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## **The Agriculture Industry in Trinidad and Tobago: Perspectives of Industry Professionals**

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### **Abstract**

*Agricultural technology dissemination is critical to establishing food security. These technologies support proper, environmentally responsible food production and can empower producers. The purpose of this study was to describe the current condition of the farming industry in Trinidad and Tobago from the perspective of agricultural professionals. There were 22 participants who represented farmers' market employees, farmers using conventional growing methods, farmers using innovative growing methods, and farmer training professionals. Participants were interviewed. Three themes emerged from the data: crop production methods, sources of information, and perceived needs to improve the industry. Findings revealed the need for a more centralized dissemination of information and training materials, governmental support and public awareness of agriculture efforts, and career potential. It can be concluded that environmentally responsible production methods are being diffused and some chose to reject such innovations due to the relative advantage of the farming techniques they are currently using. It can also be concluded farmers prefer informal information sources and, as a result, these are a primary change agent in the agriculture industry. Implications exist for the creation and delivery of education and training efforts for extension providers and producers.*

**Keywords:** managing change, technology transfer, case study research, training and development, change theory

## Introduction and Background

Officials at the World Food Summit defined food security as when all people have affordable access to safe, healthy, and consistently available food (World Food Summit, 1996). Soon after in the year 2000, the United Nations established eight Millennium Development Goals; two of which were to eradicate hunger and poverty and ensure environmental sustainability by 2015 (United Nations, 2012). Food security in the Caribbean is dependent on many factors, but one of the most influential is that of information and technology dissemination (Beckford & Campbell, 2013; Bernsten & Snapp, 2009; Falconi, Torero, Maruyama, Hernandez, & Robles, 2012; Inter-American Institute for Cooperation on Agriculture [IICA], 1991).

Rogers (2003) describes the diffusion process in terms of the innovation characteristics, communication channels, time, and the social system that it is being diffused into. Bernsten and Snapp (2009) also identify innovation performance, profitability, labor requirements, required inputs, access to extension services, and government policies as terms of innovation adoption. The rate of adoption in the Caribbean can be seen as a correlation between innovation characteristics and the advantages of the innovation in relation to the status quo, the compatibility of the innovation “with the sociocultural values, beliefs, and traditional ideas of the farming community and the needs of farmers in that community” (Beckford & Campbell, 2013, p. 60), and the ease of application. To be successful, changes also need to occur at the institutional level (IICA, 1991).

As indicated in the Millennium Development Goals (United Nations, 2012), the environmental sustainability of such technologies and information must be considered. Agricultural research has played a large role in testing this in the Caribbean.

Agricultural research and information dissemination has been present in the Caribbean for many years through universities, the Caribbean Agricultural Research and Development Institute (CARDI), and more (CARDI, 2011). Generally, the outcomes of these efforts were the result of poor structural integration and a top-down approach that was off putting to many producers (Beckford & Campbell, 2013; IICA, 1991). Through these trial and errors, general access to new technologies has been found as the seed of hindrance (Warschauer, 2002). A solution to this problem may lie in training. McDermott, Murphrey, and Wingenbach (2013) found training participants from Central America on technology skills encouraged application of the skills and subsequent dissemination of information. Likewise, farmers in Trinidad who may or may not have technology access have shown willingness to be trained in new technologies to improve their production (Dolly & Kisoonsingh, 2006). In relation to food security, growing concerns over health, the environment, and general food quality has driven such innovations in the farming industry (Beckford & Campbell, 2013; Bernsten & Snapp, 2009; Falconi et al., 2012); Trinidad is no different.

The agricultural contribution to the gross domestic product in Trinidad in 2013 ranged from an approximate 0.3%, as measured by The World Factbook (n.d.), to 0.6%, as measured by The World Bank Group (2015). The Government of the Republic of Trinidad and Tobago’s Ministry of Food Production indicated in March of 2014 that “the contribution of agriculture to GDP has increased by 77% from 2009 to 2013” (para. 2). In 2014, the agricultural work force comprised 2.4% of the total labor force (Ministry of Planning and Sustainable Development, Central Statistical Office, n.d.b) and average small-scale farm size in

southern Trinidad was found to be 4.12 acres (Patterson-Andrews & Pemberton, 2014). According to the Ministry of Planning and Sustainable Development, Central Statistical Office (n.d.a), the 2010 value of total food imports was approximately \$4 billion (TTD). In March of 2014, the Ministry of Food Production also indicated “there has been a 2 percent reduction in food imports from 2010 to 2013” (para. 2); this totals an approximate \$80 million (TTD) in savings.

