



**International Food and
Agribusiness Management Review**

***Official Journal of the International
Food and Agribusiness Management Association***

**Volume 14: Issue 1
2011**



International Food and Agribusiness Management Review

Supporters and Partners



**Santa Clara
University**

Leavey School of Business



STRONG ROOTS - BRIGHT FUTURE



ILLINOIS

Food and Agribusiness Management



**TEXAS A&M
UNIVERSITY**

The IFAMR Open Access Project is supported in part through contributions from these institutions. Scholars, practitioners, students, and policymakers may now read and download the most current and archival content from the IFAMR website. The Board of Directors of the International Food and Agribusiness Management Association feel that open and immediate access to IFAMR's articles and case studies will dramatically elevate the quality of scientific inquiry and instruction around the world in the field of agribusiness. If you would like to support this effort please contact: Kathryn White, Email: ifamr@ifama.org.



International Food and Agribusiness Management Review

Editorial Staff

Executive Editor

Peter Goldsmith
University of Illinois, USA

Regional Managing Editors

Africa and Middle East

Herman Van Schalkwyk, University of the Free State, South Africa

Asia, Australia, and New Zealand

Murray McGregor, Curtin University of Technology, Australia

Nicola M. Shadbolt, Massey University, New Zealand

Europe

Jacques Trienekens, Wageningen University, The Netherlands

North America

Corinne Alexander, Purdue University, U.S.A.

Vincent R. Amanor-Boadu, Kansas State University, U.S.A.

Mark Hansen, Brigham Young University, U.S.A.

David Sparling, The University of Western Ontario, Canada

South America

Joao Martines-Filho, Universidade de São Paulo, Brazil

Case Editor

John Siebert, Texas A&M University, U.S.A.

Editorial Board

Filippo Arfini, *Universita' di Parma, Italy*

Stefano Boccaletti, *Universita' Cattolica, Italy*

Michael Boehlje, *Purdue University, USA*

Fabio Chaddad, *University of Missouri, USA*

Dennis Conley, *University of Nebraska - Lincoln, USA*

Francis Declerck, *ESSEC Business School, France*

Hamish Gow, *Massey University, New Zealand*

David Hughes, *Imperial College - London, United Kingdom*

Eluned Jones, *Texas A&M University, USA*

Jukka Kola, *University of Helsinki, Finland*

Jay Lillywhite, *New Mexico State University, USA*

Woody Maijers, *INHOLLAND University, The Netherlands*

Marcos Fava Neves, *FEA / USP / PENSA, Brazil*

Onno Omta, *Wageningen University, The Netherlands*

Hernán Palau, *Buenos Aires University, Argentina*

Christopher Peterson, *Michigan State University, USA*

Thomas Reardon, *Michigan State University, USA*

Mary Shelman, *Harvard Business School, USA*

Johan van Rooyen, *University of Pretoria, S. Africa*



International Food and Agribusiness Management Review
Volume 14, Issue 1, 2011

Table of Contents

RESEARCH

- 1. Measuring Retail Service Quality in Farm Supply Cooperatives**
Norbert Wilson, Thomas Hall, and Deacue Fields.....p. 1
- 2. Consumer Preferences for Fresh Citrus: Impacts of Demographic and Behavioral Characteristics**
Zhifeng Gao, Lisa O. House, Fred G. Gmitter Jr., M. Filomena Valim, Anne Plotto, and Elizabeth A. Baldwin.....p. 23
- 3. Market Access for Local Food through the Conventional Food Supply Chain** *Getachew Abatekassa and H. Christopher Peterson.....p. 41*

CASE STUDIES

- 4. Processed Chili Peppers for Export Markets: A Capital Budgeting Study on the AgroFood Company** *Ayman A. Shelaby, Wael M. Semida, Daniel F. Warnock, and David Hahnp. 61*
- 5. Enterprise Risk Management at Top Agro Inc.** *Francesco Braga..... p. 71*

EXECUTIVE INTERVIEW

- 6. The Role of the Private Sector in Agricultural Development**

An Executive Interview with Joseph Zed Bahsoon, owner and Managing Director of the Bennimix Food Company, Sierra Leone, Africa
By Peter Goldsmith..... p. 83



International Food and Agribusiness Management Review
Volume 14, Issue 1, 2011

Measuring Retail Service Quality in Farm Supply Cooperatives

Norbert Wilson[Ⓐ] Thomas Hall^ᵇ, and Deacue Fields^ᶜ

[Ⓐ] *Associate Professor, Department of Agricultural Economics & Rural Sociology, Auburn University
100 C. Comer Hall, Auburn, Alabama, 36849, U.S.A.*

^ᵇ *Management Service, Alabama Farmers Cooperative, Inc.,
P.O. Box 2227, Decatur, Alabama, 35609-2227, U.S.A.*

^ᶜ *Associate Professor and Extension Specialist, Department of Agricultural Economics & Rural Sociology,
Auburn University, 100 C. Comer Hall, Auburn, Alabama, 36849, U.S.A.*

Abstract

Based on the Retail Service Quality Scale (RSQS), we develop a tool for managers of local farm cooperative stores to assess which customer service groups matter to their customers. Principal component analysis (PCA) reveals three customer groups. The results of the multinomial logit model showed younger patrons and homeowners are likely to deem customer service and personal interaction as important. Customers, who consider appearance and accessibility as important, are college graduates and persons dependent on farming. Older patrons and wildlife enthusiasts are likely to view the policies and reliability as important factors of service quality.

Keywords: Agricultural Cooperatives, Retail Service Quality Scale (RSQS), Service Quality (SERVQUAL), Principal Competent Analysis (PCA), Multinomial Logit.

ⒶCorresponding author: Tel: + 1 334.884.5616
Email: wilsonl@auburn.edu

Other contact information: T. Hall: thomah@alafarm.com
D. Fields: fieldde@auburn.edu

Introduction

Local farm supply cooperatives in the US have evolved as their customer demands have changed. Farmers originally organized these cooperatives to obtain various farm inputs. Subsequently, they began offering other products such as seed, crop protectants, feed, farm hardware and application services. Now, some cooperative stores sell lawn and garden supplies, clothing and pet care products. The change in product offerings and services necessitates a change in thinking in terms of service quality among cooperatives. As additional products are added that are not “wholesale” in nature (low margin, high volume items such as fertilizer) and as the demographics of the customer base evolves, customers who purchase these products likely seek different service quality attributes.

The results of this study will help decision makers of local farm supply cooperatives better understand expectations of their patrons relative to retail service quality. We base our work on the broad notion of service quality: “The general consensus within this literature is that service quality is a multidimensional attitude held by consumers, with each dimension comprising of a number of attributes or service aspects” (Schembri and Sandberg 2002, p. 190). The service quality literature is not, and neither are we, concerned about individual services that a cooperative store may provide such as fertilizer applications or lawn mower repair. Reflective of the service quality literature, we are interested to understand how customers, in our case member-patrons, experience the store. These experiences, as defined in the retail service quality literature, include five dimensions: physical appearance, reliability, personal interactions, problem solving and policies. Analysis of service quality is vital to helping retailers improve their competitive position through enhanced customer satisfaction.

To facilitate the analysis, we use a survey instrument based upon a previously tested scale known as the Retail Service Quality Scale (RSQS) (Dabholkar, Thorpe and Rentz, 1996). We sent the instrument to member-patrons of 10 retail cooperatives in Alabama, US. With principal component analysis (PCA), we classify patrons into groups based on their service quality experiences. A multinomial logit model permits us to determine the relevance of customer characteristics for each PCA group for AFC. Additionally, we consider a sample of stores and explore the PCA groups for the store and provide store specific analysis.

Our contribution to the literature is three-fold. First, we show that RSQS is an applicable model for farm retail cooperative stores. The marketing literature, which recommends instruments for measuring service quality, has typically focused on merchants and service providers that a majority of the population frequent. Although local cooperatives may not be as iconic or as large in sales volume as mass merchants, they serve a vital role in their local, mostly rural, economies and communities. Second, we extend the literature on service quality to show how customer characteristics influence the types of service quality that matter to different customers. Few researchers in this literature have connected customer characteristics to their interest in service quality. Also, few researchers have used the nonparametric PCA to consolidate the numerous questions of the RSQS to develop groups (or dimensions) and test the internal consistency of the possibly new groups relative to the traditional groups. Third, we apply this method and provide AFC recommendations on which areas of service quality it should focus. While our

recommendations are specific to AFC, the results point to strategies that may be applicable to other cooperatives and rural retailers in the US.

AFC Member Cooperatives

AFC is a regional, federated, supply and marketing agricultural cooperative that provides its cooperative members with products and services in Alabama and the Panhandle of Florida. Since its beginning, AFC has grown to include more than 2,300 employees and has become one of the largest farmer-owned agriculturally-related businesses in the Southeast, with annual revenue of over \$300 million (Allen, 2009 and AFC, 2009). As a regional cooperative AFC serves member cooperatives in its sales region and provides products and services (accounting, information technology, training, etc.) to the local cooperatives.

Each local cooperative in the AFC family, in conjunction with sister local cooperatives, owns AFC. The control of AFC is from the bottom up with AFC responding to the needs of the local cooperatives. Likewise the local cooperatives are responsible to meet the needs of the member-patrons.

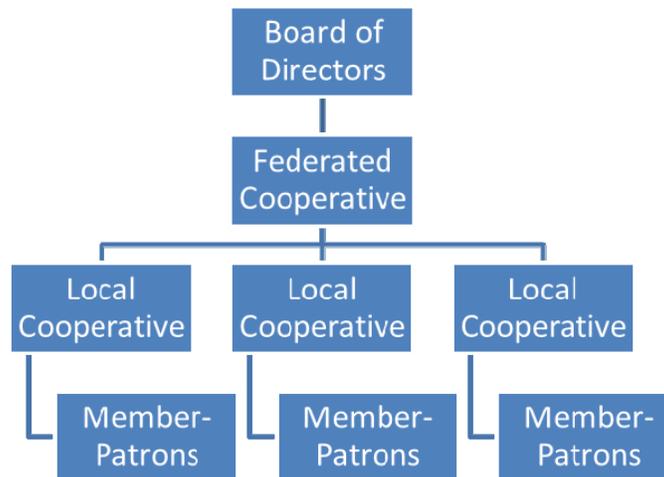


Figure 1. Organization of a Federated Cooperative

AFC's 44 member local cooperatives, with approximately 80 locations, provide products and services to a wide array of clientele in their local communities. Each location is diverse in their offerings because the local cooperative's aim is to meet the needs of their community or market area. All stores carry the traditional seed, crop nutrients, and crop protectants, but they do vary in the volumes of various products sold. A few stores' revenue is largely generated from row crop farmers, while other stores may largely meet the needs of livestock producers by supplying feed, pasture inputs, and animal health products. Aside from their traditional service and product offerings, a few stores have gas stations and/or tire shops. One store does a majority of its business in poultry supplies and provides a technician for 24-hour service calls of poultry houses. Another local cooperative's main market segment is building materials and supplies. Although most stores provide products for wildlife enthusiasts, one store has an entire department devoted to hunters and fishers, from clothing and plot supplies, to fishing lures and firearms. A visit to

only one of AFC's member cooperatives would only provide a narrow view of the product and service mix offered throughout the organization (Allen, 2009).

