Benchmarks for Supplying Produce to Commercial Buyers: A Case Study with Small Farmers

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Abstract

An illustrative case study of a six-year research-outreach initiative that successfully assisted small and limited-resource farmers to supply produce a commercial buyer revealed benchmarks that were necessary to meet. The case study data was gathered from a variety of sources, including meetings with commercial buyers and farmers, site visits to processing centers and corporate farms, conference calls, and interviews with personnel involved with the "hands-on" operation of the effort. These data were organized into a set of benchmarks that must be successively met in order to supply produce commercially; these benchmarks were capacity, capability, quality, food safety, consistency, sustainability, and marketability. It was concluded that for small and limited-resource farmers to meet these benchmarks, organization and external support would be required.

Keywords: Small Farmers, Produce, Commercial Buyers, Farmers Cooperative, Sustainability

1. Introduction

From 2011 to 2016, a commercial buyer partnered with a university in a research-based outreach initiative to investigate how to incorporate small-scale produce growers into their pool of suppliers. The buyer, at that time, was interested in the potential for increased marketing opportunities and transportation costs savings from locally branding and supply. In helping with this effort, the buyer recruited the support of their brokers who agreed to take on the task of providing technical assistance on the issues involved with supplying produce according to the commercial industry standards. These standards pertain to acceptable practices in shipping produce from beginning to end, that is, from arranging an order, through delivery, to invoicing. For the buyer, the methods used in supply are as important as the produce supplied; both had to conform to industry standards, and in this effort, although there were some significant variances offered due to scale, these standards were maintained. The fruits and vegetables sold through the stores to the customers had to meet the usual specifications (Hill et al., 2014).From the beginning of the initiative, it was understood among the executives of the commercial buyer that there would need to be a commitment to providing "hands-on" support and assistance to ensure that the information gathered was of value. With changes in personnel at the commercial buyer, brokers, and the progress of the initiative, the underlying objectives were regularly reinforced to promote the continuance of the support. During the initiative, the buyer approved and accepted several products including watermelon, shelled southern peas, leafy greens, yellow and zucchini squash, and eggplant. Each of the products was purchased by the buyer and managed by a particular broker. The brokers determined the communication processes used concerning the produce supplied through the effort; the buyer approved purchases, determined destinations, and set amounts of shipments. However, the pricing, supply period, and specifications were decided upon before of the season. The brokers also determined whether and how much they would provide technical and clerical assistance, advancement of shipping supplies, site visits, and presentations. From the various interactions with the commercial buyer and brokers, the requirements for commercial produce supply were determined. There were five critical benchmarks that had to be met towards the approval for supply to the buyer. Also, there was one, considerable underlying assumption, a benchmark that was unquestionably presumed from the beginning. Furthermore, there was another, somewhat voluntary, benchmark that would be valuable to meet. The goal of this research-outreach initiative was to determine the means and methods necessary to allow small-scale and limited-resource farmers to sell produce commercially.

Until recently, small and limited-resource farmers have rarely been able to supply produce to commercial buyers. The objective of the research-outreach initiative was to explore how these farmers would be able to supply produce commercially and maintain the effort. The focus of this case study was to document information gathered and the benchmarks that had to be met.

2. Background and Literature Review

Several studies have documented research-outreach efforts to assist farmers to sell produce to commercial buyers. Hill et al. (2014) explored the expansion of produce marketing opportunities presented by a partnership between a university, a commercial buyer, and, socially and historically disadvantaged farmers (SHDFs). The authors concluded that, although there have not been many instances of SHDFs breaking into the commercial markets and remaining viable over time, it is not unattainable given the commercial success stories of U.S. agricultural cooperatives. Hargrove et al. (2014) assessed an agricultural consortium of five 1890 land grant universities working in partnership with farmer-based cooperatives to market fruits and vegetables to a commercial buyer. They concluded that because the farmers were able to negotiate price points, develop a cold chain management system, properly package and store produce, and cultivate and build a mutually beneficial relationship with the buyer, several benefits were attained, such as supplemental income to farmers, expansion of the existing regional food system, and promotion of good farm management practices. Robinson et al. (2014) also reported on the formation of a farmers cooperative to supply produce commercially. These farmers received the training necessary to understand the importance of working together, internal management and controls, sharing of knowledge, resources, and experience, doing business at higher volumes/quantities, and operating at a higher level of quality assurance. They noted that the success of the cooperative would require that members work closely together, especially in communications; be totally committed; learn the importance of quality control, and be in "lock-step" with every aspect of the commercial marketing effort.

