounts of raw material used from figures given by recipients. Meaning, not all participants collected, received, or applied raw material through the use of 100-pound sacks. For example, some enterprises used bundles or truckloads of raw material. The researcher could infer how many pounds were being used by weighing bundles or figuring out the carrying capacity of wheel barrels and dividing these sums by 100 pounds to determine amounts of sacks used.

Micro-enterprises A and B were provided funds by the international organization to erect structures to conduct their composting operations under. Donated funds were provided in the form of building materials or moneys to be paid to contracted carpenters. The amounts of funds and materials varied. Further expenses to expand construction were spent by both micro-enterprises themselves. Funds for further construction were obtained through subsidized loans offered by local municipalities or net profit made by a micro-enterprise. Micro-enterprise C allocated donations from its members to erect their

composting their structure. Employees of the micro-enterprise were paid to construct the micro-enterprise's grounds, walls and roof.

It is important to note, this study sought to compile and quantify all costs incurred by a micro-enterprise specifically within a one six-week cycle. Since different micro-enterprises received different funds, materials and loans for building material from different parties, only direct costs associated with the 6-week production cycle were presented in the findings. These costs were collected but not calculated into the 'Grand Total Cost' for the purpose of keeping a homogenous collection method across all micro-enterprises.

Input

Tables 2 lists the type, prices, and quantities of each input used by a micro-enterprise and its output. The amounts of 'Total Cost' for the raw material, labor, energy, packaging and transport were summed to determine the 'Grand Total Cost' spent on inputs for an entire 6-week cycle.

Table 2
Micro-Enterprise Grand Total Cost, Gross Profit and Net Profit for Micro-Enterprise A, B, and C.

MICRO-ENTERPRISE A			
INPUT[a]	*PRICE*	*QUANTITY*	*TOTAL*
Manure[c]	3.54	20.00	70.83
Green Material[c]	10.00	8.33	83.30
Dry Material[c]	0.00	10.00	0.00
Transport[d]	25.00	6.00	150.00
Energy[e]	32.00	1.00	32.00
Packaging[f]	2.50	30.00	75.00
Labor[g]	40.00	26.00	1040.00
			Grand Total Cost: 1451.13
OUTPUT[b]	*PRICE*	*QUANTITY*	*TOTAL*
Compost Sack	45.00	30.00	**Gross Profit: 1350.00**
			Net Profit: -101.13
MICRO-ENTERPRISE B			
INPUT	*PRICE*	*QUANTITY*	*TOTAL*
Manure	5.00	2.00	10.00
Green Material	0.00	10.50	0.00
Dry Material	5.00	6.00	30.00
Transport	0.00	0.00	0.00
Energy	36.00	1.00	36.00
Packaging	2.50	15.00	37.50
Labor	40.00	71.50	2860.00
			Grand Total Cost: 2973.50
OUTPUT	*PRICE*	*QUANTITY*	*TOTAL*
Compost Sack	45.00	15.00	**Gross Profit: 675.00**
			Net Profit: -2298.50
MICRO-ENTERPRISE C			
INPUT	*PRICE*	*QUANTITY*	*TOTAL*
Manure	8.50	96.00	816.00
Green Material	0.00	192.00	0.00
Dry Material	0.00	0.00	0.00
Transport	0.00	0.00	0.00
Energy	38.00	1.50	57.00
Packaging	2.50	180.00	450.00
Labor	65.00	12.00	780.00
			Grand Total Cost: 2103.00
OUTPUT	*PRICE*	*QUANTITY*	*TOTAL*
Compost Sack	40.00	180.00	**Gross Profit: 7200.00**
			NET Profit: 5097.00

[a]Unit of Price, Gross, and Total are measured by Quetzals (Guatemalan Local Currency)
[b]Unit of Output is measured by 100-pound sacks
[c]Unit of Manure, Green Material and Dry Material is measured by 100-pound sacks
[d]Unit of Transport is measured by Trips made by a "Tuc Tuc" (equivalent of a U.S. Taxi Service)
[e]Unit of Energy is measured in Gallons
[f]Unit of Packaging is measured by sacks that have a holding capacity of 100 pounds
[g]Unit of Labor is measured by a One-Day-Shift completed by One Employee.
Note: All data were estimated. Number should not be treated as exact figures.

Raw Material

Employees from each micro-enterprise first were asked to state the types and amounts of each raw material used to produce compost within a 6-week cycle. Typically, the employees were not aware of the exact amounts ('Quantity' of Manure, Green Material, and Dry Material) used to produce the yields of compost they were receiving from the raw material applied. Also, the amount of raw material sometimes purchased by a micro-enterprise was delivered in an amount larger than needed for one six-week cycle. However, each micro-enterprise was extremely cognizant of the number of piles of grinded and mixed material they made during a 6-week cycle. Furthermore, each micro-enterprise had an employee who recorded the costs ('Price of Manure, Green Material, and Dry Material) and amounts of raw material delivered.

The principle researcher inquired of the amounts of raw material that equated to one pile. Each micro-enterprise had a regimented formula of the amounts of each raw material applied to each pile. The principle researcher deduced the amount of the total raw material used in one six-week cycle by multiplying a micro-enterprise's regimented formula for each pile by the number of piles they made in one cycle. The total amounts of each raw material were then multiplied by the price charged to the micro-enterprise for that material ('Cost' of Manure, Green Material, and Dry Material). It should be noted that some micro-enterprises added ash or kitchen waste to their piles, but these amounts were marginal compared to the amounts of manure, green material and dry material added.

Transport

All micro-enterprises were asked if there were costs associated with the delivery of raw material to their location of operations and/or costs associated with transport of final product to the consumer. All micro-enterprises sold their material from the locality of their operations; however, micro-enterprise A additionally vended its product in a local farmer's market. Micro-enterprise A required transport to deliver their material to a local market to vend its compost. All micro-enterprises used transport to deliver a raw material they did not have, but these costs were included in the raw material costs because their venders included the cost of delivery in the final price. Micro-enterprise A. This micro-enterprise utilized local taxi transport to deliver its bags of compost. Each week, the President traveled to their local farmer's market to vend as many bags she could. The taxi, known as a "Tuc Tuc" could only carry 12 sacks at one time. One round-trip was charged at a flat rate ('Price' of transport). If Micro-Enterprise A carried one load of compost to and back from the market in a six-week cycle, the principal researcher calculated the 'Total Cost' of transport by multiplying the 'Price' by six. It should be noted that mo charge was administered to have a table at the farmers market because the table was used during a weekday when venders were not charged by the municipality to vend their products.