Although AFC member cooperatives are diverse as a whole, they all can benefit from understanding the needs of the customers. As the customer base evolves from a production agriculture base to homeowners, hobby farmers, and wildlife enthusiasts, so must the local cooperative change and adapt to meet the needs of this new clientele. Not only will the products and services offered vary, the levels of service quality (appearance, policies, reliability, and personal interaction) must change. Currently, AFC member cooperatives have no formal mechanism to measure patrons' satisfaction with service quality provided (Allen, 2009). The following section will review literature which suggests information and instruments that can be used to measure customers' expectations and perceptions of service quality.

Literature Review

Service quality is, or should be, important to cooperative managers as well as cooperative board members. Customers perceive services in terms of its quality and how satisfied they are with their overall experience (Zeithaml, 2000). Given the economic importance of the retail and service industries, many researchers have devoted a great deal of resources exploring service quality, which has resulted in multiple models proposed and evaluated.

Two of the more popular models for measuring service quality are below. Parasuraman, Zeithaml, and Berry (1988) assert that a firm's prerequisite for success is its ability to deliver superior service. To gauge a firm's service quality, one must be able to measure consumers' perception of quality. In order to have an objective approach to measure perceived quality, Parasuraman, Zeithaml, and Berry (1988) developed an empirical method they dubbed SERVQUAL.

Initially, Parasuraman, Zeithaml, and Berry (1985) conducted exploratory research, such as focus groups and in-depth personal interviews, in an attempt to understand consumers' preferences of quality and develop a conceptual model of service quality. The researchers found, that regardless the type of service assessed, consumers used similar criteria in evaluating service quality. The researchers determined that the criteria fell into 10 categories, which they labeled "service quality determinants".

Dabholkar, Thorpe, and Rentz (1996) developed and empirically validated a scale to measure retail service quality. In developing the instrument, the researchers conducted qualitative studies involving interviews with several retail customers and recorded the thought process of a few customers during an actual shopping experience. They also reviewed the service quality related literature and made some modifications to the original SERVQUAL scale, which produced a hierarchical factor structure scale that the researchers named Retail Service Quality Scale (RSQS). RSQS includes 28 items, of which 17 are from SERVQUAL and the additional 11 items from existing literature and qualitative research.

Dabholkar, Thorpe and Rentz (1996) concluded that RSQS was suited to measure a mix of services and goods, like those found in a specialty or department store. RSQS has five

dimensions: 1) Physical aspects: Store layout, appearance, and convenience, 2) Reliability: Keeping promises and performing services correctly (doing it right), 3) Personal interaction: Personnel being courteous, helpful, and inspiring confidence in customers, 4) Problem solving: The handling of returns and exchanges as well as complaints, and 5) Policy: Policy on quality of merchandise, parking, operation hours, and credit cards.

Researchers have used RSQS in many types of retail establishments as well as in different cultural contexts. The findings showed that people of different cultural backgrounds perceive service quality in different manners. For example, Mehta, Lalwani, and Han (2000) conducted research on service quality in the contexts of supermarkets and electronic good retailers in Singapore.

Despite the extensive use of SERVQUAL and RSQS (Brady, Cronin, and Brand, 2002; Brown, Churchill, and Peter, 1993; Gaur and Agrawal, 2006; among others), few researchers have done analysis of service quality in the agribusiness literature. Gunderson, Gray and Akridge (2009) used a variant of the SERVQUAL framework to develop a hierarchical model of service quality for cooperatives that service row crop producers in the Midwest US. Eastwood, Brooker, and Smith (2005) used SERVQUAL to assess the shopping experiences customers had at green grocers. McNeil and Wilson (1997) used SERVQUAL's gap method to examine the wholesaler-retailer relationship in the red meat market in Western Australia. Our work marks a departure from this literature by assessing which customer characteristics matter to different service quality groups.

Eastwood, Brooker and Smith (2005) and McNeil and Wilson (1997) used the SERVQUAL instrument as provided in the literature. Gunderson, Gray and Akridge (2009) modified SERVQUAL questions to address the interests of row crop producers. However, the questions in the survey follow the SERVQUAL structure. For example, SERVQUAL asks customers "When XYZ promises to do something by a certain time, it does so." Gunderson, Gray and Akridge (2009) ask "Employees at this supplier respond quickly to my needs." This question is appropriate for most retailers and not specific to Midwest row crop producers.

While that approach was appropriate for their analysis, we are concerned about a broader base of customers at the AFC cooperative stores. As the customer base at AFC stores include production and hobby farmers, wildlife enthusiasts, business and homeowners, we did not narrowly focus on just one type of customer or retail experience at the cooperative.

Farmers, who dominate this survey, are in some ways different than homeowners and wildlife enthusiasts in terms of the products that they purchase and volume of their purchases. However, all of these customers still visit the store and experience similar or the same service quality (staff and physical facilities). As the old adage states, "People buy from people." In the context of AFC, people also buy from stores. Therefore, we assert that regardless of the reason or type of products purchased, all customers experience the store's service quality (personnel, physical attributes and policies); thus, the RSQS model is appropriate in the retail context of AFC. In this light, our instrument is appropriate for all customers, so we ensure that we have business-to-business (B2B) and business-to-customer (B2C) experiences because both are vital to the validity of the results. Our goal is to investigate the diversity of customers and their experiences

of service quality at AFC member cooperatives. We use this diversity to help us explore the types of retail service quality that matters to the different types of customers that AFC member cooperatives attract.

Additionally, we are able to test the applicability of the RSQS model to the unique situation and diversity of farm retail stores. As much of the literature has tried to establish the applicability of service quality models under different market conditions, this project follows that vein of scholarly activity. We believe that member-patrons of cooperatives perceive service quality differently than customers at other types of non-member retailers; however, we are not able to measure this directly. If the RSQS model, as defined in the literature, fits the AFC example, then this framework, without modification, is applicable to a wider range of retail scenarios. In our analysis, we establish that the base RSQS model can be easily replicated at different cooperative stores and rural businesses. Our research establishes RSQS as an easy model for small, rural businesses to evaluate their retail service quality.

Model Development

Unlike the previous literature, we test which factors of customer demographics affect the dimensions (or groups) of service quality. As the survey instrument has 29 questions on the Likert scale, we needed a statistically reliable way to consolidate the questions into groups of service quality. Therefore, we used principal component analysis (PCA). One of the strengths of PCA is that it is a simple tool to consolidate many variables, in our case 29, into a smaller number of variables. The smaller set of variables (components) can be viewed as providing a description for the overall data set (Dunteman 1989, Harris 2001). Unlike latent classes in conjoint analysis, PCA is a non-parametric grouping of data. PCA establishes groups of data so that the groups have strong within group correlations and weak correlation between groups.

Based on the PCA groups, we test which customer characteristics influence the placement of customers into the various groups. By knowing which factors most likely put a customer in a particular service quality group, we can help stores determine the type of service quality the store should focus. We hypothesize the following model:

- 1) *PCA Group = f(age, household income, college education, acres of land leased, acres of land farmed, percent of household income from farming).*

PCA Group. We hypothesize that principal component analysis will yield five service quality groups, and these groups will be the same, or similar, as the dimensions of RSQS (physical aspects, reliability, personal interactions, problem solving, and policies). In order to obtain this variable, we use orthogonal rotation and the Kaiser criterion to retain the factors. Based on the groups that we identify for the sample, we predict the group that each respondent fits.

Age. As a person grows older, we hypothesize that they will prefer more personal interactions. When cooperatives first started handling retail products, customers would walk to the counter and ask for the item they needed rather than shopping the store. An older patron is assumed to still desire this type of service quality, where the employees are knowledgeable and friendly.

Household Income. As income rises, we assume that people have higher expectations of the store's physical aspects because they may have had a greater chance of being exposed to higher-end retail establishments. That is, they are concerned about cleanliness and being able to shop the store easily.

College Education. This indicator represents respondents who have a bachelors or higher degree. We assume that those with a minimum of a college degree, will value policies more than those with less education. Policies encompass operating hours and acceptance of credit cards. Those with higher degrees are typically professional and will be shopping at a cooperative after work and on weekends. They will most likely use a credit or debit card.

Acres of Land Leased. Our data show that wildlife enthusiasts lease the most land. Typically these customers are high income professionals that only frequent the store right before hunting season when they plant their wildlife plots. We hypothesize that they are most likely to deem problem solving as an important area of service quality, since they may need to return product not used and may have problems with either products or services.

Acres of Land Farmed and Percent of Household Income from Farming. We hypothesize that as the acres of land farmed and percentage of household income from farming rises, the more likely this customer segment engages in full-time production agriculture. Since farmers depend on cooperatives to provide them with the service or product they need, right the first time, it is assumed that this group deems reliability as their most important service quality

Survey and Data

We sent out a mailed instrument to member-patrons of ten AFC member cooperative stores. A total of 7,562 patrons with their names and addresses were in the databases of the stores, and the patrons made at least one purchase in the 2008 calendar year. Due to budget constraints, we sent a total of 5,000 surveys. Some stores had several thousand addresses in their database and others had only a few hundred. First, we examined the database for valid mailing addresses. Upon calculating the total number of valid addresses for the entire database and for each store, we, then, sorted the database in ascending order by street address number. Taking the total number of valid addresses for each store and dividing it by 5,000 generated a weighted average of participants for each store. Based on the weighted average, we then determined the number of participants needed from each store. Finally, we selected from the sorted list of addresses the necessary number of the potential participants to the nearest row number.

We chose a mail, paper-based survey for several reasons. First, the stores did not have e-mail addresses for their patrons. We could have sent a postcard to them with a website address; however, many member-patrons live in rural areas, and we assume that they are typically older. Based on the previous assumption, we thought that a web-based survey would yield a lower than desired response rate, because an older customer base may not be as familiar or comfortable with web-based data gathering. We considered conducting an in-person survey (intercept survey) after customers made a purchase. The primary benefit of this is the survey technique would reflect fresh experiences with service quality. However, in-person surveys have problems relative to the mailed surveys. Potentially, some customers patronize an AFC store only at certain times of the

year based on their needs. That is, row crop agriculturalists may choose to shop in the spring for seed, crop protectant, and crop nutrients; whereas livestock producers may shop mainly in the fall or winter for feed. Due to store hours, a working professional may only visit the store on Saturdays, so in-person surveys may have an inherent bias. To avoid this bias, we would have had to sample customers at various times and days during the week and virtually the entire year, which would be extremely costly. A mailed survey allows for more diverse customer segments to be reached regardless of when these customers shop.

Based on the Tailored Design Method (Dillman 2007), we decided to send out the survey in late fall. Regardless of the agriculturalists' occupation (row-crop or livestock), this time is potentially their slowest time of the year, which may permit the respondent to give more attention to the survey.

The instrument contained 28-items from the RSQS scale as proposed by Dabholkar, Thorpe, and Rentz (1996). We added an additional question in which we asked respondents about patronage they received from the local cooperative. We used a seven-point Likert scale, where "7" signifies "Strongly Agree" and "1" signifies "Strongly Disagree" with the 29 items (see Appendix 1). The respondents also answered questions about their use of the stores and demographic information.

Results

Ten AFC member cooperatives gave us permission to use their mailing lists of registered member-patrons. The database had 7,562 names and addresses. We collected a total of 301 surveys out of the 5,000 mailed. Of those, 276 surveys were usable which equates to a usable response rate of 5.52%, but relative to the original mailing lists our sample reflects 3.64% of the population of the ten stores.¹ Of the 276 respondents, 92.8% considered themselves white. The youngest respondent was 25 and the oldest was 87. Of the respondents, 85.5% were male. The median age of males was 60, while the median female age was 55. With regard to education, 34% stated they had either a college or advanced degree. Only 9.0% of the respondents self-identified as wildlife enthusiasts and 10.0% identified as homeowners, leaving 81.0% of the respondents as farmers (see Table 1).