Studies are also documented on more specialized research-outreach efforts towards assisting farmers to sell produce to commercial buyers, such as with irrigation, food safety, and pest management. Shange et al. (2014) demonstrated the development, utilization, and education on a sustainable irrigation system, in both energy and water conservation. This was intended to provide opportunities for SHDFs to have steady production capacity while offsetting energy costs, allowing them to take part in the expanded marketing opportunities with commercial buyers. Vaughan et al. (2014) examined the methods used in a food safety education program with SHDFs, designed to assist them with obtaining certification. He identified the various challenges for these farmers, such as the need for motivation and information, and offered strategies to address these challenges. Wall et al. (2014) shared the challenges of African-American women in successfully securing food safety certification, as required by commercial buyers. The certification process was an effort undergirded by university outreach and research staff, commercial partners, and support from federal agencies and state offices. Vaughan et al. (2016) examined good agricultural practices used to assist a small-scale produce processor to obtain food safety certification, as required by Walmart standards. It was concluded, from detailing the changes needed for successful audits, that broad and extensive training and technical assistance may be necessary to help small-scale processors become food safety GAP certified. Quarcoo and Bonsi (2014) documented the integrated pest management (IPM) activities, pest problems encountered, IPM methods recommended for SHDFs, and pesticide residue issues found through the provision of technical expertise to farmers.

3. Method

3.1 Illustrative Case Study

The illustrative case study method was followed in this study. As defined by Becker et al. (2015, p. 5), illustrative case studies are "primarily descriptive... typically utiliz[ing] one or two instances of an event to show what a situation is like." Illustrative case studies are described Morra and Friedlander (1999, pp. 9-10) as a type of descriptive case study: "These case studies primarily describe what is happening and why, to show what a situation is like. This is especially useful to help interpret other data that may be available, such as survey data. [The World Bank Operations Evaluation Department] has many examples of this type of case study. Its study of structural and sectoral adjustment (Jayarajah and Branson, 1995) sampled and reviewed 99 loan operations in 42 countries, and provides an annex with case studies of 5 countries…

Illustrative case study sites are usually selected as typical or representative of important variations. They provide the realism and vividness of anecdotal information. The number is kept small to help keep the reader's/user's interest. Data often include visual evidence. Reports may use self-contained, separate narratives or descriptions. In using the illustrative case study, the challenge is in selecting the instances. The case or cases should adequately represent the situation.

Where considerable diversity exists, it may not be possible to select a "typical" site." In this study, the event, or case, was the effort by an educational institution working with a group of small and limited resource farmers to comply with produce industry supply standards. The term "commercial buyer" is construed to also mean a "commercial retailer," although many buyers do not sell their goods to the end consumer; however, here these terms are used interchangeably.

3.2 Data Sources and Analysis

This study documents data gathered through several university personnel over the six-year period of this effort. These data were taken from meetings with commercial buyers, co-managers, and farmers, site visits to processing centers, corporate farms, and small farms, conference calls, symposia, outreach meetings and conferences, and interviews with personnel involved with the "hands-on" operation of the effort. The data were organized by their importance and role in facilitating the farmers to be able to supply produce commercially. These data were examined to determine particularly how they had an effect on the effort. For example, the commercial buyer considered accepting watermelon, but the watermelon had to be of a certain size, and the buyer issued documentation of their tolerances on coloration and physical defects. The first set of data went towards the issue of capability, that is, the farmers' ability to grow the crop to the specified size. The second set went toward the issue of quality; that is, the farmers' ability to stay within the defects tolerances. It was possible that the farmers could not have grown a watermelon to the acceptable size, but could have met the defects tolerances. Conversely, it was possible that the farmers could grow a watermelon to the size that was acceptable, but not have stayed within the tolerances acceptable for defects. These two sets of data were, therefore, distinct as they were related to two different benchmarks; that is, capability and quality. As more data was gathered that did not fit into the existing identified benchmarks, such as the requirement for food safety certification, those data were organized separate from the first two, and thereby new benchmarks were identified. Similar to how the first two were distinguished, it was possible to have met either or both of the first two benchmarks, and not the new benchmark, or vice versa. Also, interactions with the brokers and the commercial buyer informed this process of defining the benchmarks through the data gathered.