Energy

Each micro-enterprise used a Penagos Model TP-24 Grinder during their operations to grind raw material. The Grinder was powered by standard unleaded gasoline. Gasoline was classified under the title of energy. Each micro-enterprise kept a detailed record of their expenditure of the amount used in one-cycle. Their amounts

(‘Quantity” of Energy) were multiplied by the price (‘Price’ of Energy) charged by their local gas station to determine its cost (‘Cost’ of Energy).

Packaging

All micro-enterprises used 100-pounds coffee or fertilizer sacks. The sacks were sold by at a standard price across the nation of Guatemala. Bags were classified under the title of energy. Each micro-enterprise kept a detailed record of their expenditure of the price of one bag. Their amounts (‘Quantity” of Packaging) were multiplied by the price (‘Price’ of Packaging) charged by their local gas station to determine its cost (‘Cost’ of Packaging).

Labor

The micro-enterprises then were asked about the amount of labor and salaries paid to the employees to produce compost. The principal researcher first asked the participants to define the types of tasks needed to produce compost so he could calculate the amounts of employees and time needed to complete them. Each micro-enterprise defined their production schedule by completing four tasks. They included: grinding of raw material, mixing of raw material, aerating the piles, sifting compost and packing of compost. Each task demanded a specific number of employees and days to complete them. For example, aerating the piles may only demand two employees for one day, but if the task was required to be fulfilled once per week (which typically occurred), this task amounted to twelve employee-working days within a 6-week cycle. In essence, each task required a different amount of employees and days to complete its duties. Each micro-enterprise paid their employees by day; thus, a salary was paid by the amount of days worked by an employee. The principle researcher multiplied daily shifts (‘Quantity’ of Labor) by the

salaries (‘Price’ of Labor) paid to those workers for their single day of work to determine the total amount of labor expenditure (‘Cost’ of Labor).

Output

An enterprise’s ‘Output’ was determined by the ‘Quantity’ of 100LB Compost Sacks produced from one six-week cycle. An enterprise’s ‘Gross Profit’ was determined by multiplying the total number of sacks of compost it produced (‘Output’) after one 6-week cycle by it’s selling ‘Price’. The ‘Net Profit’ was calculated by Subtracting total ‘Total Cost’ from ‘Gross Profit’.

Financial Cost Per Sack

Table 3 demonstrates the ‘Grand Total Cost’ a micro-enterprise spent to produce one sack of compost. The ‘Grand Total Cost’ of each micro-enterprise was divided by its relative ‘Output’. The calculation to determine the ‘Cost To Produce One Sack’ is know as the coefficient cost per unit. If micro-enterprises were to vend their Compost by the price listed under ‘Cost To Produce One Sack’, the revenue made from sales would cover all overhead costs.

Table 3
The Total Expenditure Spent by Micro-Enterprise A, B, and C to Produce One Sack of Compost

Micro-Enterprise	**Grand Total Cost**[a]	**Output**[a]	**Cost To Produce One Sack**[a]
A	1451.13	30.00	48.37
B	2973.50	15.00	198.23
C	2103.00	180.00	11.68

[a]Grand Total Cost, Output and Cost To Produce One Sack are figures of Quetzals
Note: All data were estimated. Number should not be treated as exact figures.

Table 4
Gross Margin Received by Micro-Enterprise A, B, and C per Sack of Compost Sold

Micro-Enterprise	Price Sold Per Sack[a]	Total Cost to Produce One Sack[a]	Gross Margin To Produce One Sack[a]
A	45.00	48.37	-3.37
B	45.00	198.23	-153.23
C	40.00	11.68	28.32

[a]Price Sold Per Sack, Cost To Produce One Sack and Gross Margin to Produce One Sack are figures of Quetzals
Note: All data were estimated. Number should not be treated as exact figures.

Table 4 compares the 'Price Sold Per Sack' by an enterprise subtracted by the 'Cost To Produce One Sack' of their compost to display the net profit it receives for each sale of one sack of compost ('Gross Margin To Produce One Sack'). Essentially the table presents an enterprise's return on investment per sack of compost.

Physical Cost Per Sack

Table 5 exemplifies the amount of raw material (i.e., 'Total Input (Sacks)) a micro-enterprise used to produce their 'Output'. The 'Total Input (Sacks)' was divided by the 'Output' to calculate the 'Physical Cost To Produce One Sack' of compost by each micro-enterprise.

Table 5
Total Pounds of Raw Material Used by Micro-Enterprise A, B, and C to Produce One Sack of Compost

Micro-Enterprise	Total Input (Sacks) [a]	Output (Sacks)[a]	Physical Cost to Produce One Sack[a]
A	38.33	30.00	1.28
B	18.50	15.00	1.23
C	288.00	180.00	1.60

[a]Total Input, Output and Physical Cost To Produce One Sack are figures of 100-pound Sacks
Note: All data were estimated. Number should not be treated as exact figures.

Limitations of the Study

Limitations to this study do exist. The three micro-enterprises had similar relationships with AGTEC such that materials were received from this international organization. These donations not only aided the micro-enterprises' by reducing the time needed to gather funds for initiating operations (e.g., construction materials were given to erect the operations units), but expedited their decomposition process by receiving machinery and tools free of charge. An important financial contribution to note was that each micro-enterprise received a Penagos Model TP-24 Grinder powered by a Honda 13HP 3600RPM Motor totaling to 28067.96 quetzales. These donations would limit other compost entrepreneurial research because the enterprises in this study were placed in a particular situation where time needed to gather capital was fairly short and manual labor was replaced by machinery for some tasks.

Micro-enterprises were confined to the cement structures they conducted their operations upon. Thus, some composting units permitted large quantities of raw material to be processed because of the size of the property the operational grounds were located

on. Micro-enterprises A and B had the ability to purchase collect more raw material but were unable to do so due to space constraints.

Financial and time restraints only allowed the principle researcher to revisit two micro-enterprises several times to confirm data collected. As a final note, the researcher acted as the instrument in this qualitative study. It is arguable that biases could have occurred based on the previous literature read about employee characteristics and profitability. That is to say, previous knowledge known about compost micro-enterprise may have unintentionally directed the researcher to investigate specific areas. Calculations made to collect numerical data regarding input and outputs as well as themes identified from employee characteristics are solely based on the responses given by participants and the instrumentation administered by the researcher.

Conclusions

The access and use of inputs varied among micro-enterprises, which resulted in differing amounts of output and profits made. Each input affected a micro-enterprise's profitable outcome differently based on its availability, price and amount. The quantified inputs and relative output of a micro-enterprise were crucial in determining if its operations could sustain its future economic endeavors.