Contributing to these statistics was the 2003 closure of the Caroni (1975) Ltd. sugarcane processing company. This closure displaced over 7,000 workers (European Commission, 2009). A portion of the land holdings was developed into 2-acre plots and “provided to 7,000 former Caroni (1975) Ltd. workers” (European Commission, 2009, p. 10). The expected benefit to the agricultural industry included increased food production for both domestic and international markets and the expansion of university level agribusiness degrees at local universities (European Commission, 2009). With an influx of new farmers, education and training is an important component to further the agricultural industry in Trinidad.

Extension services are provided by a combination of public, private, institutional, and governmental sources in the Caribbean Community (Ganpat, Harder, & Moore, 2014), this includes Trinidad. The Ministry of Food Production is a primary source of extension and training services for agriculturists, youth, and general citizens in Trinidad. In terms of agriculturists, services are available to help them be successful from inception to market. There are programs in product/material acquisition, engineering projects, animal services, and general education and training about these mentioned programs and many other topics (Ministry of Food Production, 2013).

Extension, Training, and Information Services (ETIS), a service provided through the Ministry of Food Production, provides education and training for farmers and the public through lectures, factsheets, demonstrations, workshops, and more. An example ETIS program was Farmer Field Schools (FFS; Dolly, 2005). Although no longer functioning as a formal program, this adult education program was designed to provide farmers with information on Integrated Pest Management practices (Dolly, 2005). Dolly (2009) expressed that FFS programs provided “more appropriate technology to preserve the agro-ecological environment in which the farmers cultivate vegetables” (p. 17). Lessons and techniques from the FFS program are being used in ongoing and new ETIS approaches. Extension, Training, and Information Services also has a mobile learning unit so producer trainings can be conducted at remote locations.

### **Purpose of the Study**

Farmers’ practices in Trinidad can be influenced by a number of sources, including public and privatized education and training, consumer demands, marketing materials, and informative websites. The purpose of this study was to describe the current condition of the agricultural industry in Trinidad in terms of methods used to produce crops, sources of information for the producers, and perceived needs to improve the industry and determine best practices for the dissemination of information to producers.

### **Methods**

The farming industry in Trinidad is representative or typical of other Caribbean islands and the information may also be transferable to small, developing countries or island nations with similar agricultural policies and agricultural landscapes;

therefore, the design of this study was a single-case study with multiple units of analysis (Yin, 2009). I visited the country of Trinidad for approximately 10 days per year for three consecutive years and interviewed individuals from four different perspectives: farmers' market employees, farmers using conventional growing methods, farmers using innovative growing methods, and farmer training professionals. I was given access to interviewees through gatekeepers.

There was a total of 22 participants. The farmers' market employees represented a criterion sample (Merriam, 2009). This group of participants was chosen based on their managerial expertise, knowledge and understanding of produce pricing, farmer production practices, consumer purchasing trends, and their ability to make decisions in the market. They were coded as FME 1-2; no identifying information was collected from the participants.

The farmers using conventional growing methods also represented a criterion sample (Merriam, 2009). These farmers were selected based on their use of conventional growing methods. In the case of this study, conventional growing methods include the use of synthetically produced fertilizers, and/or pesticides to enhance the production yields of their crops (Just, Schmitz, & Zilberman, 1979). Conventional farmers were approached at three different settings: at the wholesale farmers' market selling their produce, at their farm, or at growing group meetings. These respondents were coded FT 1-13; no identifying information was collected from the participants to ensure confidentiality.

Farmers using innovative growing methods represented an opportunistic sample. Patton (2002) describes opportunistic sampling as "following new leads during fieldwork; taking advantage of the unexpected; flexibility" (p. 244). Gatekeepers contacted and allowed me

access to farmers that use innovative farming methods such as unique farm designs, good agricultural practices, and unique business designs. The innovative farmers were coded FI 1-3; no identifying information was collected from the participants to ensure confidentiality.

I interviewed four individuals that work with farmer training programs. They represented an opportunistic sample (Patton, 2002). One held a strictly administrative role and three were in roles where they had some responsibilities in program creation and oversight. These individuals were coded FTP1-4; no identifying information was collected to ensure confidentiality.