Because our sample is relatively small and we had a low response rate, we validate the survey by considering the demographic data of Alabama farmers. As most of the participants self-identified as farmers, we compare our results with those of the Census of Agriculture 2007. The average age of Alabama farmers is 57.6 with 91.8% of farmers who are white and 84.8% of farmers who are men. The average size of a farm is 185 acres (Census of Agriculture 2007, 2009). Thus, our survey reflects the demographics of Alabama agriculture. Additionally, we asked AFC if our survey reflects their patrons. While AFC does not keep demographic data of their customers, the anecdotal and observational evidence from management suggests that the survey demographics reflect the demographics of AFC patrons.²

¹ We believe that our response rate is low, despite using Dillman (2007), because of the length and complexity of the survey and the survey layout. In the appendix, we provide only a portion of the full, six-page survey. Additionally, we asked participants to complete the RSQS questions twice, for expectations and actual experiences, which proved confusing for some and excessive for others.

² A reviewer commented that the farm typology from Briggeman, et al. (2007) could be a useful way to classifying AFC patrons to assess the representativeness of our data relative to national data. As suggested, our data are consistent with the

Table 1. Variable Descriptions

Variable	Mean	Standard Deviation	Minimum	Maximum
Age	57.61	12.37	25	87
Age squared	3471.60	1410.53	625	7569
Total Household Income (in thousands)	73.03	49.09	0	250
Total Household Income squared (in thousands)	7734.28	11756.17	0	62500
College Education	0.34	0.48	0	1
Acres Leased	116.40	388.47	0	3800
Acres Farmed	124.77	325.91	0	3000
Percent of household income from farming	15.73	27.86	0	81
Wildlife Enthusiast	0.09	0.28	0	1
Homeowner	0.10	0.3	0	1

With regard to household composition, 85.9% were married and 68.8% had two or few people living in the home. About two-thirds of the households had income greater than \$50,000 per year. About 16.0% of the respondents had more than 61.0% of their household income from farming. Almost three-fourths of the respondents state farm income was less than 20.0% of their household income.

Principal Component Analysis (PCA) Groups

We use PCA with orthogonal rotation to summarize the actual experience Likert questions from the instrument. To determine the factors to retain, we employ the Kaiser criterion and the scree plot (Figure 2) and (Table 2), and both methods pointed to three groups.

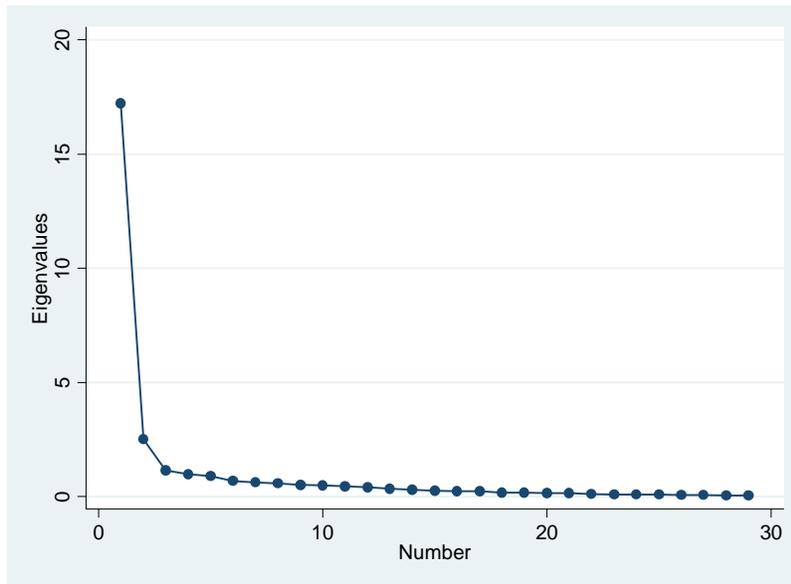


Figure 2. Scree Plot of eigenvalues after PCA

demographics of Alabama and the observations of AFC management; therefore, we believe that, despite the small sample size, we have a representative sample.

Table 2. Eigenvalues and PCA Groups

Item	Component 1	Component 2	Component 3	PCA Group
1	0.1327	0.4207	-0.2179	1
2	0.1435	0.4133	-0.159	1
3	0.1625	0.2696	-0.0033	1
4	0.1593	0.3035	-0.0395	1
5	0.1827	0.216	-0.1955	1
6	0.1555	0.3094	-0.1687	1
7	0.2059	-0.044	0.1017	0
8	0.2047	-0.0154	0.0985	0
9	0.1915	-0.0356	0.2385	2
10	0.1914	-0.0089	0.0626	0
11	0.1883	-0.1085	0.0558	0
12	0.1988	-0.1372	-0.0102	0
13	0.2107	-0.1557	-0.1003	0
14	0.2065	-0.08	0.0351	0
15	0.2085	-0.169	-0.1377	0
16	0.2054	-0.0838	-0.1082	0
17	0.2154	-0.1477	-0.1584	0
18	0.2109	-0.148	-0.1885	0
19	0.2053	-0.1686	-0.2008	0
20	0.2004	-0.1674	-0.1522	0
21	0.1939	-0.0322	0.1215	0
22	0.2144	-0.1429	-0.0706	0
23	0.2152	-0.1302	-0.0368	0
24	0.1931	0.0465	0.0043	0
25	0.1369	0.3013	0.2293	1
26	0.1633	0.0981	0.2139	2
27	0.1379	0.0492	0.6027	2
28	0.1371	0.0177	0.2463	2
29	0.1534	-0.0261	0.2558	2

From the PCA, the three groups emerge (Tables 2 and 3) namely: PCA Group 0 (Customer Service and Personal Interaction), PCA Group 1 (Appearance and Accessibility) and PCA Group 2 (Policies and Reliability). Compared to the structural equation modeling that led to five groups for RSQS, our survey realigns the five into three groups, suggesting the uniqueness of AFC stores in the application of the base RSQS model. A potential explanation for the differences in our results and those seen in other RSQS studies is that member-patrons perceive service quality differently. The most significant difference between this application of the RSQS model and the broader literature is the consolidating of the dimension of problem solving, personal interactions and reliability into one group. The member-patrons perceive these as one unit of service quality.³

The questions, from the instrument, that are in PCA Group 0 are 7-8 and 10-24 (Tables 2 and 3). These questions best represent customer service and personal interactions. The question that is most correlated with the others in this group is 17 “Employees in this store are never too busy to

³ One reviewer commented that RSQS may still have five dimensions if we considered a broader set of observations. Therefore, we are careful to state that our results, especially the three dimensions, may only be specific to AFC.

respond to customers' requests." (in bold in Table 2) Across all customers, the average score for this group of questions is 5.82 out of the seven-point Likert scale, which is the highest score of the three categories. PCA Group 1 includes items 1-6 and 25. The mostly highly correlated question of the appearance and accessibility group is "This store has modern-looking equipment and fixtures." The average score for this group, across all customers, is 5.33 out of seven, which is the lowest of the three. PCA Group 2 is composed of items 9 and 26-29, which describe the policies and reliability of the store. The correlated question is "This store accepts most major credit cards."

The average score of the customer service and personal interactions group is 5.82 out of seven. At the 1% alpha-level, we reject the null hypotheses that the score for customer service and personal interactions equals the scores for appearance and accessibility and policies and reliability given the alternative hypotheses that the score of customer service and personal interactions is greater than the other groups. Also the score for policies and reliable is statistically greater than the score of appearance and accessibility.

Once we found three PCA groups, we predicted the values for each individual for the three PCA variables. The individual selected into the group in which the individual had the highest value, suggesting that individual's scoring of the questions were most correlated with other respondents in that particular grouping.

Scale Reliability

We evaluate the reliability of the instrument by calculating the Cronbach's Alpha, which is a computation of the correlation values among the questions on the instruments. The closer the alpha is to one, the higher the reliability estimate of the instrument. Only one dimension of RSQS and one group of PCA groups have alphas less than a 0.90 (Table 3). This reflects excellent reliability of the scale. Guar and Agrawal (2006) noted several RSQS studies that fail to have alphas greater than 0.9. While the RSQS dimensions still have excellent internal consistency in the AFC context, the PCA groups have higher alphas than each of its corresponding RSQS groups. In particular, the PCA Group 0 has a stronger internal consistency than the separated groups of reliability, personal interactions and problem solving, which are the constituent dimensions of the PCA group.

Table 3. Alpha's of "RSQS" scale

Item Numbers	Dimension or Group	Alpha
RSQS		
1-6	Physical Aspects	0.9273
7-11	Reliability	0.9445
12-20	Personal Interaction	0.9771
21-23	Problem Solving	0.9463
24-28	Policy	0.8341
PCA Groups		
7-8, 10-24	Customer Service and Personal Interaction	0.9833
1-6, 25	Appearance and Accessibility	0.9285
9, 26-29	Policies and Reliability	0.8191

Our findings support the broad applicability of the model. In our survey, we included a question on patronage, which is unique to cooperatives. We tested, but did not include in the paper, the exclusion of this question. The results are the same in terms of the three groups only one question from the survey was in a different group. In short, we provide evidence of the models applicability and ease of use to cooperatives and rural businesses.

Descriptive Statistics for PCA Groups

We classify 185 respondents, which generates a response rate of 3.7%, into one of the three PCA groups. Though our response rate is low, the number of respondents is larger than some studies of larger populations. The following is a brief overview of the characteristic of the PCA groups.

Customer Service and Personal Interaction. The largest of the three PCA groups, customer service and personal interaction has a total of 109 respondents in this group with 20 women. This group reflects 58.9% of the sample. The average age of this group is 55.75. The respondents, who state that they shop at a given cooperative store as a farmer or hobby farmer, represent 78.89% of this group. Over 72% of this group receives less than 20% of income from farming. This group has the largest proportion of homeowners at 15.60%. Wildlife enthusiasts have, among other respondents in this group, the highest median income, which is \$100,000, and homeowners have the lowest median income of \$50,000.

Appearance and Accessibility. A total of 46 respondents fall into this group with five women. This group represents 24.9% of respondents. The group with the youngest median age, 49.5, is hobby farmers. The average age of this group is 55.9. Farmers have the largest median income of \$75,000 and wildlife enthusiasts lease an average of 591 acres. Of those receiving income from farming, 54.4% state that they receive less than 20.0% of their income from farming. The respondents of this group have the highest level of educational attainment with 41.3% that are college educated. This group has the smallest percentage of homeowners (6.52%) and wildlife enthusiasts (8.70%), which are both less than the overall sample averages.

Policies and Reliability. A total of 40 respondents compose this category with three women. This group reflects 21.6% of the sample. Across the groups, policies and reliability have the largest share of wildlife enthusiasts. The average age of this group is 55.87. Wildlife enthusiasts represent 15%, while homeowners compose 10% of the group. Wildlife enthusiasts lease, on average, 705 acres while farmers lease 40 acres in comparison to hobby farmers leasing 158 acres. Homeowners are the youngest with a median age of 50 compared to the wildlife enthusiasts who are the oldest with a median age of 63. The percentage of income from farming less than 20% is 65% of this group.

In all three groups, wildlife enthusiasts lease the most acres of land. As expected, respondents reporting that they are farmers had the highest percentage of household income coming from farming. Self-reported farmers are also the most represented group.