Raw Material

Findings confirmed that a micro-enterprise could increase its margin of profit by eliminating the costs of raw material. Some micro-enterprises received raw materials free of charge either because of its abundance or disregard for value. Findings partially agreed with Zurbrugg's et al. (2004) argument where abundant raw material was associated with alleviating overhead costs. The findings exemplify how access to free abundant raw

material allowed Enterprise C to produce an inexpensive sack of compost and increase its margin the most among other enterprises. However, Table 5 revealed how the study disagreed with Zurbrugg's et al. (2004) findings. Enterprise C's compost formula required more of its abundant green material (i.e., coffee mucilage) to produce one sack as compared to the other enterprises. Table 5 illustrated how Enterprise C's profit was not completely associated with free material, but rather another variable. Enterprise B had the most effective formula with regard to large output by using dry corn cane, strawberry leaves and cow manure. Enterprise B used green corn and bean leaves, dry corn cane and cow manure. The data suggested that if Enterprise C added dry material to its formula, output would be increased; thus, more revenue would follow by having more product to vend. It was conclusive that while an enterprise may gain more profit because of free ample material, a thorough evaluation of the amounts yielded from types of raw material is needed prior to production.

Prices of raw material varied because of their availability and a micro-enterprise's relative locality to them. Among the many raw materials used (illustrated in Table 6), manure was the most expensive and crucial raw material to utilize when producing compost. The data concurred with Vukobratović's et al. (2008) argument that while manure may be expensive, its application to the compost formula was necessary to retain consumers. Manure was confirmed as the highest expenditure of raw material incurred among all micro-enterprises.

Table 6
Total Expenditure Spent on Raw Material alone by Micro-Enterprise A, B, and C to Produce One Sack of Compost

Micro-Enterprise A	**Price**[a]	**Quantity**[b]	**Total**
RAW MATERIAL			
Manure	3.54	20.00	70.83
Green Material	10.00	8.33	83.30
Dry Material	0.00	10.00	0.00
			TOTAL: 154.13
			154.13Q/30.00 Sacks = 5.10Q Per Sack
Micro-Enterprise B	**Price**	**Quantity**	**Total**
RAW MATERIAL			
Manure	5.00	2.00	10.00
Green Material	0.00	10.50	0.00
Dry Material	5.00	6.00	30.00
			TOTAL: 40.00
			40.00Q/15.00Sacks = 2.67Q Per Sack
Micro-Enterprise C	**Price**	**Quantity**	**Total**
RAW MATERIAL			
Manure	8.50	96.00	816.00
Green Material	0.00	192.00	0.00
Dry Material	0.00	0.00	0.00
			TOTAL: 816.00
			816.00Q/180.00Sacks = 4.53Q Per Sack

[a]Price is measured by Guatemalan Currency (Quetzal)
[b]Quantity is measured by 100LB Sacks
Note: All data were estimated. Number should not be treated as exact figures.

Transport

Transport costs were not the most significant expenditure spent by all micro-enterprises, but had the potential to increase and hinder future profits. Enterprises with enclosed operations (i.e., a composting operation not visible and accessible to potential

consumers) faced larger transport costs due to delivery expenditures endured weekly to and from a market as opposed to an enterprise that had open operations permitting it to vend in situ. This point confirmed Okorley's et al. (2001) findings where transportation costs significantly affected rural persons needing to carry their product to urban markets. Enterprises B and C produced compost in a location surrounded by a well established infrastructure (i.e., paved roads) permitting consumers to collect their material with vehicles. Additionally, Enterprise B and C collected their green material in close proximity to their operations, which did not require delivery costs for materials needed. Transport costs were suffered by Enterprise A because of its enclosure and ill supported infrastructure. These findings further supported Achuonjei and Jose Da Curz's (2003) conclusions that functioning roads facilitating transportation to and from market places sustained rural enterprise profits.

Energy

Energy costs remained generally similar among all micro-enterprises, fluctuating minimally because of local unleaded gas prices. Enterprise A and B only produced 16% of Enterprise C's total output with the same amount of energy. It is debatable to confirm if technology was inefficiently being used by Enterprise A and B. Each enterprise used different types and amounts of raw material. The amount of energy required for machinery (i.e., grinder) to process different materials is unknown. If Enterprise A and B were using technology inefficiently and suffering high energy costs from these actions, it would confirm arguments made by Flury and Guiser (2002) that entrepreneurs experience financial setbacks when technology used is not being operated at its optimal level.

Packaging

All enterprises needed 100LB fertilizer bags to place their compost in before sale. Costs accrued by enterprises varied upon their output. No sources were found specifically to validate the costs incurred by the packaging methods each enterprise carried out.

Labor

Labor was one of the largest determinants of profit because it had the ability to eliminate revenue completely. The data confirmed with the conclusions made by Haggblade et al. (2004) where when agricultural innovations, such as compost, required much manual labor, profits decreased dramatically. All of the employees from Enterprise A and B participated in the production process, while Enterprise C paid two skilled laborers to complete their entire operations. Enterprise A and B desired to pay their entire work force a salary once profit could be made; however, the findings explicitly state that if their operations and labor remained the same, financial returns would continue to be negative. Table 3 further showed that unless an enterprise's product is sold for a certain price, it will continue to receive negative returns. These findings opposed O'Brian's et al. (2004) statements where a small skilled workforce with high salaries and a large unskilled workforce with small salaries would produce the same output and their costs generally would be the same. In contrary, this study indicated that enterprises using unskilled labor did not produce as much compost and created large overhead costs compared to small workforces that were skilled.

Implications and Recommendations

The case study sought analyze all necessary inputs of compost micro-enterprises and their relative output within the region of Chimaltenango, Guatemala in order to

determine profitability within a six week cycle. Thus, it is important to recognize that the findings are context bound and cannot be directly transferred to a different context. However, implications exist among the findings when calculated to evaluate a micro-enterprise's operations.

All micro-enterprises in this study were cognizant of the amount of raw materials added to a single pile to produce compost, but none quantified the total amount of raw material used among all the piles. Subsequently, the expenditure spent on all these raw materials as well as the overhead used to process compost were not assessed by participants. Therefore, crucial financial information was not known or used to calculate the value of a single sack in means of raw material cost or total costs (e.g., labor, energy, packaging, etc.). These calculations implied three key financial insights for compost micro-enterprises; raw material yields, overhead correlations of labor type used, and cost mitigation associated with where it conducted its operations.