Semi-structured interview protocols were created to guide the interviews. There were four interview protocols, one for each of the identified groups. The protocols were designed to answer the research questions from the perspective of the participants. The interviews were conducted on location with the participants (i.e., farmers' market employees were interviewed at the farmers' market and the farmers were interviewed at their farms, while selling their goods at the farmers' market, or at growing group meetings). The interviews were recorded with field notes and lasted approximately 20-40 minutes depending upon the interviewee's availability. The interviews were audio recorded and transcribed to ensure accuracy of my field notes.

The data were analyzed using the constant comparative method (Glaser & Strauss, 1967). This process allowed me to (a) compare incidents applicable to each category, (b) integrate categories and their properties, (c) delimit the theory, and (d) write the theory (Glaser & Strauss, 1967). This process was done for each of the four sample groups. The findings from each of the sample groups were then compared to make conclusions, implications, and recommendations.

Research quality was established through construct validity, external validity, and reliability (Yin, 2009). Construct validity was established through the use of prolonged engagement, maintaining a chain of evidence in a reflexive journal, triangulation of multiple sources of evidence, peer debriefing, and member checks with the participants when possible (Lincoln & Guba, 1985; Yin, 2009). External validity was established through a single-case study design, with thick description of the context of the interviews, and purposive sampling (Lincoln & Guba, 1985). Reliability was established through the creation of a case study protocol (Yin, 2009) and an audit of my processes by an experienced qualitative researcher (Lincoln & Guba, 1985). I kept a reflexive journal throughout the research process; a reflexive journal is a support document for all research quality tests (Lincoln & Guba, 1985).

A limitation of this study is that the individuals interviewed represent only a small number of producers and industry professionals. Although saturation of the data was reached, I note that there may be additional producers and industry professionals that could provide data on varying and/or extreme situations. Due to the qualitative nature of this study, there was also potential for researcher bias. My biases are as follows: I am a resident of the United States of America and my personal and professional background is in agriculture and education in the United States. In light of the human instrument, every effort was made to remain neutral and ensure accuracy through qualitative research quality measures, as described in the previous paragraph.

### Findings

With growing concern over health, the environment, and general food quality, I

asked farmers about their experiences with the farming industry. The themes that emerged through our conversations related to their methods of producing crops, how they access information and training about farming techniques, and what they believe to be the key issues that must be addressed to make the farming industry in Trinidad successful. The farmers in Trinidad reported three general growing methods during our interviews: conventional growing techniques, innovative growing techniques, and a combination of the two.

### Growing Methods

#### Conventional growing methods.

Farmers using conventional growing techniques use agrochemicals (i.e., fertilizers and pesticides) to stimulate yield increases. While we were speaking at the wholesale farmers' market, farmer FT5 said, "We have different pesticides, insecticides, and fungicides, depending on the crop." Farmer FT12 further explained, "We use soil fertilizers when they are growing and then spray chemicals [when fruiting]." Agrochemical product prices have greatly affected the farming industry in Trinidad and farmers' market employee FME1 indicated, "The prices of chemicals and fertilizers—that is our biggest force right now. And access to these." The process of importing agrochemicals affects the input costs on crops (FI3). "Most of these things, I say 90% of these things, have to be imported. And then you have exchange rate according to the country that you are buying from, and then you have the freight costs" (FME1). Farmer FT10 explained to me that garden shops enhance the problems by inflating the prices because of the perceived scarcity of particular agrochemical products.

Every time you go in the garden shop, you go for the chemical, they going to tell you they have limited

quantity. So you are going to probably buy two or three bottles, and then when you go back again, you see a lot on the shelf. (FT10)

Even with increased input cost, most farmers do not consider reducing their agrochemical input or producing organically. As farmer FT10 was unloading his produce at the wholesale farmers' market, he explained, "When you already introduce your crops to these harsh chemicals, it don't make sense to turn around and put these [organic] products on the land...you are looking to get back more than what you put in the land." Farmers in Trinidad do not necessarily abide by the instructions listed on agrochemical labels; many apply on a regular schedule or by observation. "We start off [applying pesticides] one time per week and then, when it comes close to production—we spray four days per week" (FT10). "Everyone has their own ways in dealing with spraying; the way I do it is by observation. If it doesn't need it, I don't spray. It reduces my costs," Farmer FT5 explained as we walked around his field of cabbage. The rainy season also plays a part in the application of agrochemicals. "In the rainy weather, you do more spraying than dry weather because the rain comes and washes away the chemicals from the plants and you need to protect the plant" (FT10).