Multinomial Logistic Regression

After estimating the hypothesized multinomial logit model, we found evidence of heteroskedasticity because the χ^2 test rejected the null hypothesis that all the variables were

statistically insignificant and each individual t-test failed to reject the null hypothesis that the variable was different than zero. We plotted the error terms against each stores' profit (see Figure 3). After determining that heteroskedasticity affected the results, the model was run again allowing intergroup correlation clustering by each store.

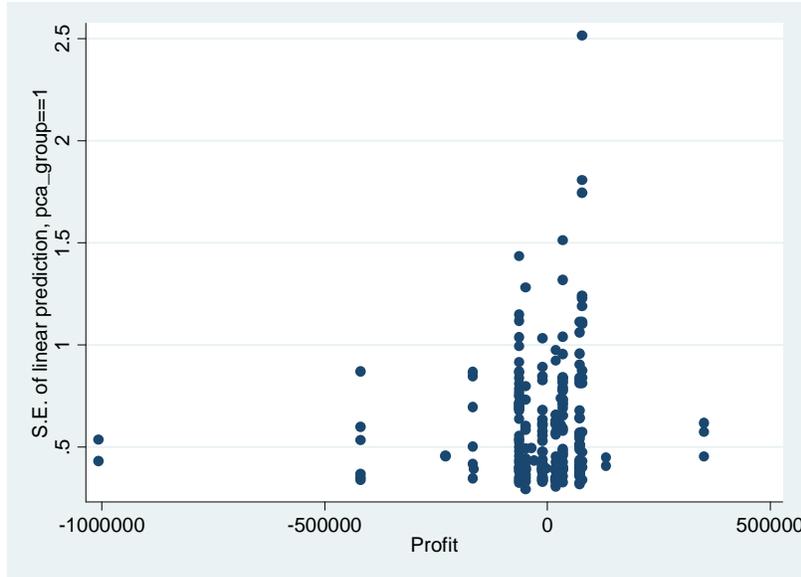


Figure 3. Heteroskedasticity

After estimating the initial hypothesized model a second time and correcting for heteroskedasticity, the marginal effects for each group had inconsistencies. We noticed in PCA Group 1 (Appearance and Accessibility) that as a respondent's income increased, they were less likely to be in that group. However, as the percentage of household income from farming increased, the respondent was more likely to be in PCA Group 1 (Appearance and Accessibility). Because of the inconsistency of these results, we concluded that we had a missing variable problem, which created biased and inconsistent results.

The potential missing variables were the variables that explained the activities of those respondents that called themselves homeowners and wildlife enthusiasts. We asked respondents: "When shopping at this co-op store, what best described you? Production Agriculturalist (farmer), Hobby Farmer, Homeowner, or Wildlife enthusiast (hunter, fisher, etc.)?" We include dummy variables for homeowners and wildlife enthusiasts. We omit farmers (hobby and production) to avoid perfect correlation. Respondents could only choose one of these. From the preliminary modeling and additional testing, we hypothesize that age and income have quadratic effects on the choice of PCA Groups. Thus, we include age and income squared in the model. The revised model is:

$$PCA\ Group = f(age, age\ squared, household\ income, household\ income\ squared, college\ education, acres\ of\ land\ leased, acres\ of\ land\ farmed, percent\ of\ household\ income\ from\ farming, respondents\ shopping\ as\ a\ homeowner, respondents\ shopping\ as\ a\ wildlife\ enthusiast).$$

The results of the multinomial logistic regression model are given in Appendix 2. Since the coefficients of the multinomial logistic model cannot be interpreted directly, the results of such models can be interpreted by viewing the marginal effects from the logistic model. A discussion of these results follows.

Marginal Effects

Marginal effects clarify the relationship between the multinomial logit parameter estimates and their associated effects. Marginal effects allow the researcher to interpret effectively the impact of explanatory variables on the dependent variables. A positive sign of marginal effects indicates a greater likelihood that the model will select the consumer into the PCA group. The results for marginal effects can be seen in Table 4.

Table 4. Marginal Effects

Variable	Customer Service and Personal Interaction	Appearance and Accessibility	Policies and Reliability
Age	-0.063** (-0.025)	0.018 (0.027)	0.045** (0.022)
Age squared	0.00056** (0.00023)	-0.00015 (0.00025)	-0.00041** (0.00019)
Total Household Income	-0.0015 (0.003)	0.00065 (0.0019)	0.00081 (0.0022)
Total Household Income squared	0.000013 (0.00001)	-0.000013 (0.00001)	0.00 (0.0001)
College Education	-0.089 (0.059)	0.093* (0.053)	-0.0035 (0.054)
Acres Leased	-0.00018** (0.00009)	0.00017*** (0.0006)	0.000018 (0.00006)
Acres Farmed	0.00017 (0.00011)	-0.000046 (0.00008)	-0.00012 (0.00008)
Percent of household income from farming	-0.0018 (0.0014)	0.0014* (0.00076)	0.00045 (0.0011)
Wildlife Enthusiast	-0.28*** (0.097)	0.042 (0.091)	0.24* (0.14)
Homeowner	0.22*** (0.084)	-0.11*** (0.043)	-0.11 (0.90)
Prob of PCA Choice	58.58	22.37	19.06

***= significant at the 1% alpha, **= significant at the 5% alpha, *= significant at the 10% alpha

Customer Service and Personal Interactions. Homeowners and wildlife enthusiasts dominate this group. As they are mutually exclusive, if a patron self- identifies as homeowner, he or she is

28% more likely to be in the customer service and personal interactions group. Younger customers tend toward this group, at an increasing rate, given age squared. This result does not support our hypothesis. Older customers may know what they want and are less concerned with advice or support from the staff. As the acres leased increases, patrons are less likely to select into the group. However the marginal effect is small.

Appearance and Accessibility. A respondent holding a bachelors degree or greater is 9.3% more likely to choose appearance. Those with more education may have had more exposure to high-end shopping establishments; thus, they may be accustomed to new, clean and organized storefront, as suggested by the most correlated question in this group. As a person's percentage of household income from farming increases, a respondent is more likely to choose appearance by 0.14%. Farmers may be concerned about parking and quick access to agricultural inputs. Homeowners decrease the chance of appearance being chosen by 11%. Given the previous results, homeowners put more value on personal interaction, so it is reasonable to conclude that appearance is not as important.

Policies and Reliability. Wildlife enthusiasts are 24% more likely to select into the policies and reliability group. Wildlife enthusiasts tend to be career professionals. Nearly 70% of wildlife enthusiasts have a college or higher degree. Thus, they would be concerned about the use of credit cards, the question that most correlates with others in this group. As the average age increases by 10%, they are 4.5% more likely to choose policies, at a decreasing rate. Patronage rebates and the desire to have services preformed correctly may be a reason older customers have a preference for policies and reliability.

Suggested Management Strategies

For the overall sample, we identified three PCA groups of service quality. The multinomial logit model gives us indicators of the types of customers who are interested in these different types of service quality. For AFC member cooperatives, the demographics suggest which customers are interested in particular types of service quality. For example, if the customer base evolves to higher percentages of homeowners or younger patrons, then, AFC member cooperatives should consider training staff and developing better mechanisms to satisfy informational concerns of these customers. Patrons who want strong customer service and personal interactions want staff to be attentive, knowledgeable and capable of addressing concerns. These customers are not as interested in the physical appearance or policies of the store as they are in a staff that can help them. Costly investments in improving the look and order of the store may be misplaced. Also changes in policies, such as patronage payments, have administrative costs or can affect the store's bottom line.

In contrast, if the customer base moves away from homeowners, especially to individuals more dependent on farming for income, and if the customer base grows in percentage of college educated, then appearance and accessibility matters. Given the trends in agriculture such as consolidation and urbanization, fewer people will depend on income generated solely from farm production as compared to today. Therefore, based on this sample, improving the appearance of the stores may not attract or keep clientele, such as homeowners and wildlife enthusiasts, except in settings where the education of the population is increasing. Because education has a

marginal effect that is nearly ten times the effect of leasing or income from farming, and as the percent of college graduates increases, then physical appearance cannot be overlooked. Wildlife enthusiasts and older patrons, to a lesser degree, play a significant role in the policies and reliability group. If the customer base moves to more of these customers, then improving policies, especially those related to credit cards and patronage payments can be useful. As this is the smallest of the PCA groups, the priority of addressing these concerns may not be as great as improving staffing capacity.

Consider these results for three of the stores in the survey. We use codes to protect the identity of the individual stores. Respondents from store A fall in to the three groups as follows: 64.5% in customer service and personal interactions, 9.7% in appearance and accessibility, and 25.8% in policies and reliability. The average score for customer service and personal interactions by respondents from this store is 6.17 out of 7, which is higher than the average and highest of the three stores. At the 1% alpha level, customer service and personal interactions is statistically greater than either appearance and accessibility (5.07) or policies and reliability (6.006). This store has one of the largest percentages of customers who shop at the store as homeowners 18.92%, which is higher than the sample overall sample average, which confirms the connection between homeowners and interest in customer service.

In contrast, the respondents of store B fall into the mix of service quality as follows: 51.43% in customer service and personal interactions, 37.14% in appearance and accessibility, and 11.43% in policies and reliability. While customer service and personal interactions represent the majority of the customers, this group has the highest percentage of respondents in the appearance and accessibility category. Similarly, this store has an average score on appearance and accessibility at 5.79 that is higher than the other two categories. This score is the highest of the three stores and higher than the average. However, this score is not statistically different from customer service (5.57), but at the 10% alpha-level, the score is greater than the score for policies and reliability (5.54). In terms of college education, 40.4% of respondents reported completion of a college degree, which is greater than the sample average. The store has one of the largest percentages of respondents who reported that at least 61% of income comes from farming, suggestive of the modeling results.

Store C has a large representation of customers who are interested in policies and reliability. The percent of customers in each category is 36.36% in customer service and personal interactions, 18.18% in appearance and accessibility, and 45.45% in policies and reliability. The average score on policies and reliability is 5.13 which is below the average score on customer service and personal interactions at 5.71. This score is not statistically different from the score for appearance and accessibility (5.027). At the 5% alpha-level, the score of customer service and personal interactions (5.71) is greater than the score for policies and reliability. Also, policies and reliability score is below the sample average. However, this group follows the model more closely. As suggested by the model results, wildlife enthusiasts play an important role in this store, representing 43.75% of the respondents, the highest percentage of stores. Likewise, respondents of this store are also older than the average at 59.31.

This store level analysis illuminates the modeling results. The diversity of the customer service base contributes to the distribution of the customer service groups. Managers can look at the

types of customers they serve and have information on the types of service quality that they need to focus. While each store has a different mix of customers in the three groups, all have a large portion of respondents in the customer service and personal interactions. In all three cases, appearance and accessibility never dominates.

From this analysis, the greatest area of interest is staff capacity to meet the needs of the customers. This statement is not indicative of the quality of the service already provided by the staff. As stated earlier, the customer service questions have an average score of 5.82 out of seven and the highest of the three PCA groups. Rather customers coalesce around the issue. The upshot of this analysis at the macro- and the store-level is simple: Customers desire good personnel who are available, knowledgeable and attentive.