4. Results

4.1 Benchmarks and Definitions

The data presented were categorized into seven benchmarks, presented in Table 1. The development and understanding of this set of benchmarks were ongoing throughout the cooperation between the university, the small farmers, the commercial buyer, and the brokers over the six-year period. These benchmarks are ordered in terms of the progression of time as well as the progression of their importance within the effort. As mentioned above, the underlying assumption benchmark is capacity. The five successive benchmarks are capability, quality, food safety, consistency, and sustainability. The optional benchmark is marketability.

Table 1. Case study benchmarks, their descriptions, and how they are met and measured.

Benchmark	Description / Definition	How Benchmark is Met and Measured
Capacity	Basic facility to sell produce according to commercial methods and standards	Farmer has the wherewithal to supply produce commercially. Standard methods of handling, holding, documenting, and management are used.
Capability	Agronomic ability to grow the specified crop	Farmer can supply the produce. Acceptable varieties are grown successfully.
Quality	Adherence to produce industry physical and aesthetic standards	Farmer can meet the specifications. Rigorous defect and color standards are met.
Food Safety	Verification that produce is grown in a manner that reduces the risk of contamination	Farmer utilizes industry-recommended "Good Agricultural Practices" in production, harvesting, and handling. Farm operation is food safety/GAP certified.
Consistency	Maintenance of a commitment to the scheduled of amounts and dates for shipment	Farmer can meet the quantity needs and timetable. All shipments are correct in volume and on time.
Sustainability	the continuation of the and ability to supply produce notwithstanding the agricultural risks	Farmer can supply produce to the buyer on a long-term basis. Farm uses standard risk management techniques.
Marketability	the ability to promote the produce items independently, to some extent, of the retailer	Farmer has the means to generate sales of the product in the stores. Products are highlighted in in-store and general promotions.

4.2 Capacity

In order to provide for the needs of the growing population, the global food system has become more complex over the past few decades. The management, scientific, and regulatory components governing bringing food to consumers have modernized over this period. Much of the processes involved in the global food system for perishable, fresh produce has become uniform and very efficient. New industries have been created to support the system, such as reusable packing container (RPC) rental and sterilization companies. Commercial buyers over time have encouraged changes which have improved the quality of the products, shortened the time between the supplier and the consumer, and maximized profits. These changes have included standard procedures in four areas, packing and processing, storage and transportation, ordering and invoicing, and staffing and management. In this research-outreach initiative, the steps taken were iterative and by trial-and-error. However, necessarily, the first steps taken were to develop capacity in packing and processing, storage and transportation, ordering and invoicing, and staffing and management.

4.2.1 Packing and Processing

Packing and processing, or handling, comprises all the automated and manual stages it takes to prepare harvested produce for shipment to market. Commercial buyers, from the retail standpoint, intend that what they offer to customers have uniformity and quality. Specifically, what is present in any store at all times should be similar. Packing and processing requirements are determined from produce and retail industry standards. Produce which is delivered must be ready to enter the distribution system to be shipped on to the stores. This includes the produce: meeting the grading standards; being picked, pre-processed, or processed; having code stickers and tags; being packed in approved containers (e.g., boxes, crates, clamshells, bags); having traceability and origin labeling, etc.

4.2.2 Storage and Transportation

Storage and transportation includes all the vehicles, equipment, structures, and facilities necessary to move the produce from the harvesting on the farm, through handling, to sale in the stores. The storage and transportation method and procedures will be dictated by the characteristics of the particular fruit or vegetable. For example, some produce may be stored at room temperature, some require refrigeration only for shipping, and others, at all times. Facilities will need to be designed for convenience in shipping and receiving, and equipment for loading and unloading must be available. Commercial buyers will require that vehicles coming to their warehouse or retail facilities meet their standards for delivery.

4.2.3 Ordering and Invoicing

Ordering and invoicing are among the most critical communications. Commercial buyers and their brokers have standard and acceptable methods of keeping and validating records of shipments and deliveries. Such methods are uniform, and the documents involved must contain the information necessary to permit delivery. Some documents are common to commercial sales such as orders, bills of lading, invoices, etc. Other means of communication must also be available, namely, email, facsimile, and phone.