Farmers who intend to export their crops limit their agrochemical applications. Farmer FT11, a papaya farmer, explained "the standard for being able to ship worldwide is by the amount of chemical residue. When we go to ship papayas, [the regulatory agency] take a sample box ... and test it for chemicals before they let it ship."

Conventional farmers are not unaware of the growing consumer demand for organic foods. They indicated the use of agrochemicals is necessary for crop

production in Trinidad. "We tried [organic production], but we had real problems with insects" (FT7). Innovative farmer FI2 stated "farmers use pesticides because they need a quick fix," not because organic farming does not work.

### **Innovative growing methods.**

Innovative growing methods in Trinidad focus on farm design to create a system that is sustainable over time. As farmer FI2 and I walked around his lime trees, he elaborated, "When you develop a project that can pass on to the next generation—that is sustainable farming and sustainable development." Farmer FI3 explained "we need to adopt more eco-friendly systems," because "in trying to save the world with [agro]chemicals, we have killed the world."

Permaculture is "a design system that tries to look at a farm from a holistic approach—where you treat everything on the farm as connected" (FI1). Production in a permaculture system is organic and it creates microclimates to ensure sustainability (FI1). "We have not used pesticides on this farm in the last 15 years and we have eliminated the use of herbicides about five years ago," stated farmer FI1. Permaculture encourages the production of food for self-sustainability before selling food at market for money. "A lot of farmers get into growing crops for cash and then they have no food for themselves. It's a big issue in a lot of third world countries" (FI1).

Innovative farmer FI2 practices sustainable farming methods centered on farm design. "My sons are engineers and they designed this place.... I moved a lot of overburdened land and limestone into here to create the landscape," farmer FI2 said proudly of his farm plot. The landscape allows him to collect water in the rainy season for use in the dry season, it allows for alley cropping, and the incorporation of protective plants, such as neem trees. "You

use plants that help each other. If you have neems and insect repellent-type plants, it helps tremendously. I use neem trees on the fence line; I make the fence from neem wood, etc.” (FI2). This type of beneficial plant integration allows for the application of fewer inputs. “I have not used pesticides for the last 10-15 years. I do weed management with a weed whacker” (FI2).

Innovative farmers recognize the difficulties and long-term vision required to produce organically. As farmer FI1 described his growing methods to me, he said, “We tried eliminating [agrochemicals] as soon as we came on the farm, but we were overrun; we just couldn’t maintain it. But as we got things established, we worked them out [of the system].” He went on in his explanation, “I worked on [my farm] for 15-20 years before it looked like this” (FI2). FME1 stated, “Organic production requires more time than normal” and that influences the amount of farmers practicing this type of production.

Skeptics of organic crop production argue “organics are at a premium price” (FT4) and organic farmers “probably have problems selling their crops” (FME2) due to the high prices and lack of interest from buyers. Some are skeptics of those encouraging organic production. Farmer FI3 stated, “The same people that created [agro]chemicals are now trying to produce organic [inputs]. It is an economic move. They are not ‘true.’”

### **Combination growing methods.**

Combination growing methods are identified by the use of both conventional and innovative growing methods. All of the producers in this study self-identified as either conventional or innovative. This theme represents conflicting statements made by the participants and the lack of production expectations in Trinidad.

There was a lack of congruency among the farmers when it came to organic production practices. As we discussed the use of synthetic pesticides and chemical fertilizer, farmer FT4 stated that “traditionally grown is organic here [in Trinidad]. Farmer FI2, a self-proclaimed organic farmer, stated, “Since I don’t use pesticides, the biggest problem is ants. If it gets bad, then I use a soil insecticide.” Farmer FT5 indicated his production is “organic to a point.” He went on to say “we incorporate organic and man-made fertilizer to get the response we want; we are looking to make money ... and to try to produce organic alone, you may not survive” (FT5). Farmer FI3 stated he produces “not all organic, but as much as possible,” and farmer FT4 indicated consumers, education agencies, and the government should “promote safe production, ecological crop production.” FME1 stated, “The education that the farmers need now is how to use biological controls so they don’t have to use the amount [of agrochemicals] that they are [currently].”