Conclusion

Farm supply cooperatives provide the agriculturalist with needed production inputs. As subdivisions spring from land that once grew crops and provided forage for livestock, managers of local farm cooperatives are looking for services and products that can replace the business lost when the farms cease buying crop nutrients, seed, and crop protectants. Savvy managers have replaced lost revenue with retail products. As they enter the retail field, from a wholesale mentality, they must meet the needs of their new clientele, not just through new product offerings, but also by meeting the service quality standards of this new customer base. The results and analysis of this study can provide local farm supply cooperative decision makers with suggestions to serve better their existing clientele. It should be noted that these suggestions are based on current customers' preferences. New customers, or those with contact information not retained by a local cooperative, may desire different types of service quality.

In the context of retail farm supply cooperatives, we find that the RSQS scale-items and PCA Groups have excellent internal consistency; thus, our results suggest that the scale is readily applicable to these stores. Management has a mechanism which can allow them to assess regularly their progress toward meeting the service quality desires of their member-patrons, as well as new clientele.

We found with the employment of principal component analysis three service quality groups (customer service and personal interaction, appearance and accessibility, and policies and reliability) that particular customer segments deem valuable. As an extension of the literature on service quality, the marginal effects from the multinomial logit model illuminate the characteristics of customers who belong to a given service quality groups. These findings give local cooperative management a better idea of the service quality that certain customer segments value when they patronize his or her store. However, people are not static in their preferences. Thus, as people and the customer segments evolve, so must the service quality of the cooperative adapt.

In this study we provide retailers strategic management recommendations based on our modeling of AFC stores: Local cooperative managers now have three customer segments to consider when seeking service quality improvements. Homeowners' service quality preferences are customer service and personal interaction. Homeowners desire individual attention from employees who

are courteous, professional, prompt, and knowledgeable. They also prefer high quality merchandise that is available when demanded and error-free transactions, such as sales, returns, and exchanges. Given the size of this group and its score, emphasis on maintaining high quality customer service and personal interactions is the clearest suggestion. Customers with higher education and large percentage of income from farming prefer stores that are clean, accessible, and convenient. As this group was the least dominant, appearance and accessibility may not be the top priority. Wildlife enthusiasts and older patrons view store policies and reliability as an important factor of service quality. These customers seek to have services preformed “right the first time,” value convenient operating hours, use major credit cards, seek financing options and expect patronage returned to be adequate.

Future research might also examine stated versus revealed preferences. The instrument used in this study asked respondents to choose the service quality dimension they felt was most important to them. This stated preference could be compared to the responses they gave in the 29-RSQS items section. Future analysis may look at the difference of expectations and experiences of customers, as we collected these data.

The aim of this study is to provide suggestions to management of local farm supply cooperatives, which can assist them in meeting the service quality needs of their customer base. Our evidence suggests that strong customer service and personal interactions is a key area to maintain.

Management of AFC and similar rural retailers now have a mechanism to assess their cooperatives progress toward meeting the service quality needs of their member-patrons, as well as new clientele.

Acknowledgements

The Auburn University Institutional Review Board for Research Involving Human Subjects approved the survey for this project under the protocol number #08-212 EX 0809. The authors acknowledge support for this project with funding from Hatch ALA095-008 and the Alabama Cooperative Extension System/Alabama Agricultural Experiment Station Agricultural Initiatives under the title “Evaluating the Evolution of Agricultural Cooperatives to Meet the Needs of Non-Traditional Clientele”. The management, employees and member cooperatives of Alabama Farmers Cooperative were very helpful throughout this project, and the authors greatly appreciate their support. The authors thank Bandon Kaetzel for his assistance with PCA modeling. The authors are indebted to the reviewers; Corinne Alexander, managing editor; and participants of the Annual IFAMA Forum and Symposium 2010 for their helpful comments. The views expressed in this article are those of the authors and do not necessarily reflect the view of Alabama Farmers Cooperative or member cooperatives.

References

Alabama Farmers Cooperative, Inc (AFC). Internet site: <http://www.alafarm.com> (Accessed May 29, 2009).

Allen, J. Personal Communication. Alabama Farmers Cooperative, Inc., May 2009.

- Brady, M.K., J.J Cronin, and R.R Brand. 2002. "Performance-only Measurement of Service Quality: A Replication and Extension." *Journal of Business Research* 55(1):17-31.
- Briggeman, B.C, A.W. Gray, M.J. Morehart, T.G. Baker and C.A. Wilson. 2007. "A New U.S. Farm Household Typology: Implications for Agricultural Policy." *Review of Agricultural Economics* 29:765-782.
- Brown, T.J., G.A Churchill Jr., and J.P. Peter. 1993. "Improving the Measurement of Service Quality." *Journal of Retailing* 69:127-139.
- Census of Agriculture 2007, "State Profile: Alabama".
http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/Alabama/cp99001.pdf. Released 2009. Accessed December 6, 2010.
- Dabholkar, P.A., D.I. Thorpe, and J.O. Rentz. 1996. "A Measure of Service Quality for Retail Stores: Scale Development and Validation." *Journal of the Academy of Marketing Science* 24(1):3-16.
- Dillman, D.A. 2007. *Mail and Internet Surveys: The Tailored Design Method, Second Edition*. Hoboken, NJ: John Wiley & Sons.
- Dunteman, G.H. 1989. *Principal Components Analysis*. Newbury Park, CA: Sage Publications, Inc.
- Eastwood, D. B., J. R. Brooker, and J.D. Smith. 2005. "Developing Marketing Strategies for Green Grocers: An Application of SERVQUAL." *Agribusiness* 21:81-96.
- Harris, R.J. 2001. *A Primer of Multivariate Statistics, Third Edition*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Gaur, S. S., and R. Agrawal. 2006. "Service Quality Measurement in Retail Store Context: A Review of Advances Made Using SERVQUAL and RSQS." *The Marketing Review* 6:317-330.
- Gunderson, M. A. , A. W., A. Gray and J. T. Akridge. 2009. "Service Quality in Agronomic Inputs: Does the Hierarchical Model Apply?" *Agribusiness* 25(4): 500–519.
- McNeil, M., and R. Wilson. 1997. "Satisfaction in the Wholesaler-Retailer Relationship: The Experience if the Read Meat Retailers in Western Australia." *Agribusiness* 13(6):567-577.
- Mehta, S.C., A. K Lalwani, and S.L. Han. 2000. "Service Quality in Retailing: Relative Efficiency of Alternative Measurement Scales for Different Product-Service Environments." *International Journal of Retail & Distribution Management* 28 (2):62-72.

Parasuraman, A., V.A Zeithaml, and L.L. Berry. 1985. "A Conceptual Model of Service Quality and its Implications for Future Research." *Journal of Marketing* 49:41-50.

---. 1988 "SERVQUAL: A Multiple-Item Scale for Measuring Customer Perceptions of Service Quality." *Journal of Retailing* 64:12-40.

Schembri, S. and J. Sandberg. 2002 "Service Quality and the Consumer's Experience: Towards an Interpretive Approach." *Marketing Theory* 2(2):189-205.

Zeithaml, V.A. 2000. "Service Quality, Profitability, and Economic Worth of Customers: What We Know and What We Need to Learn." *Journal of the Academy of Marketing Sciences* 28 (1):67-85.

Appendix 1

Selected Page from the Survey

DIRECTIONS: We are interested in **your experiences at the AFC member co-op store that you patronize the most**. Please show the extent to which you think this co-op store possesses or achieves the ideals described by each statement. Use a scale of 1 to 7, where "7" means "Strongly Agree" and "1" means "Strongly Disagree." Circle the number to indicate your level of agreement with each statement. Please be sure to read each statement carefully.

		Strongly Disagree	←.....→	Strongly Agree				
1	This store has modern-looking equipment and fixtures.	1	2	3	4	5	6	7
2	The physical facilities at this store are visually appealing.	1	2	3	4	5	6	7
3	Materials associated with this store's service (such as shopping bags, catalogs or statements) are visually appealing.	1	2	3	4	5	6	7
4	This store has clean, attractive and convenient public areas (showroom, restrooms, fitting rooms, feed storage areas, etc.).	1	2	3	4	5	6	7
5	This store's layout makes it easy for customers to find what they need.	1	2	3	4	5	6	7
6	This store's layout makes it easy for customers to move around in the store.	1	2	3	4	5	6	7
7	When this store promises to do something by a certain time, it will do so.	1	2	3	4	5	6	7
8	This store provides its services at the time it promises to do so.	1	2	3	4	5	6	7
9	This store performs the service right the first time.	1	2	3	4	5	6	7
10	This store has merchandise available when the customers want it.	1	2	3	4	5	6	7
11	This store insists on error-free sales transactions and records.	1	2	3	4	5	6	7
12	Employees in this store have the knowledge to answer customers' questions.	1	2	3	4	5	6	7
13	The behavior of employees in this store instills confidence in customers.	1	2	3	4	5	6	7
14	Customers feel safe in their transactions with this store.	1	2	3	4	5	6	7
15	Employees in this store give prompt service to customers.	1	2	3	4	5	6	7
16	Employees in this store tell the customers exactly when services will be performed.	1	2	3	4	5	6	7
17	Employees in this store are never too busy to respond to customers' requests.	1	2	3	4	5	6	7
18	This store gives customers individual attention.	1	2	3	4	5	6	7
19	Employees in this store are consistently courteous with customers.	1	2	3	4	5	6	7
20	Employees in this store treat customers courteously on the telephone.	1	2	3	4	5	6	7
21	This store willingly handles returns and exchanges.	1	2	3	4	5	6	7
22	When a customer has a problem, this store shows a sincere interest in solving it.	1	2	3	4	5	6	7
23	Employees of this store are able to handle customer complaints directly and immediately.	1	2	3	4	5	6	7
24	This store offers high quality merchandise.	1	2	3	4	5	6	7
25	This store provides plenty of convenient parking for customers.	1	2	3	4	5	6	7
26	This store has operating hours convenient to all their customers.	1	2	3	4	5	6	7
27	This store accepts most major credit cards.	1	2	3	4	5	6	7
28	This store offers financing options.	1	2	3	4	5	6	7
29	The patronage returned to members is adequate.	1	2	3	4	5	6	7

Appendix 1

Multinomial Model of PCA Groups

Variables	Appearance and Accessibility	Policies and Reliability
Age	0.19 (0.15)	0.34*** (0.13)
Age squared	-0.0016 (0.0014)	-0.0031*** (0.0011)
Total Household Income	0.0054 (0.013)	0.0068 (0.016)
Total Household Income squared	-0.000079 (0.000067)	-0.000022 (0.000065)
College Education	0.55* (0.29)	0.14 (0.35)
Acres Leased	0.0011** (0.00044)	0.00041 (0.00044)
Acres Farmed	-0.00049 (0.00051)	-0.00093 (0.00058)
Percent of household income from farming	0.0094* (0.005)	0.0055 (0.008)
Wildlife Enthusiast	0.80* (0.43)	1.49** (0.65)
Homeowner	-0.95*** (0.3)	-1.065 (0.83)
Constant	-6.33 (3.63)	-10.55 (3.5)
Number of observations		
		186
Wald chi2(20)		
		1995.74
Prob > chi2		
		0
Pseudo R2		
		0.073
Log pseudolikelihood		
		-170.021

Std. Err adjusted for 23 clusters in by store

***= significant at the 1% alpha, **= significant at the 5% alpha, *= significant at the 10% alpha



International Food and Agribusiness Management Review
Volume 14, Issue 1, 2011

Consumer Preferences for Fresh Citrus: Impacts of Demographic and Behavioral Characteristics

Zhifeng Gao[Ⓐ], Lisa O. House^ᵇ, Fred G. Gmitter Jr.^ᶜ, M. Filomena Valim^ᵈ, Anne Plotto^ᵉ, and Elizabeth A. Baldwin^ᶑ

^ᵃ *Assistant Research Scientist, Food and Resource Economics Department,
University of Florida, PO Box 110240, Gainesville, Florida, 32611-0240, U.S.A.*

^ᵇ *Professor, Food and Resource Economics Department,
University of Florida, PO Box 110240, Gainesville, Florida, 32611-0240, U.S.A.*

^ᶜ *Professor, Citrus Genetics and Breeding, Citrus Research and Education Center, University of Florida,
700 Experiment Station Road, Lake Alfred, Florida, 33850, U.S.A.*

^ᵈ *Research Scientist, Florida Department of Citrus, University of Florida,
700 Experiment Station Road, Lake Alfred, Florida, 33850, U.S.A.*

^ᵉ *Research Plant Physiologist, ARS, Citrus and Subtropical Products Laboratory, USDA,
600 Ave. S. NW, Winter Haven, Florida, 33881, U.S.A.*

^ᶑ *Research Horticulturalist, ARS, Citrus and Subtropical Products Laboratory, USDA,
600 Ave. S. NW, Winter Haven, Florida, 33881, U.S.A.*

Abstract

In the last twenty years, trends within fresh fruit consumption have shifted from consumption of fresh citrus to non-citrus fresh fruit. Within citrus, consumers are switching from the traditionally dominant fruit, oranges, to tangerines. Using survey results from three cities in the U.S. on consumer preferences for fresh citrus products, we demonstrate that freshness, flavor and appearance are the most important attributes of fresh citrus. Heterogeneous preferences exist among consumers and both demographic and behavioral variables have significant impacts on preferences. Results indicate there are no dominant best predictors of consumer preferences. However, it appears there is potential to develop specific marketing strategies based on demographics.