Different types of green and dry materials, complimented by manure, may yield more output than others. Dry corn cane seemed to be the most financially effective dry material to use. Dry corn cane was relatively inexpensive within the region and led to larger yields of compost when complimented with a green material and manure. However a formula only containing coffee mucilage as green material and manure (i.e., Enterprise C's raw material formula), demands 24% more pounds of raw material to produce a 100LB sack as compared to administering a formula with all three raw materials (i.e., green material, dry material and manure). Whereas a compost formula consisting of manure and coffee mucilage alone may have higher moisture and nitrogen percentages, exclusion of dry material within the formula will require larger quantities of raw material

(e.g., expensive manure) to produce a single sack and increased labor to process the additional raw material needed.

The quality of compost produced by each micro-enterprise varied depending upon raw materials used. The researcher noted that Enterprise C had a darker, heavier and more moist product compared to the other enterprises. In the final collection days, an analysis was being conducted by AGTEC to measure the pH and macronutrient levels of each micro-enterprise's compost. The micro-enterprises noted that their consumers were requesting such information based on the crops the compost was being applied to. Future micro-enterprises should measure their compost's pH and macronutrient levels to offer more information for their consumers so they feel less questionable about the product's efficacy in the field. The concept of long-term bioactivity and its benefits obtained from natural fertilizer were relatively unknown by the population; thus, they based compost's benefits according to measures (i.e., pH, nitrogen, phosphorus and potassium levels) they were familiar with.

A compost micro-enterprise's workforce entailing skilled, or rather, able bodied labor paid at a higher salary may be more economical than semi-skilled labor claiming a lesser salary. In this study, a larger labor force did not directly correlate to more work completed. Additionally, completion of tasks seemed restrained in a composting operation when the spatial size of the operational grounds was limited. Finally, enterprises encountered challenges when placing semi-skilled workers on the payroll who had limited capability of completing tasks (e.g., organizing and lifting 100LB tasks).

The construction of the manufacturing grounds for a micro-enterprise and its location indicated many financial outcomes. If a micro-enterprise's operational grounds

prevented the view of their venture, financial opportunities were possibly lost from potential consumers. Their situation may be exacerbated further if infrastructure is not accessible. Additionally, an enterprise may have to rely upon transporting their compost to a farmer's market that would render payment for services; in spite of sales not made. If a micro-enterprise was located in an area where raw material was available and vending was able to occur, transport costs could be mitigated. Moreover, labor and energy expended to collect raw material may be alleviated.

As new agricultural innovations are diffused to populations of developing nations, these technologies and ideas must first be determined if they are economically viable and consequently sustainable. Agricultural extension educators who direct newly initiated compost micro-enterprises must be advised to instruct the practice of composting to individuals, but more so the competence to evaluate its financial aspects. Adopters of this innovation must be educated in determining if their operations warrant a profit, which will be able to sustain a livelihood and the parties involved. If adopters are unwilling or unable to determine this concept, extension educators must be obligated to assist with quantifying costs, projecting output, and determining profit.

More specific subjects should be explored from this field including, efficient labor use, raw material formula affording ample output and high-quality compost, and other economic aspects that contribute to financial success. If the profitable outcome of a compost's practice cannot be predicted by its entrepreneur, the financial well-being of themselves and others may be jeopardized.

SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Summary

Current compost micro-enterprises and their employees are faced with the daily challenges of sustaining their operations. However, the way in which these quandaries of profit or productivity are dealt with vary based on the proposed strategies or solutions. In order to assist compost micro-enterprises, research must be conducted to outline detailed plans for economic sustainability according to its available resources, market knowledge and the employees it is supported by. This case study sought to describe a micro-enterprise's entire input inventory and output of a single six-week cycle as well as the positive impacts employees can have during and following that cycle. Rural residents of Chimaltenango, Guatemala and their respected micro-enterprises advised and funded by AGTEC served as the population for this study. The study included responses from twenty-four employees from three compost enterprises. Findings from the study revealed that although micro-enterprises were aware of the financial costs they incurred to begin their operations; little knowledge of the exact amount of output was actually known. Additionally, there was awareness of the positive impact employee characteristics had upon a compost enterprise's mission to conduct an efficient and economical operation, but little assessment or strategies were in place to utilize this knowledge.

Conclusions and Implications

The sustainability of a compost micro-enterprise lies in the strategy its members employ to utilize employee characteristics and input assessment. Failure to recognize potential advantages arising from employee traits and the availability of necessary

materials to produce compost leaves little room to plan an effective operation. The production of any product on a large scale must anticipate how positive financial outcomes will occur because profitability may not arrive as planned. If the revenue cannot be determined and/or made, compost micro-enterprise may fail to be a sustainable, much less a viable option for alternative income streams. The findings of the case study document the variables that impacted a compost micro-enterprise substantially during its operations in Chimaltenango, Guatemala.

Gender was a characteristic that affected the way compost production was managed. It was confirmed with substantial findings that women and men operated their micro-enterprises differently. Men were more emotionally autonomous from their micro-enterprise, and treated their enterprise more as a business, rather than a tool to learn more about agriculture. Women typically included as many laborers as possible (e.g., including family and friends), usually at lower salaries than men paid their workers. This fact seemed logical because women who ran households typically accessed inexpensive labor from their family (Burton, 2006; Rojas & Siga, 2009); however, this labor may be inefficient. Abundant labor did not equate to greater amounts of compost produced. Inexpensive labor as well, was not associated with more profit, but rather, large financial losses. Determining the physical and financial outcomes of labor used was a quintessential factor in projecting profit.

Skilled and able-bodied labor is needed to meet the demanding tasks of composting. A healthy workforce may not completely secure profits, but it will prevent truncation of physical operations (e.g., aerating piles) (Burton, 2006). While many members of a micro-enterprise may desire to participate in the micro-enterprise, the

inability to fulfill daily tasks will deter working operations and affect the able-bodied labor as well. Inefficient practices, as seen from this case study, can eliminate and even bring debt to an enterprise. Until compost is adopted fully by community members as an effective fertilizer and its relative advantage (Rogers, 1995) is recognized, it will remain being sold at its low current price. These prices cannot and will not cover high overhead.

Several jobs related to composting micro-enterprises were generally secluded to each gender's participation, especially in rural developing regions (Mayoux, 1995). This association dictated the types of social networks that were closed off or open to certain micro-enterprises. These social networks included an abundant amount of pertinent information, which could allow micro-enterprises to capture profitable markets, receive inexpensive inputs and most definitely- effective labor. Employment affected production greatly. Rural agricultural industries tended to demand the completion of time consuming and arduous tasks from its employees (Hynes et al., 2009). However, the majority of roles assumed by employees were not proven as a characteristic granting better formula or yields because of previous experience in an agriculturally related field. This conclusion differed from Stofella and Kahn's (2001) findings that compost's quality was dependent upon its agriculturally versed employees. Conversely, compost micro-enterprises comprised of farming individuals received the more profit but used more raw materials to produce compost. Once again, the ineffective use or even acknowledgement that different formulas determined different outputs was never recorded or monitored by micro-enterprises in Chimaltenango.