### **Information and Training Access**

Producer access to information and training programs are topics of discussion when it comes to the dissemination of materials, technologies, procedures, and policy. This was also a theme that emerged from the interviews. Sources of information and training in Trinidad are both informal (e.g., garden shops and growing groups) and formal (e.g., privatized and government services and programs).

### **Informal information sources.**

Garden shops in Trinidad are retail locations that provide farmers with seeds, plants, tools, and inputs for their farms. When asked where most farmers get their information, farmers FI2, FT3, FT4, and FTP3 indicated the garden shop. As

suppliers of production implements and goods, garden shops are a frequent stop for farmers and therefore are convenient locations to gain knowledge about the latest products and processes. Farmer FI2 laughingly stated, “Farmers don’t take advice very well from people. The only advice they get is from the garden shop.” As we discussed sources of information, farmer FT3 explained he lives behind a garden shop and perceives the owner is good because he is a lecturer, professional in the business, and he sells the same products that he uses. A farmer training professional stressed the retail nature of garden shops as we walked through the demonstration farm. “Farmers go to AgriSuppliers for information and [AgriSuppliers] want to sell products. They have been moving to more environmentally friendly products, but they still want [farmers] to use plenty of it” (FTP3).

A second type of informal information source was the growing group. Many farmers in Trinidad organize into location-specific growing groups so they can learn from each other and band together as a group when needed. Farmer FT1 had just started farming and came to growing group meetings to learn from the other farmers. Likewise, farmer FT2 was looking for seller contracts and felt the group knowledge could be beneficial. Growing groups may also associate with more formal agricultural organizations to promote policy change and/or implementation.

#### **Formal information sources.**

Privatized services and programs in Trinidad include demonstration farms. “Some people call it volunteer farm methodology, but essentially, it is somebody besides the centralized extension institution performing extension functions,” farmer training professional FTP4 explained. Farmer FI2 went on to say “what [other farmers] are doing is using [my farm] as a model. We are

doing ‘extension’ by allowing people to come out and model this farm; Antigua brought 60 farmers.... Dominica came last year.” Farmer FI1 also uses the permaculture farm as a demonstration farm and to teach a 10 day training course in permaculture. Farmer FI2 believes “[training programs] are not using farmers, successful farmers, as role models to promote farming. You need to show something of substance, you need to show how to use it.”

Formal agricultural organizations are another formal information source for farmers in Trinidad. These organizations are not sponsored or formally/financially supported by the government. I met with four farmers from a growing group (FT1-4) who work very closely with a formal agricultural organization. These farmers explained these organizations provide services for farmers beyond just education and training. Formal agricultural organizations can organize small farmers, be a voice for farmers, and “fight government to repeal oppressive laws on farmers” (FT4).

Training and education is also provided through a number of governmentally supported and private centers, organizations, etc. Training centers in Trinidad vary in their services and delivery method. For example, the Farmers Training Centre creates informational materials to distribute to producers and they hold trainings on and off-site for farmers; they are also looking to incorporate online training (FTP3). Their trainings and materials are limited to content areas where they employ or consult with experts and to programs that are in the national focus (FTP3).

Another example is the National Agricultural Marketing and Development Corporation (NAMDEVCO). It is charged with providing information to farmers “in terms of what should be grown and what is on the ground [currently] ... push for value

added,” (FME1) and to improve farmers’ methods. With improved methods, the farmers “could demand a price for their goods because of the quality and freshness” (FME1). NAMDEVCO provides “educational programs that [the Ministry of Food Production] recommends” (FME1).

Although agricultural extension is carried out in many ways in Trinidad, several farmers whom I interviewed (FT1-4, FT7, FI2) did not know if they had access to extension information in their growing area. Farmer FI2 bluntly stated, “There is no relationship with me and extension. It is very sad to say, I have not an extension officer in this area.” Farmer FT3 further explained “extension is book smart but not practical.” Farmer FI2 found extension incentives to be unhelpful. “People will go through extremes to get the incentives. We need to rethink what we are doing. You cannot see growing more food without addressing the issues of sustainability.”

### **Farming Industry Issues**

In every country there are issues that could be addressed to improve the farming industry, especially when several facets of stakeholders are included. In the interviews, the conventional farmers, innovative farmers, and the farmer training professionals identified three areas where improvements are needed: marketing and education, youth involvement, and land tenure policy.