Keywords: Fresh citrus, consumer preference, attitude, cluster analysis, market segmentation

[Ⓐ]Corresponding author: Tel: +1 352.392.1928x424 Email: zfgao@ufl.edu

Other contact information: L.O. House: lahouse@ufl.edu; F. G. Gmitter Jr.: fgmitter@ufl.edu;
M. Valim: fvalim@citrus.state.fl.us; A. Plotto: anne.plotto@ars.usda.gov; E.A. Baldwin: liz.baldwin@ars.usda.gov

Introduction

Increasing consumption of fruits and vegetables is encouraged as part of a healthy diet that will lead to lower personal and social health costs. The FAO has established increasing fruit and vegetable consumption as a global priority (FAO 2003). In the U.S., several campaigns and programs, such as Produce for Better Health Foundation (PBH) and the Nutrition Assistant Program administered by USDA, have continuously and extensively promoted vegetable and fruit consumption among U.S. consumers to reduce the risk of diseases such as stroke, cancer and diabetes (Stewart and Harris 2004; USDA-FNS 2008). Increased demand for fruits and vegetables has provided opportunities for several agricultural sectors. For instance, from 1990 to 2007 the per capita consumption for fresh berries (blueberry, cranberry and strawberry) doubled and the consumption of pineapple and papayas increased more than fivefold. However, per capita consumption of fresh citrus (orange, tangerine, lemon, lime and grapefruit) experienced a decline from 26.6 pounds in 1998 to 20.6 in 2008. Among citrus groups, the consumption and sales of the historically dominant citrus fruit, oranges, experienced a continuous decline, while tangerines experienced an increase in consumption. From 1990 to 2008, per capita consumption of fresh oranges decreased from 12.4 to 9.9 pounds and tangerines increased from 1.4 to 3.1 pounds (USDA-ERS 2009a; USDA-ERS 2009b).

Demand for fruits is expected to grow, from 164.5 pounds per capita in 2000 to 182.3 pounds by 2020 (Lin et al. 2003). The shift from consumption of fresh citrus to non-citrus fresh fruit, combined with a shift within fresh citrus from oranges to tangerines, and the projection for increases in demand for fresh fruits bring forward a critical question for the citrus industry – how to take advantage of the increasing demand for fresh fruit, and why consumers are shifting citrus consumption habits from the traditionally dominant oranges to tangerines? Developing an increased understanding of consumer preferences for fresh citrus may play a key role in aiding the biological scientists who need to understand what to focus on when developing new varieties in citrus breeding programs. Identifying the characteristics of citrus that play a key role in consumer fresh citrus choices is an important step in determining consumer preference for fresh citrus. Determining the importance of product attributes “...is of special relevance to public policymakers interested in understanding and perhaps influencing the information environment of the consumer as it relates to purchase decision-making” (Quelch 1979, p232).

Despite the importance of identifying the critical factors determining consumer preferences for fresh fruit, few studies are available that focus on citrus. The two most relevant studies are from Campbell et al. (2004) and Poole and Baron (1998). Campbell et al. use conjoint analysis to determine consumer preference for seven attributes that may affect consumer preferences for Satsuma mandarins. They also cluster consumers into three segments as no-blemish, price-sensitive and no-seed segment. Poole and Baron study the importance of ten citrus attributes, but they do not investigate the factors that may impact consumer preferences.

Other existing literature focuses on consumer preferences for specific fruit attributes such as pesticide use in apples (Baker 1999); organically, locally grown potatoes (Loureiro and Hine 2002); and locally grown fresh produce (Eastwood, Brooker and Orr 1987). Studies in food science focus on the comparison of sensory attributes of several products and consumer overall rating of those products to determine the best alternative among those being tested (e.g.

Campbell et al. 2004; Jaeger et al. 1998; Kühn and Thybo 2001). However, trying to elicit consumer preferences for a single attribute may not be enough to explain consumer choices of different fruits. Further, determining consumer choices of products directly after a taste test of selected sensory attributes may evoke respondents' attention to those characteristics being tasted, which may be ignored in a real world purchase (particularly when many sensory attributes are not experienced at the time of purchase). Therefore, the results from sensory taste tests may be misleading to predict consumer purchase behaviors. Perhaps the most famous example of this is Coca-Cola's introduction of a new formula in 1980s that was designed to beat their competition in a taste test, but did not succeed in the marketplace (Whyte 1991). A simple, but powerful, tool to identify consumer preferences may be to ask consumers to rank the importance of product attributes as suggested by Quelch (1979).

In addition, previous studies (Campbell, et al. 2004; Gao and Schroeder 2009) have shown that consumer preferences are heterogeneous, and as such, identification of specific consumer groups that have similar attitudes toward product attributes is critical. Both demographic and behavioral variables can be used to explain heterogeneous preferences, though neither is sufficient on their own. Consumer demographics are commonly believed to be poorly related to consumer behavior (Johns and Gyimothy 2002), however, consumer demographics are readily available. Although demographics are not likely to explain all of the variation in consumer preferences, some are often significantly related to preferences. For example, numerous studies have found location (city, region or country) to be an important factor in explaining heterogeneous consumer preferences (e.g. Fox 1995; Jaeger, et al. 1998). Psychographic characteristics are more reliable as a measure of consumer lifestyle and may serve as a better predictor for market segmentation; however these variables are lacking theoretical foundation, measurement reliability, and are difficult to access without a detailed survey designed for the specific problem (Lesser and Hughes 1986; Edris and Meidan 1989).

The purpose of this article is to (1) determine the importance of fresh citrus attributes; and (2) determine the impact of consumer demographics and behavioral variables on consumer preferences for key citrus attributes. By including both demographic and behavioral variables, we expect to be able to identify the most important factors in determining consumer preferences for citrus products and possibly shed a light on future studies on consumer preference for other fruits. Our paper differs from previous studies on consumer preference for citrus products in several aspects. First, we collected a long array of variables on consumer demographics and purchase behavior to identify the impacts of those variables on consumer preference and consumer grouping. This is significantly different from Poole and Baron (1996) who did not consider the potential heterogeneous preferences among consumers and from Campbell et al. (2004) who only included a few demographic and behavioral variables in their analysis. In addition, unlike Campbell et al., the attributes that are ranked in our study are for the broad concept of citrus (including orange, tangerine, grapefruit and pummelo etc.), instead of for one breed of mandarin. By focusing on citrus in general, we are more able to provide input for the biological scientist, who has the ability to develop products that mix attributes from various citrus fruits. This information will help breeders develop strong varieties of citrus fruits that may have multiple attributes from different varieties of citrus to best meet consumer demand.

Importance Rating of Fresh Citrus Attributes

Three consumer surveys on consumer preferences for fresh citrus attributes were conducted by Ipsos-Reid¹ in 2008 in Chicago, Illinois; Baltimore, Maryland; and Tampa, Florida, resulting in 223 usable responses. Respondents were randomly selected for mall intercept interviews and were asked to rate the importance of eight attributes in their purchase decisions for fresh citrus. The eight attributes include seven sensory attributes *Appearance*, *Freshness*, *Flavor*, *Fruit Size*, *Ease of Peeling*, *Seeds* (number of seeds in fruit), *Juiciness*, and, one extrinsic attribute, *Price*. The attributes investigated in this study are similar to those in Poole and Baron (1996) with the exception of *Packaging* which was the least important factor affecting consumer choice of citrus, and is difficult to evaluate as the types of packaging differ, making it unclear to what the consumer was referring. Consumer demographics such as age, household income, household size, etc., were collected and are summarized in Table 1 (see Appendix 1). Also summarized in Table 1 are the variables collected on purchase and consumption behavior. Consumption habits of citrus, as well as other fruits and drinks were collected as previous research has indicated other fruits may be substitutes or complements for citrus (Lee, Brown and Seale 1992).

More than 60% of respondents indicated each of four attributes were extremely important: *Freshness*, *Flavor*, *Appearance* and *Juiciness*. *Seeds*, *Ease of Peeling*, and *Fruit Size* were less important attributes with more than 30% of the respondents ranking these three attributes as “somewhat” or “not at all” important. These results are slightly different from Poole and Baron (1996), who found that more than 50% of the respondents rated *Juiciness*, *Skin Quality* (similar to our variable *Appearance*), *Sweetness* (similar to our variable *Flavor*) and *Texture* as the most important attributes. However, Poole and Baron (1996) did not include *Freshness* in their survey.

Consumers in the three cities had similar but slightly different preferences for fresh citrus attributes. Consumers in all three cities ranked *Freshness* and *Seeds* as the most and least important attributes, respectively (Table 2). Baltimore consumers considered *Appearance* and *Flavor* equally important. However, consumers in both Chicago and Tampa rated *Flavor* over *Appearance* as the second most important attribute (Table 2). People in Baltimore tend to be

Table 2. Importance of Fresh Citrus Attributes by City

	Baltimore				Chicago				Tampa			
	1	2	3	4	1	2	3	4	1	2	3	4
Freshness	0.0	1.4	12.5	86.1	0.0	2.7	16.4	80.8	0.0	0.0	16.7	83.3
Flavor	0.0	0.0	19.4	80.6	0.0	4.1	15.1	80.8	0.0	2.6	24.4	73.1
Appearance	0.0	1.4	18.1	80.6	1.4	6.9	31.5	60.3	1.3	5.1	33.3	60.3
Juiciness	0.0	4.2	22.2	73.6	2.7	5.5	23.3	68.5	1.3	6.4	44.9	47.4
Fruit Size	2.8	11.1	22.2	63.9	8.2	26	24.7	41.1	6.4	38.5	24.4	30.8
Price	2.8	16.7	22.2	58.3	1.4	19.2	24.7	54.8	9.0	25.6	28.2	37.2
Ease of Peeling	6.9	12.5	29.2	51.4	9.6	27.4	31.5	31.5	11.5	35.9	25.6	26.9
Seeds	8.3	9.7	30.6	51.4	19.2	20.6	23.3	40.0	32.1	19.2	19.2	29.5

Notes: 1 = not at all important; 2 = somewhat important; 3=very important; 4 = extremely important

¹ Begun in 1975, Ipsos is a global company that focuses on survey-based market research.

more demanding for the quality of fresh citrus- even for the lowest rated attributes such as *Ease of Peeling* and *Seeds*. More than 50% of respondents in Baltimore rated *Ease of Peeling* and *Seeds* as the most important, while in Chicago and Baltimore, less than 40% respondents rated those two attributes as the most important.