4.2.4 Staffing and Management

Packing and processing, storage and transportation, and ordering and invoicing all require personnel to undertake those tasks. However, there is also an expectation from commercial buyers, that a supplier will have a capable and adequate workforce to maintain standards, procedures, and performance levels. Packing requires workers who are knowledgeable and reliable in grading and quality and managers who can account for and coordinate a shipment. Similarly, processing requires knowledgeable workers who are also trained in safe food processing and handling, hygiene, and sanitation and managers who are equipped to monitor and document their work. Storage and transportation workers should be able to inspect and maintain equipment and vehicles, operate them correctly and safely, and be available at the early or late hours if necessary. Their managers must have the proficiency to communicate with the buyers and transporters and to keep records. Persons tasked with oversight of orders and invoicing must have competence with the use of various office technologies, such as a scanner, fax, computer, or mobile phone. Record keeping and documentation are important as it leads to payments. Substantial efforts were made to build the capacity for this research-outreach initiative. Federal, state and other funds were leveraged to provide the personnel and infrastructure. For building capacity in the various areas, the necessary items are shown in Table 2. The majority of the capacity in the last area, staffing and management, was provided by current university employees. The task of processing, however, was outsourced to a small farmer who has a processing facility, with some assistance from university staff. The necessary tasks for building capacity in the various areas are shown in Table 3.

Table 2. Items Necessary for the Building of the Various Areas of Capacity

Area	**Items Necessary**
Packing and Processing	Bins, pads, and lids RPCs Containers (i.e., clamshells or bags) Stickers Labels for bins, RPCs, and containers Rubber bands and band tags Papers Shellers and Blower Ice maker Pallets
Storage and Transportation (Facilities)	Walk-in cooler(s) In-field coolers (at farms) Forklifts Pallet jacks Indoor storage Covered outdoor storage Refrigerated truck
Ordering and Invoicing	Computer Internet access Facsimile or scanner Cellular phone

Table 3. Tasks Necessary for the Building of Capacity in the Various Areas

Area	Tasks Necessary
Packing and Processing	Grade produce for quality and size Assemble bins or inspect or clean crates Operate and maintain shellers and blower Inspect, pack or ice produce Label produce, containers, bins or crates Account for traceability of shipments
Storage and Transportation (Facilities)	Operate and maintain coolers and equipment Handle produce for receiving and shipping Drive forklift for receiving and shipping Drive shipments to warehouses
Ordering and Invoicing	Coordinate with farmers to determine loads Communicate with co-managers Handle and confirm bills of lading (BOLs) Invoice co-manager and manage accounting

4.3 Capability

Commercial varieties of fruits and vegetables have been developed through the selective breeding and now genetic engineering. These varieties are "designed" to make commercial production, handling, and sales highly efficient and effective. Commercial varieties may be drought tolerance, provide high yields, or have morphology suitable for harvesting. They may also have high moisture retention, a more durable outer layer, or provide ease of processing. To promote sales, they have a desirable color, flavor, shape, shelf life, or nutritional values. Developing these optimized varieties require efforts and expenses that are usually reflected in the price of the seeds and plants. Also, commercial varieties often require more management, technical knowledge, and agricultural inputs fertilization, irrigation, pollination, etc. to produce than traditional varieties. Basically, commercial varieties usually have higher prices and production costs. However, commercial buyers require produce that is profitably produced, acceptably transported, and effectively marketed in the stores. Therefore, commercial varieties are integral to the food system. In this research-outreach initiative, over the six-year period, the farmers have grown many different varieties of the crops accepted. The varieties of the fruits and vegetables had to meet the basic retail criteria and be of high quality. Most of the crops sold through the initiative were those that the farmers had been and were able to grow. An effort was put into determining which of the commercially available varieties fit into the standards of the buyer and could be profitably grown by the farmers.