#### **Marketing and education.**

Marketing and education emerged out of the need for educational programs to better agriculture in Trinidad and for campaigns to market their produce after they implement such programs. Farmer FI2 compared his farm to one next to him. As he pointed out the obvious differences in landscape, he suggested “many of our agricultural problems stem from not managing our

landscapes.” Farmer FI3 further suggested a “need to adopt more eco-friendly systems,” and FT4 suggested the promotion of safe, ecological crop production. FI2 expressed, “There is such a lack of information and education that people are essentially making their own cocktails to try to solve their problems.” Such education is also needed for the approximately 7,000 new farmers that emerged when the Caroni (1975) Ltd. sugarcane processing plant closed in 2003 (FTP3). I also spoke with farmer FT6 who has a need for a technical education program in tilapia farming. Farmer FT6 was offered a contract to sell tilapia to the local market. He began to raise approximately 1,600 tilapia and did not know how to harvest them until after he had the pond established (FT6). Farmer FI2 indicated educational programs need to reach beyond farmers; they need to include all aspects of the food production process. “There is more we can do in the growing, processing, and storing aspect of educational programs. I don’t just think of farmers, I think of agriculturist” (FI2).

Farmer F4 stated, “Right now, there are low prices and marketing problems.” Providing education and training ideally results in an increase of better food products. Prices of inputs have increased in Trinidad and there is a need for marketing campaigns to expose the efforts of the farmers and their produce (FT4, FT9). “We need to recognize the farmers and what they are doing” (FI1).

**Youth involvement.** “The problem with agriculture is that children are not in agriculture. Young people need to get into agriculture” (FI2). The farmer population in Trinidad is aging and there has been little effort to engage youth in the farming culture (FI2, FTP1). “Most parents have never encouraged their children to be involved in farming because it is very difficult and it is not a very sexy course” (FTP1). Farmer FI2

explained to me that it is more than just encouraging youth to be farmers; they need to be given the right education and tools to succeed and to protect the environment. The Ministry of Food Production has developed The National Food Production Action Plan 2012-2015: Agriculture Now (Ministry of Food Production, Land, and Marine Affairs, n.d.). As part of this program, the Young Professionals in Agriculture Development and Mentoring Programme was created to “provide structured, focused and closely monitored opportunities for tertiary level graduates to be mentored in agriculture and related studies” (p. 19).

**Land tenure policy.** From the distribution process to the mandates placed on the land, farmers saw land tenure in Trinidad as a big issue (FT4, FT7, FT11, FI2). Although farmers may have been producing on their land for many years, “they can be forced off of the land by the government” (FT7). Much of the land tenure policy is unclear to most farmers. “The length of my lease is 30 years with the option to renew for another 30 years. But they are saying now five years with a maximum of 30 years. I don’t know what that means” (FI2). Farmer FT4 explained “approximately 80% of small farmers still do not have a title to their land.” Farmer FI2 went on to describe that the government can mandate what you grow, what structures you can build and tear down, and must approve any changes. “The government does not understand what it means to get people to work the land for you. Their rules don’t make sense many times” (FI2).

### **Conclusions**

Participants indicated three types of growing techniques used to produce crops in Trinidad: conventional growing techniques, innovative growing techniques, and a combination of the two. It can be concluded

from these findings that diffusion of information about environmentally responsible production is occurring in Trinidad.

According to Rogers (2003), “the innovation-decision process begins with the knowledge state, which commences when an individual (or other decision-making unit) is exposed to an innovation’s existence and gains an understanding of how it functions” (p. 171). The producers in Trinidad are aware of environmentally responsible production, such as organic production and strategically planned farm design and many have completed the persuasion stage and formed a favorable or unfavorable opinion of the innovations (Rogers, 2003). Some have also passed through the decision stage and made the decision to reject these types of innovation. Rejection of environmentally responsible production techniques could be due to the method of information delivery, the failure of the innovation to provide a relative advantage, to be compatible with the current system, or to be simple enough to use in a desired time frame (Beckford & Campbell, 2013; Bernsten & Snapp, 2009; Rogers, 2003).