Impacts of Demographic and Behavioral Variables on Consumer Preferences

Eight ordered probit models were estimated to identify the underlying determinants that explain the differences in consumer preferences. Because each respondent rates the importance of eight fresh citrus attributes, there may be correlation in the unobserved errors of the eight regression equations. Models that account for correlation in the errors for systems of equations may be more appropriate. However, because the regressors in the eight models are the same, models such as seemingly unrelated regression (SURE) result in the same estimates as ordinary least square (OLS) method that does not account for the correlation in the errors in a system of equations (Greene 2000). In this article an ordered probit model is used as the dependent variable is the respondents' ordinal rating of a certain level of importance (from 1 to 4). Estimating the ordered probit models may not account for correlation in the errors, but is more consistent with the nature of the dependent variables. As such, the observed rating of citrus attributes is:

$$(1) \quad y_i = j \text{ if } \mu_{j-1} \leq y_i^* \leq \mu_j, j=1,2,3,4$$

where y_i is the observed importance rating of citrus attributes, y_i^* is unobserved true importance rating of attributes and μ_j s are threshold levels. With the assumption that $y_i^* = \beta'x + \varepsilon_i$ and ε_i is a random component with normal distribution, the probability that a respondent rates an attribute as importance level j is:

$$(2) \quad Prob(y_i = j) = \Phi(\mu_j - \beta'x) - \Phi(\mu_{j-1} - \beta'x), j=1,2,3,4$$

where Φ is the cumulative distribution function of standard normal distribution, β s and μ_j s are parameters being estimated and x s are independent demographic and behavioral variables².

The results of the ordered probit models are reported in Table 3³ (See Appendix 2). Location and marital status are the most important demographic variables explaining the heterogeneous preferences among consumers. Consumers in Baltimore tend to consider *Appearance, Juiciness, Fruit Size, Price* and *Ease of Peeling* (five of eight attributes) as more important than Tampa consumers. Married consumers were statistically more likely to rate *Freshness, Appearance, Flavor, Fruit Size, Price* and *Ease of Peeling* (six of eight

² It is very common to include behavior variables such as purchase behavior as regressors to explain consumer preferences. However, by including the purchase behavior variables as regressors, we are not arguing that purchase behavior determines consumer preferences. As in most regression analysis, we are not trying to establish a cause-effect relationship between the dependent and independent variables. Whether purchase behavior determines consumer preference or consumer preference determines consumer purchase behavior is not the focus of this paper.

³ Marginal effects are not reported because the focus of this study is to determine the negative or positive impact of the regressors rather than the scale. In addition, reporting marginal effects will take more pages than reporting the estimates of the model (for each regressor there are four marginal effect estimates). The marginal effects estimated at the mean are available from the author per request.

attributes) more important than other consumers. Overall, education, employment status and ethnicity do not significant affect consumer rating of citrus attributes.

A number of the behavior variables significantly influenced consumer perceptions. For instance, consumers who did the majority of the household shopping (*Shopping Percent*) are significantly more likely to rate seven of the eight attributes higher than consumers who were not the primary shopper. In addition, consumers who have purchased oranges in the last 30 days rated *Size*, *Price*, *Ease of Peeling* and *Seeds* significantly less important than those who had not purchased oranges in the last 30 days. Consumption behavior of oranges also has a significant impact on consumer ratings for some of the fresh citrus attributes. For instance, people who consumed grapefruit in last month are more likely to rate *Appearance* and *Flavor* less important than those who did not, while people who consumed tangerine are more likely to rate *Ease of Peeling* and *Seeds* less important. Although this may seem counter-intuitive at first, it may be a result of the primary shopper being more discriminating than a person who consumes the fruit, but may or may not be the purchaser.

One interesting phenomenon demonstrated by the results is the opposite signs of coefficients of purchase and consumption behavioral variables. The results show that consumers who purchased oranges in the last 30 days were significantly less likely to rate *Ease of Peeling* and *Seeds* as more important than those who did not purchase oranges. However, consumers who consumed oranges in the last three months were significantly more likely to rate *Ease of Peeling* and *Seeds* as more important than those who did not consume oranges. The same phenomenon happens with the effects of purchase and consumption of grapefruit on consumer preferences for *Appearance* and *Flavor*. Those that purchased grapefruit were significantly more likely to rate *Appearance* and *Flavor* as more important, while those that consumed were less likely to rate these two factors as important. With tangerines, *Ease of Peeling* and *Seeds* were more important to purchasers and less likely to be important to consumers. Although at first this result seems incongruous, the pattern revealed is consistent with Poole and Baron (1996), who showed that there were mismatches between consumer purchases and stated preferences.

This finding is also consistent with literature on consumer attitude formation (Schiffman and Kanuk 2000). As consumer attitudes are often formed by unconditioned stimulus (past experience) and conditioned stimulus (experience with the use of products), it is reasonable that expectations before consumption (purchasers, not consumers) might differ from post-consumption beliefs. In our case, for example, consumers might not believe ease of peeling and seeds to be important attributes in oranges before consumption. However, after consumption, their opinion changes as a result of the experience they had with the orange. In this case, the indication is the consumption experience may have contained negative information related to seeds and peeling, thus making it more important for the next purchase opportunity. To take this a step further, the consumer might not expect seeds in oranges, therefore, they are surprised to find any seeds, and this becomes more important. For grapefruit, the relation may be easier to demonstrate. At the time of purchase, appearance is important, as it is one of the criteria that can be observed pre-consumption (unlike seeds). After consumption, the consumer may find no relationship between appearance and the consumption experience, hence appearance becomes less important.

Impacts of Demographic and Behavioral Variables on Consumer Segmentation

The results of the ordered probit models demonstrate that some variables, such as city, marital status, and shopping percent have a significant impact on consumer preference for several fresh citrus attributes. This implies that among the respondents being surveyed, some consumer groups were more critical on a number of the attributes of fresh citrus. As such, a cluster analysis was used to divide consumers into groups based on their rating scale of the eight citrus attributes in Table 2. Ward’s hierarchical clustering method was implemented because this method performs better with uniform cluster size when the original clusters are poorly separated (SAS 2008).

Three clusters were identified and are reported in Table 4. One cluster of consumers rated all attributes more important than consumers in the other segments. For this reason, we refer to these consumers as Perfectionists. Another cluster rated all attributes except for price higher, thus are referred to as Pro-Quality consumers. The final segment includes the remaining consumers, who gave their focus on the price variable and are referred to as Pro-Price consumers. Consumers in the Pro-Quality cluster rate *Appearance, Freshness, Flavor, Juiciness* as significantly more important, and price as significantly less important than consumers in the Pro-Price cluster.

Table 4. Importance of Fresh Citrus Attributes by Consumer Cluster Segment

	Perfectionist	Pro-Price	Pro-Quality	Overall Sample
Freshness	3.99	3.34	3.88	3.82
Flavor	3.98	2.89	4.00	3.76
Appearance	3.85	3.13	3.55	3.61
Juiciness	3.87	2.89	3.47	3.55
Fruit Size	3.73	2.40	2.47	3.08
Price	3.83	2.79	2.45	3.20
Ease of Peeling	3.54	2.28	2.35	2.92
Seeds	3.40	2.17	2.32	2.82
# of Respondents	110	47	66	223

Numbers are reported on a scale from 1-4, with 4 representing extremely important and 1 representing least important.

Multinomial logit model are estimated to determine impact of the demographics and behavioral variables on consumer types. In the multinomial logit model, the probability that a consumer belongs to the *ith* consumer group is

$$(3) \quad P(y = i) = \frac{\exp(\beta_i'x)}{\sum_{j=1}^3 \exp(\beta_j'x)}$$

In the estimation, one consumer group must be chosen as a comparison group and the log of the odds ratio of the probability that consumers belong to group *i* vs. group *j* is

$$(4) \ln \left[\frac{P_i}{P_j} \right] = \beta_i' x$$

The sign of the parameter estimates indicate the impact of independent variables on the probability of consumers belonging to consumer group i as compared to group j (Greene 2000). Each of the three groups from the cluster analysis is used as a comparison group and three multinomial logit models were estimated⁴.

By focusing on the significant variables from the results of multinomial logit models, we are able to examine the different make-up of each cluster (Table 5). The largest portion of consumers in the Perfectionist cluster is from Baltimore (40.0%), consumers from Chicago and Tampa account for 35.5% and 24.6% of the Perfectionist group. Tampa consumers led both the Pro-Price and Pro-Quality clusters (with 40.4% and 48.5% of the clusters, respectively). In the Pro-Price group, singles account for more than half of the consumers, while married people are more likely to be in the Perfectionist or Pro-Quality clusters. This result is consistent with a study on food behavior that showed married adults are more likely to follow the dietary guidelines, thus are more concerned with food quality than people who are single (Roos et al. 1998).

Number of children present was different by cluster. As over half of the respondents in our survey do not have children, it is not surprising that each cluster is more likely to have consumers without children. However, what is interesting is that consumers with children of different ages were likely to be in different clusters, which does not comply with Roos et al. (1998) who found that the age structure of children in families did not significantly affect parents' food behaviors. Considering the difference in nutrition intakes of children and the cost of raising children at different ages differ significantly (Lino and Carlson 2009; Ganji, Betts and Whitehead 1995), this result may reflect changing attitudes of parents with children at different ages towards fruit quality. Specifically, parents with children less than 2 years old are more likely to be in the Pro-Quality cluster over the Perfectionist group, which indicates parents of very young children are focused on food quality and less focused on price. Parents of children aged 6 to 12 were more likely to be in the Pro-Quality and Perfectionist group over Pro-Price, implying food quality has more impacts on the choice of fresh citrus for consumers with children than those without children.

Behavioral variables also impacted cluster membership. The Pro-Price group contained equal amounts of people that indicated they performed about half, more than half, and all of the family's shopping. However, the Perfectionist group was largely made up of those who did all of the shopping. Past purchases of grapefruit and tangerine were significant in determining cluster membership, but purchases of other fruits were not. Over 45% of Perfectionist had purchased grapefruit in the last 30 days, as compared to only 27% of those in the Pro-Quality group. In addition to purchasing habits, consumption habits influenced group membership. Nearly all respondents in Perfectionist and Pro-Quality consumer groups (90%) had consumed orange juice in the last 30 days, but those in the Pro-Price group were less likely to have had orange juice. There was a lower concentration of grapefruit consumers in the Pro-Quality cluster.

⁴ The results of the multinomial logit model are not reported because of the space limits. From the multinomial logit model we were able to identify the important factors that affect the clusters of consumer groups.