Farming backgrounds, however, were not entirely related to negative outcomes. Agricultural backgrounds positively impacted the number of social networks available to

them. Every enterprise that had an employee with previous or current agronomic involvement indicated privileged access to inexpensive and even free raw material. However, raw material was not plainly accessed, horizontal social networks were needed first to find the material and then to negotiate advantageous terms for the employee. Findings and conclusions made by Oleas et al. (2010) in Chimaltenango were reconfirmed regarding the social channels used by persons of similar backgrounds. More importantly the type of background afforded more beneficial channels than others, such as ones offering consumer knowledge (Hinrichs et al., 2009).

The construction of a micro-enterprise's operations grounds incurred the largest cost, but was the most limiting factor for future profit. The size and location of operations will inevitably influence all previous variables. Literature revealed that an employee's agroecological location would significantly affect their access to abundant material (Sseguya et al., 1999). Findings from this case study supported the comment that general geographic location and its surrounding infrastructure considerably affected access to consumers and markets. The size of operation was found as a limiting factor as well. The physical boundaries which compost is produced upon will inevitably affect the amount of raw material and its labor's working space to process it. As a final note, while security is necessary, if a micro-enterprise's operational unit is constructed in such a way that operations are not seen adoption of this new innovation relative to the region, can impede sales.

As observed, it is difficult to quantify an entire operations cost while managing and participating in the physical activities simultaneously. Yet, a standard instrument can be made for determining total costs that will be incurred by calculating the amounts of

raw material used and expenditure spent over one cycle. The nutrient capacity of compost is important to be mindful of. The quality of the product and value as compared to synthetic fertilizer can influence consumer demand (Vukobratović, 2008). Although, in terms of profit, the output received from a certain raw material formula may hold precedence over quality of its product. For example, if only a small amount (e.g., five sacks) of high quality compost is yielded from 1000 pounds of one type raw material, little return will be made. However, if a larger quantity of mediocre quality compost (e.g., 10 sacks) yielded from 1000 pounds from a different type of raw material, returns may permit salary distribution and continuation of operations. Therefore, the creation of an instrument will be necessary to project raw material formulas' output.

Recommendations for Further Research

Before advisement can occur, more research must be conducted about inputs and outputs of micro-enterprises within the region or who perform their operations under similar conditions (e.g., access to material, assistance). These investigations should validate, refute or elaborate upon the current study's findings. This case study was limited to an analysis of one six-week cycle from three compost micro-enterprises due to access and time constraints. An evaluation of additional six-week cycles would allow validation of output received from given inputs. For example, the inputs and output of eleven six-week cycles collected from each of the three micro-enterprises would offer a more substantial sample for quantitative analysis. On the other hand, one six-week cycle could be observed from thirty-one separate compost micro-enterprises. A sufficient number of enterprises with necessary data compiling their inputs and outputs could be tested in a quantitative study. Quantitative research could use levels of significance and

standard deviations to determine the most effective labor practices and optimal raw-material formulas. Additional research is needed to conduct a detailed scientific economic study based on the cost to produce compost. The current study revealed many of the costs to account for, but the findings are estimates at best. A thorough economic analysis must weigh and quantify more exact amounts of raw materials needed to produce a given amount of compost. Further scientific analysis must determine raw material macro-nutrient levels to establish which formulas will create the most well-balanced and high-bearing results. After which formula strategies are made, pH and macro-nutrient levels must be measured to determine if a specific compost's productive capability is one comparable to its conventional fertilizer competition. The principle researcher noted the texture of compost, but did not have sufficient instruments or knowledge of the soil to effectively rate the quality of compost from each micro-enterprise. A final economic analysis must calculate the compost produced by a micro-enterprise in means of financial worth as compared to conventional fertilizer to effectively price the product and should include pH and macronutrient analyses.

Studies must evaluate a sufficient number of cases (i.e., compost micro-enterprises or employees of compost micro-enterprises) to determine if the advantages associated with each trait studied persist. Other advantages may arise as well if a researcher observes compost micro-enterprises for longer time periods. Additionally, other characteristics affording the possibility of impacting the micro-enterprises must be explored. Researchers must not only ask what other characteristics may be beneficial according to employees, but what employees define as success. If the success can be defined, then further questions may be asked according to a specific definition. From this

definition, researchers could develop different methods of inquiry regarding employee characteristics working collaboratively with micro-enterprise employees. By viewing participants as non-passive voices in this type of research, larger cooperation and participation from participants may occur in future studies; thus providing richer and more descriptive data.

Recommendations for Further Practice

Individuals striving to utilize compost micro-enterprises must be mindful of employee characteristics that can impact the success of a compost micro-enterprise as well as input factors that can impact profit acquisition. The earlier characteristics such as gender, age and occupation are assessed in terms of their impact in a specific region, the more rapidly strategies can be developed to create competitive plans for compost micro-enterprises in their local markets.

Recommendations for Compost Micro-Enterprises

Based on the contexts (e.g., location, raw material availability, etc.) the following advisements are provided.

Enterprise A

Micro-enterprises should be mindful of how they construct their operational unit. Enterprise A suffered by not making their operations visible. Potential consumers and those unaware of composting were not given the opportunity to visit and inquire about their operations. Transport used to transfer compost to markets should be used sparingly. While infrastructure surrounding a micro-enterprise may not permit vehicular collection, a market should be developed as close to the micro-enterprise as possible. Farmer markets may be used to diffuse the idea of compost, but reliance upon transport and

markets deters profit.

Enterprise B

Micro-enterprises inclined to use family labor, which may not be able-bodied as non-farming labor, should be cautioned. Careful selection of employees is essential to assess how operations will be carried out. Also, future employees should be informed of arduous tasks demanded by composting. Employees should not be paid for an entire day's work when they are limited to a certain number of hours and tasks due to the impact that this practice can have on outputs.

Enterprise C

Micro-enterprises with ample free green-material must evaluate how effective that material is and not rule out using additional dry material. While free green material may mitigate the total cost of raw material, it may take more pounds of the product to produce compost as compared to other raw materials. More material requires more time, labor and energy to process it into compost. Consideration of the types and amounts of material received free or at a cost is critical.

Recommendations for Training Programs

Training programs to facilitate composting micro-enterprise development must include not only effective composting practices, but also instruction regarding the measurement of inputs, outputs, quality of compost, and overall good business practices. This would involve accounting for all expenditures including inexpensive labor and related benefit cost, raw material, and any other costs that might be incurred in future operations. Education regarding finances must be extended to composting individuals so that they may understand the consequences of each investment.