Because of the cyclical nature of agriculture, trialability and observability are also factors that can inhibit the immediate adoption of new technologies (Rogers, 2003). Just et al. (1979) explained the use of conventional farming technologies, such as agrochemicals, in terms of increased yields. Therefore, in accordance with Bernsten and Snapp (2009) and Dolly and Kisoosingh (2006), producers in Trinidad may also see the relative advantage of conventional farming techniques in terms of ease of use, minimal education requirements, and quick, visible results. For those producers who implement a combination of conventional and innovative systems, it may be that the diffusion process is occurring slowly as an integrative process. The producers may be

incorporating the innovative farming methods while phasing out the conventional techniques over time. Participant choices of farming practice may also be directly related to the producer's security in their land tenure contract (IICA, 1991).

The second theme that emerged from the data was the source of producer information and training. According to Falconi et al. (2012), information and technology dissemination is a driving force that influences food security in the Caribbean. The participants in this study indicated their education and training was acquired through informal and formal sources. Farmers in Trinidad prefer to use informal sources, such as garden shops and growing groups. This conclusion is in accordance with Rogers' (2003) explanation of homophilous communication, or the concept that "the exchange of ideas occurs most frequently between individuals who are alike" (p. 305). Producers may see themselves as more similar to the garden shop employee versus the government agency employee. It can also be concluded that these informal sources of information are the primary agricultural change agents in the Trinidadian farming industry. Change agents are described by Rogers (2003) as able to "facilitate the flow of innovations from a change agency to an audience of clients" (p. 368) through being perceived as trustworthy and empathetic by the intended audience. Through the very nature of retail, garden shop employees are able to fulfill this role by carrying and selling products from agrochemical companies that they feel are necessary to aid the local producers.

The third theme to emerge was that of key issues to be addressed to improve the farming industry in Trinidad. The participants indicated marketing and education, youth involvement, and land tenure policy as focus areas. Current farmers in Trinidad feel isolated and unappreciated.

According to the Ministry of Food Production (2014), agriculture in Trinidad is making increasing contributions to the country's GDP. A portion of this success could be attributed to The National Food Production Action Plan 2012-2015: Agriculture Now (Ministry of Food Production, Land, and Marine Affairs, n.d.). With sustained diffusion of appropriate agricultural technologies (Bernsten & Snapp, 2009; Falconi et al., 2012) and increased yields, contributions can be made to food security on the island. To carry this progress into the future, it can also be concluded that it is essential to engage youth in production agriculture. This change can happen in conjunction with policy changes at the government level that facilitate access to land (Falconi et al., 2012; IICA, 1991) and increased trust in the government-producer relationship; change can also occur through change agents who will facilitate an increase in information access and training (Rogers, 2003).

### **Recommendations**

It can be implied that producers and industry professionals are not effectively communicating and are not operating from or being held to a similar set of standards. It is recommended that sources of extension education, materials, and services in Trinidad work to streamline dissemination efforts and production expectations and standards for clarity and consistency (Beckford & Campbell, 2013); content and administrative training for extension sources may also positively influence this. Message consistency ensures all parties involved are working from the same understanding.

Many farmers were found to have rejected some current farming practice innovations. According to Rogers (2003), Beckford and Campbell (2013), and Bernsten and Snapp (2009), there is a number of innovation characteristics or

dissemination efforts that may not meet the criteria of producers in Trinidad. Further research should be conducted on the impact of growing method on production yields and the effects of marketing campaigns on the pricing and selling of organically grown produce in Trinidad to provide more information to producers. It is also recommended that land tenure policies in Trinidad be evaluated so producers can have a sense of long-term stability and thus be willing to make long-term production choices.

Farmers in Trinidad were found to prefer receiving their information from informal information sources; therefore, an effective way to diffuse information and technologies to farmers is by creating relationships with both the producers and the sources of informal information. Education and training programs must be altered to fit this paradigm of producer communication, learning, and adoption. Extension efforts are a great source of agricultural information and technology (Bernsten & Snapp, 2009; Rogers, 2003), but this study found informal and potentially biased information sources were acting as the change agents in Trinidad. If extension is to maintain its position as an agricultural change agent, it will need to better translate research information into more understandable, practical terms and provide practical solutions (Bernsten & Snapp, 2009; Rogers, 2003).

This study also found the lack of youth in agriculture is a major issue to the future of the industry. The agricultural industry in Trinidad will greatly diminish if youth do not view agriculture as a viable career. Research with youth groups is recommended to determine what education, incentives, and other factors are necessary to engage youth in production agriculture. Evaluating and revising the land tenure policies and reducing undue risk in

production agriculture could attract people to the agricultural industry in Trinidad and Tobago.

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