4.4 Quality

Along with the commercially desirable properties held by commercial varieties, the quality is important in making sure that the produce will "sell-through" the stores. Aesthetics are important to consumers; however, the condition of the fruits and vegetables is vital for factors such as spoilage prevention, storage viability, and shelf life. Most commercial buyers have rigorous quality control programs for produce. Suppliers are typically provided with the specifications for each type of fruit and vegetable. Acceptable ranges for weight, color, shape, size, containers, packing configuration, grades, etc., are included in these specifications. The allowable number or prevalence of defects in a lot, if any, along with images of ideal produce, is designated. Normally, every incoming delivery of produce to the buyer's warehouse is inspected against the specifications. The entire delivery or any portion of may be rejected for non-conformity with the specifications. In the event of a rejection, documentation of the reasons, with images, is sent to the supplier. The supplier then may choose whether the warehouse may dispose of the delivery, or, at the supplier's expense, have the delivery returned. The quality standards were readily available from the brokers and the commercial buyer. Many of the farmers were dedicated to making sure that farm workers observed the quality specifications. Watermelon, for example, was graded both in the field and in the packinghouses. Fruit that were too small or too large or had defects were culled, that is, discarded or diverted to local markets. Fruit were also rigorously screened for the presence of disease. Fortunately, there were very few rejections in the entire initiative, and those few were caused by late-season disease and underweight. As for the vegetables, the farmers were specific on the desired weight of the collard greens bundles and with the packing of crates. The farmers were diligent in picking the squash, zucchini, and eggplant by the specifications of length, diameter, or weight.

4.5 Food Safety

Food safety will continue to be critical for commercial buyer supplier approval programs. Carried out by third-party firms that are private or public, audits of on-farm practices, worker training and conduct, and traceability record keeping give some assurance that growers are taking significant measures to minimize the risks of contamination to fruits and vegetables. Requiring that produce suppliers are food safety certified also may satisfy insurance carrier concerns and reduces legal exposure for the buyer. The commercial buyer has required food safety certification at the highest levels since the initiative began, and the third-party firms accepted have changed over the years. In 2013, USDA Agricultural Marketing Service released their Produce Harmonized Good Agricultural Practices (GAP) with Global Markets Program (formerly "Addendum") at an Intermediate Level which has met the commercial buyer's standards. Purely out of necessity, the university started the educational outreach program on food safety for serving the research-outreach initiative. Every aspect of a farming operation is addressed by food safety; for the USDA AMS Produce Harmonized Good Agricultural Practices (GAP) program, the areas of concern are found in Table 4. Each of the areas requires actions for compliance from developing a procedures or policy, to documenting an action taken, to keeping regular records of measures. Examples of such would be creating a headwear policy for workers and visitors, maintaining the results of pesticide residue testing for produce, and having a daily log for cleaning of toilet facilities. These requirements are comprehensive, and mostly new to the small farmers in the initiative. There have been several different educational methods utilized since 2011 to introduce farmers to food safety Good Agricultural Practices (GAPs), and assist the farmers in the initiative in becoming certified. The methods utilized included large group trainings, small group meetings, weekly conference calls, outreach publications, on-farm mock audits, individual consultations, tours to broker corporate farms and processing facilities, visits from the brokers to the small farms, and various presentations by brokers and buyer representatives. The method that proved to be the most effective was individual consultations, in combination with some of the other methods. In the consultations, university research-outreach personnel met with farmers at their farms to review the records, talk to workers, and observe the farms in advance of audits (Vaughan et al., 2014).

Table 4. Food Safety Areas from the USDA AMS Harmonized GAP Field Production Checklist

Checklist Section	Food Safety Area
General	Management Responsibility Food Safety Plan Documentation and Recordkeeping Worker Education and Training Sampling and Testing Traceability Recall Program Corrective Actions Self-Audits
Field Production	Field History and Assessment Worker Health/Hygiene and Toilet/Handwashing Facilities Agricultural Chemicals/Plant Protection Products Agricultural Water Animal Control Soil Amendments Vehicles, Equipment, Tools and Utensils
Harvesting	Pre-harvest Assessment Water/Ice Containers, Bins and Packaging Materials Field Packaging and Handling Postharvest Handling
Transportation (Field to Packinghouse)	Equipment Sanitation and Maintenance
Global Markets Primary Production Addendum	Food Safety Plan and Documentation Propagation Material Fertilizers and Biosolids Harvesting Agricultural Chemicals Waste Management Food Defense