Initial costs to set-up a compost micro-enterprise, especially construction cost, must be outlined in an understandable format for micro-enterprises and their employees. The pinnacle step of realizing where (e.g., near raw materials, well established infrastructure) and how (i.e., visible or hidden to potential consumers) this operational unit is built will create awareness of the many variables employees must be cognizant of when operating a compost micro-enterprises. For example, the space upon which raw material is laid and employees are permitted to work effectively, inevitably affects the amount of compost that can be processed and sold for profit. Awareness of cost and profit (e.g., access to potential consumers) causes sustainable financial planning. Investment decisions must be discussed to determine the impact these decisions can have on profitability.

Exploration of the most inexpensive raw materials that yield the largest output without jeopardizing the quality of the final product is critical. Material availability and price will vary depending on the region where a compost micro-enterprise is located. Also the labor, time and energy necessary for each material should be considered before purchasing or collecting large amounts. Each raw material weighs differently, decomposes at different rates, and requires an assortment of capitol to process it into compost. These variables should be evaluated prior to the practice of composting.

Compost training materials including worksheets, calculation sheets, and foot sheets, which can facilitate the outlining and planning future incurred costs and output for a micro-enterprise, must be organized in usable format for rural participants. If inputs and outputs are not put in a compatible format, for a composting adopter, or employees are unable to calculate figures of cost, profit or output, support will be required to prevent

further debt and poverty. Evaluating one's own employees and investments is the first step in establishing sustainable practices.

Once compost entrepreneurship is understood in means of its financial sustainability, explanations and justified reasoning can be provided to prospective governmental or non-governmental donors who are interested in supporting these endeavors.

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APPENDIX A

VERBAL CONSENT SCRIPT - FOCUS GROUPS/SURVEY/INTERVIEWS

VERBAL CONSENT SCRIP – Focus Groups/Survey/Interviews
A Study of Sustainable Compost Micro-Enterprise Efficacy

The purpose of this form is to provide you information that may affect your decision as to whether or not to participate in this research study. If you decide to participate in this study, this form will also be used to record your consent.

You have been asked to participate in a research project studying the impacts of AGTEC in your community. The purpose of this study is to help AGTEC identify ways to improve their composting programs to better serve you, your family, and your community. You were selected to be a possible participant because of your knowledge, experience, and participation with AGTEC.

If you agree to participate in this study, you will be asked to participate in either a focus group discussion, survey and/or interview. Each discussion, survey or interview will take less than one hour and will be conducted in a centralized location in the community for the convenience of all participants.

The risks associated with this study are minimal, and are not greater than risks ordinarily encountered in daily life. Questions will be limited to your knowledge of your community and characteristics of the compost training program, the compost business in your village, and your participation with the program and/or business.

You will receive no direct benefit from participating in this study; however, the results of this research may assist international organizations that serve your community with identifying ways of improving their programs to better serve you, you family, and the community as a whole.

Your participation is voluntary. You may decide not to participate or to withdraw at any time without your current or future relations with Texas A&M University or AGTEC being affected.

This study is confidential. The records of this study will be kept private. No identifiers linking you to this study will be included in any sort of report that might be published. Research records will be stored securely and only the researcher will have access to the records.

If you have questions regarding this study, you may contact Timothy Silberg or Carolina Oleas.

Should you choose to participate in this study, a consent form will be read to you and require a verbal response of confirmation.

****SEE TRANSLATION ON NEXT PAGE****

El propósito de este formulario es proporcionar información que puede afectar a su decisión de si desea o no participar en este estudio de investigación. Si decide participar en este estudio, también se utilizará este formulario para registrar su consentimiento.

Ha pedido a participar en un proyecto de investigación, estudiando los efectos de AGTEC en su comunidad. El propósito de este estudio es ayudar la organización AGTEC a identificar formas de mejorar sus programas de abonos para servir mejor a usted, su familia y su comunidad. Fueron seleccionados para ser un posible participante debido a su conocimiento, experiencia y participación con AGTEC.

Si está de acuerdo participar en este estudio, se le pedirá a participar en una serie de debates, encuesto, y/o entrevista. Cada debate, encuesto, o entrevista durará menos de una hora y se llevará a cabo en una ubicación centralizada en la comunidad para la conveniencia de todos los participantes.

Los riesgos asociados con este estudio son mínimos y no son mayores que los riesgos que normalmente se encuentra en la vida cotidiana. Las preguntas estarán limitadas a sus conocimientos de su comunidad y características de su participación con el programa capacitación de abono, el negocio de abono de su puebla y su participación con el programa y/o negocio.

No recibirá ningún beneficio directo de participar en este estudio; sin embargo, los resultados de esta investigación pueden ayudar a las organizaciones internacionales que servir a su comunidad con identificar formas de mejorar sus programas para servir mejor a usted, su familia y su comunidad.

No. Su participación es voluntaria. Puede decidir no participar o retirar en cualquier momento sin sus relaciones actuales o futuros con la Universidad de Texas A&M o Amigos de las AGTEC.

Este estudio es confidencial. Los registros de este estudio serán confidenciales. No identificadores que se le vincula a este estudio, se incluirán en cualquier tipo de informe que podría publicarse. Registros de investigación se almacenará de forma segura, y sólo el investigador tendrá acceso a los registros.
Si decide participar en este estudio, usted puede elegir permitir la grabación de audio. Cualquier grabaciones de audio se almacenará de forma segura, y sólo el investigador tendrá acceso a las grabaciones. Será mantenidos durante un año y, a continuación, borrar cualquier grabación.

Si tiene alguna pregunta relacionada con este estudio, puede comunicarse con Timothy Silberg o Carolina Oleas.

Debe que escoge tomar parte en este estudio, una forma de consentimiento será leída a usted y requiere una respuesta verbal de confirmación.

APPENDIX B

SURVEY & FOCUS GROUP PROTOCOL

A Study of Sustainable
Compost Micro-Enterprise Efficacy

Survey/Focus Group Protocol

The protocol that follows includes a survey followed by a number of open-ended questions regarding compost micro-enterprises. The purpose of the survey is to enable the individuals to express their level of agreement or disagreement regarding composting. In addition, the purpose of the open-ended question is to allow individuals to be informative as possible about their thought and opinions about member contributions. The questions are neutral and encourage additional information, but do not suggest specific answers. Encouraging questions such as "How is that?", "In what ways?", "Why?", and "Why not?" will be used during the open-ended question forum to support conversation.

Guide

Introduction:

Hello, my name is Mr. Timothy Silberg. I am a student of Texas A&M University. This study is being conducted to better understand your perceptions of soil-fertility technology, as well as compost micro-enterprise employee structures. The study's goal is to more effectively deliver such technologies to Guatemalans.

Thank you for taking the time to attend this meeting today. The focus group session should only take approximately one hour. As a reminder, all information shared will remain confidential. Your name will not be associated with any comments you make or answers you mark on the survey. Information shared will combined and you name will

not be associated with the study. I value your time and appreciate your willingness to participate.

Guiding Survey Statements:

Financial cost and benefits of the micro-enterprise

1. Profits can be made from compost micro-enterprises
2. Much input (work, time and money) is needed to run a compost micro-enterprise, but all are feasible to complete/obtain
3. Compost micro-enterprises possess the capacity to produce much fertilizer
4. Compost made fertilizer possesses a secure market (stable price and stable purchases) to sell it

Humus-making material availability

1. There is free viable access to collect ample green manure (e.g. dead plants, rotten produce, etc.) available for a compost micro-business
2. There is free viable access to collect ample animal manure for a compost micro-business
3. There is free viable access to natural canopies that offer humus-making material (e.g. trees that provide fruit, leaves, or wood) for a compost micro-enterprise

Education/training of natural fertilizer

1. Education about soil health and business is needed before one can begin compost-enterprises

2. Much training is needed from an organization (e.g. AGTEC) before you begin composting

3. Composting was already being used in your village before training or education about it

Cultural opinions of composting

1. Compost micro-enterprises produce a generally more effective fertilizer than commercial operators

2. Natural compost material must be used to replenish soil nutrients

3. Compost made fertilizer can produce greater crop yields (e.g. larger fruits and vegetables, more vegetables and fruits bearing per plant) than commercial fertilizer

4. Plants grown in compost-made fertilizer produce fruits and vegetables that are safe to eat

5. Plants grown in compost-made fertilizer produce fruits and vegetables that possess normal flavor if not richer and/or healthier than conventional fertilizers

6. Plants grown in compost-made fertilizer produce fruits and vegetables that have a longer storage life than conventional fertilizers

7. Your community has a positive view about compost-enterprises

8. Most compost-enterprise employees are female

Contributions/Characteristic Guiding Questions:

1. What are the employee roles that operate a compost micro-enterprise (manager, compost material collector, technician)?
2. What are the responsibilities of each role?
3. Are there any characteristics that an employee possesses which benefit the compost micro-enterprise?
4. If so, how?
5. Describe any skills, training/education, and/or knowledge employees may have that benefit the micro-enterprise.
6. How do these skills or training assist the compost micro-enterprise's operations?
7. Do any employees have access to humus-making material (manure, much rotten produce)?
8. Please describe the access (type of material, amount, cost) and reason for access.
9. Do any of the members have access modes of transportation necessary to sell the material?
10. Please describe the access of transport (type of transport, frequency, cost).
11. Other than the micro-enterprise's local market, are there other markets employees have found, used, or connected to the enterprise?
12. Please describe the access (type of relationship, amount sold to market) and how it was entered by that employee.

13. Are there any other contributions, which the micro-enterprise employees have made that have not been mentioned or indicated?

14. If so, please describe.

Conclusions:

Thank you for your time today and sharing your thoughts with us. My goal is to better understand Guatemalans' acceptance of technology and the employee structure that supports it. The intention of the study conducted today is to understand why or why not the persons of Chimaltenango have adopted this specific technology. Additionally, the study hopes to deliver soil fertility technologies more effectively in rural settings. I appreciate the information you have provided me with today. Again, your name will not be associated with the comment you have provided.

****TRANSLATION****

Introducción:

Hola, Mi nombre es Timothy Silberg. Soy estudiante de la Universidad de Texas A&M. Estoy realizando investigaciones para escribir un estudio para mejorar el entendimiento de sus percepciones de la tecnología sobre la elaboración de abono orgánico, fertilidad del suelo y la estructura de la microempresa de compostaje. Esta investigación está siendo realizada para que se pueda transferir las tecnologías de manera eficaz a los agricultores de Guatemala.

Le (s) doy las gracias por tomarse el tiempo para asistir a esta reunión, el día de hoy. La entrevista debe durar aproximadamente una hora. A modo de recordatorio, toda la

información compartida se mantendrá confidencial. Su nombre no será asociado con comentarios o respuestas que señala(n) en el estudio. La información compartida por los entrevistados en un grupo será presentada en conjunto. Yo aprecio mucho su tiempo, buena voluntad, y agradezco su interés por participar. Esta investigación no afectará de ninguna manera su relación con el Proyecto AGTEC de la Universidad de Texas A&M.

Costos y beneficios financieros de la microempresa

1. Se obtiene ganancias de las microempresas de Abono Orgánico
2. Es factible e importante utilizar inversión como trabajo, dinero y tiempo para operar una microempresa de Abono Orgánico
3. La microempresa de Abono Orgánico puede producir un gran cantidad de abono
4. El abono orgánico tiene un mercado seguro (por ejemplo: precio seguro y muchas compradores)

La disponibilidad de material para la fabricación de abono orgánico

1. Es fácil de conseguir una cantidad abundante de material verde natural (por ejemplo hojas, hortalizas, etc.) sin costo para la microempresa de Abono Orgánico
2. Es fácil de conseguir una cantidad abundante de estiércol gratis para la microempresa de Abono Orgánico
3. Es fácil de conseguir una cantidad abundante de material seco natural (como hojas secas, aserrín, etc.) sin costo para la microempresa

La educación y enseñanza del método de abono orgánico

1. Se necesita una capacitación sobre fertilidad del suelo y manejo de microempresa antes de empezar la producción de Abono Orgánico

2. Una organización (por ejemplo, AGTEC) necesita dar mucha capacitación sobre elaboración de abonos orgánicos antes de producir abono

3. Ustedes han producido abono orgánico antes de la capacitación y formación de la microempresa

Las opiniones culturales del abono orgánico

1. Las microempresas de Abono orgánico producen abono un abono de mejor calidad que el abono químico

2. El abono orgánico debe ser usado para mejorar la fertilidad del suelo

3. El abono orgánico puede producir mejores rendimientos (por ejemplo: mas frutos por planta y frutos mas grandes) que los abonos químicos

4. Las cosechas producidas con abono orgánico dan frutas y vegetales que son seguras para comer

5. Las cosechas producidas con abono orgánico producen frutas y vegetales que saben mejor (por ejemplo: son más ricas y saludables).