4.6 Consistency

To meet the consumer demand for fresh fruits and vegetables, commercial buyers work with brokers to plan the amount and timing of the supply sometimes a year or more in advance. Many commercial buyers record and follow sales trends, even at the store level, to predict the needs for future seasons. This method allows for stability in providing produce, and also requires and enables the development of long-term relationships with suppliers. At any given time of the year, a commercial buyer can accurately determine the potential needs of any fruit or vegetable, which fluctuate in a season. Accordingly, the agreements made with brokers specify the quantities needed for each warehouse and the time that that quantity is needed. An agreement for the supply of any crop, among other things, will include a schedule, and there is an expectation that this schedule will be followed exactly. In retail sales, it is known that customers gain an appreciation for a product when they can purchase it regularly. To support this appreciation, the product must be in stock, when the customers demand it. The unavailability of a product may disappoint and deter customer demand; it may even discourage customers from seeking that product, and others, from that buyer altogether. Consequently, the supply of the fruits and vegetables must be at the agreed upon amounts, and be delivered at the agreed upon times. That is, the supply must be consistent. For this research-outreach initiative, it would have been difficult, if not impossible, for one small farmer, to satisfy even the comparatively, commercially minuscule amounts required from the initiative consistently over the duration of supply.

Early on, in 2011, the university utilized the strategy of helping the farmers to work together by forming a cooperative, the leadership of this cooperative was formed from leaders of existing cooperatives throughout the state. One of the goals of this strategy was to maintain the consistency of supply to the brokers (Robinson et al., 2014). Each season, an effort was made to stagger the planting and harvest of the crops, usually between farmers, so that the crop would not all mature at the same time. However, because climate conditions could vary between the farmers, this effort yielded various amounts of success. As a result, there were several incidences of inconsistency in supply. Sometimes, farmers counted upon to maintain the bulk of the supply during certain supply periods had a small or even no harvest, due to drought, flood, or disease. Also, the weather made several farmers scheduled for successive weeks mature simultaneously, and had to compete for what may have been a limited amount of supply. There still were instances, nonetheless, where, for a particular crop, the consistency of supply was maintained during a good season. In these instances, the key was not favorable agricultural or climate conditions, but the farmers agreeing to work together. With watermelon, one such example was found. Watermelon is shipped in large cardboard bins, each holding 700 pounds, in a tractor-trailer with a set number of these bins. During the 2015 season, this number was sixty bins. However, a farmer could have much more or significantly less than sixty bins of mature, healthy, harvested, and shipment-ready watermelon. The farmers, understanding the situation, agreed to cooperatively make efforts to "complete a load" by supplying only the remainder that was needed.

Consequently, on any load, bins from as many as four farmers might be included, yet all the farmers might or might not be actively harvesting. By cooperating, bins contributed from farmers with large harvests were combined with bins from others who had small harvests to consistently deliver full loads. The same strategy was used by the farmers to meet the required supply for collard greens, squash, and zucchini, but to a much lesser extent.

4.7 Sustainability

In the produce industry, several commercial buyers have the goal of capturing a sizable portion of the global food market in the near future. To accomplish this, commercial buyers in recent years have focused their attention on maintaining relationships with suppliers who can respond to their increasing and changing requirements. Also, commercial buyers evaluate the long-term agronomic potential for its suppliers to adjust and to maximize their resources. To that end, production information such as land holdings, yield per area, and input use is reviewed for certain suppliers. Also, with the increased contracting of labor, greater scrutiny has been placed on compliance with labor laws. Overall, many commercial buyers are assessing the sustainability of their supplier base. For some years, the university had responded to requests for information on the farmers that supplied through the initiative. In 2015, however, representatives from one of the brokers visited to conduct tours of all the supplying small farms to make recommendations on how to improve the supply of produce. The main recommendation was to increase the amount of inputs in irrigation, pest management, and labor.

In response, the university collected information on inputs for the crops supplied through the initiative from the most successful supplying farmers. This included the expenditures for seeds or plants, irrigation, fertilizers and pesticides, and labor. The information was compared with commercial produce industry standards found in the literature for these specific crops as grown in this region (University of Georgia, 2009). The comparison showed the extent to which the small farmers in the initiative would need to increase these inputs to meet these commercial industry standards. These farmers were typically expending, on average, from twenty to seventy-five percent of the standard amounts of inputs per acre. The greatest shortfalls were in irrigation, where some crops were grown without irrigation at all, and the yields were far lower than industry standards with irrigation. Subsequently, the university made an effort to assist the farmers in obtaining federal resources for operating costs and irrigation.