6. Las cosechas con abono orgánico producen frutas y vegetales que duran más y que no se marchitan tan rápido

7. Su comunidad tiene una opinión positiva de la microempresas de Compostaje

8. Muchos de los socios son mujeres.

Preguntas de guía (Contribuciones/características):

1. ¿Cuáles son los roles de los empleados en la microempresa (gerente, recolector, técnico)?

2. ¿Cuáles son las responsabilidades de cada personas?

3. ¿ Qué características debe tener un socio para que la microempresa de Abono Orgánico funcione mejor?

4. Si es así, ¿cómo?

5. ¿Hay empleados que tienen destrezas, educación/ formación y conocimiento que benefician la microempresa?

6. ¿Cómo ayudan a desarrollar estas destrezas y formación a la microempresa de abono orgánico?

7. ¿Hay empleados (trabajadores) que tienen acceso a material para hacer abono orgánico (estiércol, plantas, productos del campo)?

8. Describir el acceso (tipo de material, cantidad, costo).

9. ¿Hay empleados que tienen acceso a un modo de transporte necesario?

10. Describir el acceso (modo de transporte, frecuencia, costo).

11. ¿Afuera de sus mercados locales, hay otros mercados que los socios han encontrado y conectado a la microempresa?

12. Descríbamelo este acceso (tipos de relaciones, cantidad vendido al mercado).

13. ¿Hay otras contribuciones que hacen los empleados que no han sido mencionados o indicados? Si o No? Explíquemelas.

Conclusiones:

Le doy las gracias por su tiempo y haber compartido esta información. Mi meta es comprender la adopción de la tecnología por los guatemaltecos y la estructura de empleo que aporta. El propósito del estudio de hoy es comprender por qué las personas de Chimaltenango aceptan o no la tecnología de abonos orgánicos. También, para conocer como transferir las tecnologías sobre la fertilidad del suelo de una manera eficaz en las áreas rurales. Aprecio toda de su participación. Quiero recalcar que su nombre no será relacionado con sus comentarios y respuestas.

APPENDIX C

GROUP INTERVIEW PROTOCOL

A Study of Sustainable

Compost Micro-Enterprise Efficacy

Group Interview Protocol

The protocol that follows includes a survey followed by a number of open-ended questions regarding compost micro-enterprises. The purpose of the survey is to enable the individuals to express their level of agreement or disagreement regarding composting. In addition, the purpose of the open-ended question is to allow individuals to be informative as possible about their thought and opinions about member contributions. The questions are neutral and encourage additional information, but do not suggest specific answers. Encouraging questions such as "How is that?", "In what ways?", "Why?", and "Why not?" will be used during the open-ended question forum to support conversation.

Guide

Introduction:

Hello, my name is Mr. Timothy Silberg. I am a student of Texas A&M University. This study is being conducted to better understand compost business ventures in order to more effectively deliver such technologies to Guatemalans.

Thank you for taking the time to attend this meeting today. The interview should only take approximately one hour. As a reminder, all information shared will remain confidential. Your name will not be associated with any comments you make or answers you mark on the survey. Information shared will combined and you name will not be associated with the study. I value your time and appreciate your willingness to participate.

Guiding Interview Questions:

1. What are the required materials (construction blocks, manure, plants, rotten produce) needed to begin a compost micro-enterprise?
2. Of the materials states, how much is used to operate the micro-enterprise monthly? Yearly?
3. How much does each of these materials cost? Please note if certain material is free and if there are other costs associated with collection/pick-up.
4. How many laborers do you need to make compost-made fertilizer?
5. How many hours does each of them spend a week working? Monthly? Yearly?
6. What is their salary rate?
7. Is transport necessary for this operation? If so, how much is used?
8. What is the cost of transport?

9. Are there any other costs associated with making compost-made fertilizer that have not been indicated?

10. What type of persons (e.g. farmers) and/or business purchase compost-made fertilizer from your micro-enterprise?

11. How is the fertilizer sold by your enterprise (sack, pounds, etc.)?

12. What is the cost of conventional fertilizer in your area?

13. How much of the product is sold monthly by the enterprise? Yearly?

Conclusions:

Thank you for your time today and sharing this information with us. My goal is to better understand Guatemalans' micro-enterprise operations so that it can be delivered more effectively in rural settings. I appreciate you participation. Again, your name will not be associated with the comment you have provided.

****TRANSLATION****

Introducción:

Hola, Mi nombre es Timothy Silberg. Soy estudiante de la Universidad de Texas A&M. Esta investigación es siendo realizado para mejorar el entendimiento de la empresa de compost para que se pueda entregar las tecnologías de manera eficaz a los guatemaltecos.

Le (s) doy las gracias por tomarse el tiempo para asistir a esta reunión de hoy. La entrevista se debe durar aproximadamente una hora. A modo de recordatorio, toda la información compartida se mantendrá confidencial. Su nombre no será asociado con comentarios hacen o respuestas que señala(n) en el estudio. La información compartida por los entrevistados será combinada en un grupo y no será usado aislada. Yo aprecio su tiempo y su buena voluntad, y agradezco su interés por participar.

Las Preguntas de entrevista:

1. ¿Qué son los materiales (de construcción, de estiércol, de plantas, de productos agrícolas) para realizar un compost de microempresa?
2. ¿De cada uno de estos materiales, cuánto se usa en el proceso de microempresa por mes? Por año?
3. ¿Cuánto cuesta cada material (por saco, por kilo, por libra)?

Por favor explíqueme si hay alguna material gratis y hay otras cuestas relacionadas con la colección o la entrega de los productos.

4. ¿Cuántos trabajadores necesita hacer fertilizante orgánico?
5. ¿Cuántas horas trabajan los campesinos por semana? por mes? por año?
6. ¿Cuál es su tasa de salario?
7. ¿Es el transporte necesario para esta operación? En este caso, con qué frecuencia se úsalo?
8. ¿Cuál es la cuesta del transporte?
9. ¿Hay otras cuestas (no se indica) en el proceso de hacer Compost?
10. ¿Qué personas o empresas compran fertilizante orgánico de su microempresa?

11. ¿Cómo vende el fertilizante (por saco, por libra, por kilogramos) ?

12. Cuánto cuesta el abono en su región?

13. ¿Cuánto de su producto vende usted por mes? Por año?

Conclusiones:

Le doy las gracias por su tiempo y compartimiento de información. Mi meta es comprender las operaciones microempresas de guatemaltecos así que se puede comunicarles eficazmente en los pueblos rurales. Aprecio toda de su participación. Quiero recalcar que su nombre no será relacionado con sus comentarios y respuestas.

VITA

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EDUCATION

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B.S., Agricultural Sciences
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PROFESSIONAL EXPERIENCE

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