4.8 Marketability

Commercial buyers, if also a retailer, provide product manufacturers with the opportunity to sell their products in their retail stores. In most cases, each product sold in a store will have several options of styles and brands. In fact, certain items, such as cereals or shampoos, will have several hundred options typically available in the same store. Even though the placement of a product in a store, which influences sales, is often purchased, the responsibility is on the product manufacturer to participate in activities that enhance sales outside and occasionally inside the retail stores. These activities outside the store include print, radio, TV, and social media advertising, promotion, sponsorships, etc. Inside the stores, these activities include displays, in-store coupons, tastings, etc. Where the outside activities typically are not coordinated with the stores, the in-store activities must be. The primary purpose of the outside activities is to prompt buyers to visit stores to buy the product. The primary purpose of the in-store activities is to distinguish the product from other similar products in the store for likely buyers. The brokers work closely not only with the commercial buyers, but also with the store and department managers. The opportunities for product suppliers to merchandise are typically arranged by the brokers through corporate with the local management, but may be arranged directly with the store. With the initiative, in the past few years, this aspect of increasing sales in the stores was discussed with the broker for the vegetables. There had been some minor effort to increase sales, such as having the university media team to post information in social media or having the university communications department to generate a press release. Unfortunately, outside of "word of mouth," and these efforts an expansion of these opportunities have not yet been manifested. The most promising activity discussed was the possibility of in- or outside-of-store tastings of foods. Though both the university personnel and brokers agreed that these activities would be substantial in increasing the "sell-through", such efforts remained in the planning stage.

5. Discussion

During the six-year period of 2011 to 2016, there were many outputs toward the goals of this university research-outreach initiative. The goals and the outputs are found in Table 5. These goals were identified at the establishment of a multi-state consortium on sustainable agriculture for historically disadvantaged farmers, for which this initiative was a component. The consortium determined these goals those to be necessary to "assist small farmers with the sale of their produce to commercial markets" (Hargrove et al., 2014). As a result of the initiative, the small farmers were able to supply five crops successfully to a major, commercial buyer, in amounts that were substantial to the farmers. The outputs were drawn from the data gathered during the initiative and categorized by how they went towards satisfying the consortium goals.

Table 5. University Research-Outreach Initiative Goals and Outputs

Goals	Outputs
Having access to a guaranteed market	Met quality, volume, and food safety specs Sold watermelons, peas, greens, squash and eggplant
Ability to market collaboratively	Farmers cooperative formed Majority of members sold under the cooperative Functional logistics and communications
Receiving hands-on-training in food safety, cold chain management, value-added processing, record keeping, transportation, etc.	Farms and facilities were GAP certified Field coolers and refrigerated trucks were used Post-harvest handling and shelling was traceable Farms cooperated to meet shipping volumes
Increases in farmer incomes	Peak revenues in 2014, additional crops added in 2015 Farms explored market diversity
Promote and teach good farm management practices	Increased volume, but not consistency Brokers visited to assessed farm inputs onsite

For example, it was necessary for the farmers to negotiate with the commercial buyer as a group. The farmers cooperative was formed to get the farmers to work together. Therefore, this output went towards the consortium goal them giving the farmer participants the "ability to market collaboratively." Consequently, the seven benchmarks defined in this study—capacity, capability, quality, food safety, consistency, sustainability, and marketability—present the major steps that must be taken, not just for small farmers, but for any farm operation to be successful in supplying to commercial markets (Table 1). In fact, several of the farmers that were involved with the initiative were approved to supply to other national specialty grocery buyers.

6. Conclusion

Although the singular success of assisting and facilitating small farmers to supply to a commercial buyer is significant, perhaps more important is the absolute wealth of information that was gathered, in many cases through trial and error, in this research-outreach initiative. These data gathered have shaped the efforts made in the initiative, in an iterative manner, and have also had an influence on how the university teaching, research, and outreach functions engage with and serve farmers. The "lessons learned" from the initiative have been and will continue to be documented and published. This includes certain specific aspects such as irrigation, cooperative formation, and food safety. For example, through the study of farmer sustainability, it was learned that for the farmers must have irrigation to continue to be able to supply to the commercial market. This would allow them to maintain the consistency of production and to manage the risk of drought.

Also, from the small farmers' interactions with the broker farmers, it was learned that pest management is a vital component of a commercial operation. However, the university experts on integrated pest management (IPM) have determined that small and limited resource farmers will necessarily need to approach that level of pest management in a sustainable and cost-efficient manner. This study focused on the benchmarks necessary to have been met for the farmers in this research outreach initiative to be equipped to supply the commercial market. The details of the more specialized efforts within the initiative that assisted with helping the farmers to meet the benchmarks delineated here will be examined in future studies. Based on farmer goals and market needs, the understanding of these benchmarks will be modified and expanded.

References

Becker, B., P. Dawson, K. Devine, C. Hannum, S. Hill, J. Leydens, D. Matuskevich, C. Traver, and M. Palmquist. (1994-2012). "Case Studies." [Online] Available: http://writing.colostate.edu/guides/guide.cfm?guideid=60 (November 30, 2016)

Hargrove, T.M., W.A. Hill, J. Brown, M. Robinson, I. Cole-Crosby, E. Myles, B. Lawton, and K. Martin. (2014). "A Case Study Analysis of a Regional Food System: The Sustainable Agriculture Consortium for Historically Disadvantaged Farmers Program." Professional Agricultural Workers Journal 1 (2): 1-11, Article # 4.

Hill, W.A., R. Shange, M. Robinson, and T.M. Hargrove. (2014). "A Transformative Partnership between Socially and Historically Disadvantaged Farmers, 1890 Land Grant Institutions, and Walmart." Professional Agricultural Workers Journal 1 (2): 1-5, Article # 2.

Jayarajah, C., and W. Branson. (1995). Structural and Sectoral Adjustment: World Bank Experience, 1980-92. Operations Evaluation Department, World Bank, Washington DC.

[Online] Available: http://documents.worldbank.org/curated/en/435351468740163386/Structural-and-sectoral-adjustment-World-Bank-experience-1980-92(November 29, 2016)

Morra, L.G., and A.C. Friedlander. (1999). "Case Study Evaluations." [Online] Available: http://documents. worldbank.org/curated/en/323981468753297361/Case-study-evaluations (November 29, 2016).

Quarcoo, F., and C. Bonsi. (2014). "Overview of the Integrated Pest Management (IPM) Terrain and Activities in Furtherance of the Walmart Initiative to Purchase Fresh Vegetables from Local Growers in Alabama." Professional Agricultural Workers Journal 1 (2): 1-14, Article # 8.

Robinson, M., J. Brown, A. Paris, W.A. Hill, T.M. Hargrove, B. Vaughan, R. Shange, A. Hooks, D. Hooks, T. Turner, B. England, and A. Zeigler. (2014). "Small Farmers Agricultural Cooperative Launched." Professional Agricultural Workers Journal 1 (2): 1-7, Article # 5.

Shange, R., R. Martin, V. Khan, K. Daniels, G.X. Hunter, G. J. Johnson, S. Musser, W. Puckett, and W.A. Hill. (2014). "Extending Sustainable Irrigation Opportunities to Socially and Historically Disadvantaged Farmers in the Alabama Black Belt to Support Commercial-Level Production." Professional Agricultural Workers Journal 1 (2): 1-8, Article # 3.

University of Georgia. (2009). "2009 MALTAG conventional vegetables planning budgets." [Online] Available: http://www.caes.uga.edu/content/dam/caes-website/departments/agricultural-and-applied-economics/ documents/extension/budgets/non-beef/2009ConvVegbudget.pdf (November 28, 2016).

Vaughan, B., D. Hooks, and M. Robinson. (2016). "Good Agricultural Practices Certification for Small-Scale Produce Processors: A Case of Food Safety." Journal of Extension 54 (6): Article 6RIB4.

Vaughan, B., A. Zeigler, G.D. Wall, M.D. Robinson, W.A. Hodge, C.O. Bonsi, N.R. Baharanyi, and W.A. Hill. (2014). "Case Study of a Food Safety/Good Agricultural Practices (GAPs) Educational Program for Small and Limited Resource Produce Farmers." Professional Agricultural Workers Journal 1 (2): 1-7, Article # 7.

Wall, G.D., W.A. Hill, B. Vaughan, B. Shipman, A. Maat, R. Hill, S. Tyson. (2014). "Alabama's Women in Agriculture: The Road to GAPs Harmonization and Global Addendum - Tuskegee's Walmart Initiative." Professional Agricultural Workers Journal 1 (2): 1-10, Article # 6.