Table 5. Statistics of Consumer Profiles by Segment

	Perfectionist	Pro-Price	Pro-Quality
<i>Demographics</i>			
<i>City</i>			
Baltimore	40.0%	29.8%	21.2%
Chicago	35.5%	29.8%	30.3%
Tampa	24.5%	40.4%	48.5%
<i>Marital Status</i>			
Single	40.9%	51.1%	42.4%
Married	44.6%	27.7%	45.5%
Other	14.5%	21.3%	12.1%
<i>Children Age Structure</i>			
No Children	45.5%	61.7%	48.5%
Children Under 2	7.3%	4.3%	12.1%
Children 2 to 5	17.3%	4.3%	9.1%
Children 6 to 12	30.9%	10.6%	27.3%
Children 13 to 18	19.1%	23.4%	25.8%
<i>Purchase Behavior</i>			
<i>Shopping Percent</i>			
About Half of Shopping	14.6%	38.3%	28.8%
Almost All the Shopping	17.3%	25.5%	16.7%
All the Shopping	68.2%	36.2%	54.6%
<i>Fruit Purchased</i>			
Grapefruit	45.5%	36.2%	27.3%
Tangerine	63.6%	68.1%	50.0%
<i>Consumption Behavior Food Consumed</i>			
Orange Juice	93.6%	76.6%	92.4%
Grapefruit	46.4%	51.1%	36.4%
Tangerine	67.3%	72.3%	69.7%
Grape	80.9%	83.0%	71.2%

Notes: For City and Martial Status, the numbers across different category for each consumer segment add up to 100%. However, for other variables, those numbers does not add up to 100% because those categories are not exclusive.

In Pro-Price group, more than 50% of consumers have consumed grapefruit, while only 36% of this group had indicated they purchased grapefruit. This may again indicate the inconsistency between purchase and consumption, where consumers behave as a perfectionist, wanting all attributes before purchase, but post-consumption, they become more concerned with price. This could be explained by the experience they have when consuming grapefruit. If they purchase a poor quality fruit, they may regret the price they paid for the fruit. However, if they have a good experience, they may think they can obtain that same experience at a lower price (for example, they may think the good quality is a result of the correct season, thus assuming they can get good quality at a lower price). As price is an important welfare measure and quality indicator, consumers may use price as an indicator of quality at purchase. However, after consumption,

price loses its role as a quality cue, thus the consumer may change weighting of the importance of price in their decision.

Conclusions

Fruit and vegetable consumption is lower than recommended levels in the United States. Understanding the consumer decision making process with regard to fruits and vegetables is a vital step in successfully promoting fruit and vegetable consumption. Using survey results from three cities in the U.S. on consumer preferences for fresh citrus products, we demonstrated that freshness, flavor and appearance are the most important attributes of fresh citrus. However, heterogeneous preferences exist among consumers. Demographic variables such as city, marital status, age and presence of children in the household, and behavioral variables, such as share of shopping responsibility, purchase and consumption of fruits also have significant impacts on consumer preferences.

One of the most interesting results in this analysis is the reversed impacts of purchase and consumption behavior on consumer ratings of fresh citrus attributes. Although this is consistent with Poole and Baron's (1996) study on consumer preferences for citrus, it is still surprising as it may reflect poor performance of current labels in the market as indicators of product quality. Because of the difference between the expected quality (at purchase) and experience quality (after consumption), consumers alter their attitudes about the role of product attributes in their purchase decision. This demands the development of more efficient strategies to provide accurate information on quality of fresh citrus.

In addition to identifying the product attributes that most significantly determine consumer choice of fresh citrus, the ratings of these attributes were used to identify clusters of consumers. Both demographic and behavioral variables played important roles in identifying consumer preference for fresh citrus and can be effectively used to identify clusters of consumers. There is no dominant best predictor of consumer preferences. However, the finding that parents with children at different ages show different attitudes towards citrus attributes indicates the potential to develop specific marketing strategies based on the children's age structure in the household. The significant impact of purchase and consumption of tangerine and grapefruit on consumer preferences require further detailed study on those consumer groups. In addition, follow up research to identify the exact components of freshness, flavor, appearance and other citrus attributes is critical for producers to provide the right products, as well as for researchers to develop more favorable new products for consumers. Using focus groups to identify the key factors that may explain the disparity in consumer attitude toward fruit attributes before and after purchase also warrants future research.

Acknowledgements

Support for this research was provided by the Florida Department of Citrus, the Florida Citrus Production Research Advisory Council, Mr. Peter McClure Chairman, on behalf of the Florida citrus industry, and grants provided by the New Varieties Development and Management Corporation, Mr. Peter Chaires, Executive Director. Mention of a trademark or proprietary product is for identification only and does not imply a guarantee or warranty of the product by the U.S. Department of Agriculture.

References

- Baker, G. A. 1999. "Consumer Preferences for Food Safety Attributes in Fresh Apples: Market Segments, Consumer Characteristics, and Marketing Opportunities." *Journal of Agricultural and Resource Economics* 24:80-97.
- Campbell, B. L., R. G. Nelson, R. C. Ebel, W. A. Dozier, J. L. Adrian, and B. R. Hockema. 2004. "Fruit Quality Characteristics That Affect Consumer Preferences for Satsuma Mandarins." *HortScience* 39:1664-69.
- Campbell, B. L., R. G. Nelson, R. C. Ebel, W. A. Dozier, J. L. Adrian, and B. R. Hockema. 2004. "Fruit Quality Characteristics That Affect Consumer Preferences for Satsuma Mandarins." *HortScience* 39:1664-1669.
- Eastwood, D. B., J. R. Brooker, and R. H. Orr. 1987. "Consumer Preferences for Local Versus Out-Of-State Grown Selected Fresh Produce: The Case of Knoxville, Tennessee." *Southern Journal of Agricultural Economics* 19:183-194.
- Edris, T. A., and A. Meidan. 1989. "On the Reliability of Psychographic Research: Encouraging Signs for Measurement Accuracy and Methodology in Consumer Research." *European Journal of Marketing* 24.
- Food and Agricultural Organization. 2003. *Increasing Fruit and Vegetable Consumption Becomes a Global Priority*. (Accessed 07/01). Available at:<http://www.fao.org/english/newsroom/focus/2003/fruitveg1.htm>
- Fox, J. A. 1995. "Determinants of Consumer Acceptability of Bovine Somatotropin." *Review of Agricultural Economics* 17:51-62.
- Ganji, V., N. Betts, and D. Whitehead. 1995. "Nutrient intakes of 1-3, 4-6 and 7-10 year age group children: Analysis of diets reported in 1987-1988 Nationwide Food Consumption Survey." *Nutrition Research* 15:623-631.
- Gao, Z., and T. C. Schroeder. 2009. "Effects of Label Information on Consumer Willingness-to-pay for Food Attributes." *American Journal of Agricultural Economics* 91:795-809.
- Greene, W. H. 2000. *Econometric Analysis*. Upper Saddle River, New Jersey: Prentice-Hall, Inc.
- Jaeger, S. R., Z. Andani, I. N. Wakeling, and H. J. H. MacFie. 1998. "Consumer Preferences for Fresh and Aged Apples: A Cross-Cultural Comparison." *Food Quality and Preference* 9:355-366.
- Johns, N., and S. V. Gyimothy. 2002. "Market Segmentation and the Prediction of Tourist Behavior: The Case of Bornholm, Denmark." *Journal of Travel Research* 40:316-327.

- Kühn, B. F., and A. K. Thybo. 2001. "The Influence of Sensory and Physiochemical Quality on Danish Children's Preferences for Apples." *Food Quality and Preference* 12:543-550.
- Lee, J. Y., M. G. Brown, and J. L. Seale. 1992. "Demand Relationships among Fresh Fruit and Juices in Canada." *Review of Agricultural Economics* 14:255-262.
- Lesser, J. A., and M. A. Hughes. 1986. "The Generalizability of Psychographic Market Segments Across Geographic Locations." *Journal of Marketing* 50:18-27.
- Lin, B., J. Variyam, J. Allshouse, and J. Cromartie. 2003. *Food and Agricultural Commodity Consumption in the United States: Looking Ahead to 2020*. Washington, DC: U.S. Department of Agriculture, Economic Research Service, February.
- Lino, M., and A. Carlson. 2009. *Expenditure on Children by Families, 2008*. U.S. Department of Agriculture, Center for Nutrition Policy and Promotion 1528-2008, July.
- Loureiro, M. L., and S. Hine. 2002. "Discovering Niche Markets: A Comparison Of Consumer Willingness To Pay For Local (Colorado Grown), Organic, And Gmo-Free Products." *Journal of Agricultural and Applied Economics* 34:477-487.
- Poole, N., and L. Baron. 1998. "Consumer Awareness of Citrus Fruit Attributes." *British Food Journal* 98:23-28.
- Quelch, J. 1979. "Measurement of the relative importance of product attribute information: A review of the information display approach." *Journal of Consumer Policy* 3:232-245.
- Roos, E., E. Lahelma, M. Virtanen, R. PRÄTTÄLÄ R, and P. Pietinen. 1998. "Gender, socioeconomic status and family status as determinants of food behavior." *Social Science & Medicine* 46:1519-1529.
- SAS. 2008. *SAS/STAT(R) 9.2 User's Guide*. Cary, NC: SAS Institute Inc.
- Schiffman, L. G., and L. L. Kanuk. 2000. *Consumer Behavior*. 7 ed. Upper Saddle River, New Jersey: Prentice Hall.
- Stewart, H., and M. Harris. 2004. "Obstacles to Overcome in Promoting Dietary Variety: The Case of Vegetables." *Review of Agricultural Economics* 27:21-36.
- U.S. Department of Agriculture. 2009a. *Fresh Fruit: Per Capita Consumption, 1980 to Date*. Fruit and Tree Nut Yearbook (Accessed 07/01/2010). Available at:<http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1377>
- U.S. Department of Agriculture. 2009b. *Fruit and Tree Nuts: U.S. Cash Receipts, 1980 to Date*. Fruit and Tree Nut Yearbook (Accessed 07/01/2010). Available at:<http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1377>

U.S. Department of Agriculture. 2008. *Increasing Fruit and Vegetable Consumption through the USDA Nutrition Assistance Programs*. Food and Nutrition Service Progress Report, Alexandria, VA, March.

Whyte, G. 1991. "Decision Failures: Why They Occur and How to Prevent Them." *The Executive* 5:23-31.

Appendix 1

Table 1. Demographic and Behavioral Variables of Survey Respondents

Variable	Description	Total	Baltimore	Chicago	Tampa
<i>Demographic Variables</i>					
City	City of residence	223	32%	33%	35%
Age	Age of respondent	38.4	38.7	38.4	38.0
Gender	Percent male respondents	48.0%	50.0%	48.0%	46.1%
Household Size	Number of residents in household	3.3	3.1	3.5	3.2
Household Income	Under \$30,000	10.3%	8.3%	15.1%	7.7%
	\$30-\$49,999	48.9%	51.4%	46.6%	48.7%
	\$50-\$74,999	19.7%	23.6%	17.8%	18.0%
	\$75-\$99,999	11.7%	9.7%	8.2%	16.7%
	\$100,000 and above	9.4%	6.9%	12.3%	9.0%
Marital Status	Single	43.5%	48.6%	46.6%	35.9%
	Married	41.3%	36.1%	34.3%	52.6%
	Other	15.2%	15.3%	19.1%	11.5%
Education	High school or lower	47.5%	51.4%	56.2%	56.2%
	Technical school or a university	30.0%	25.0%	31.5%	31.5%
	2-year college diploma	12.6%	16.7%	8.2%	8.2%
	Undergraduate or graduate degree	9.9%	6.9%	4.1%	4.1%
Employment	Employed, full-time	46.6%	72.2%	32.9%	35.9%
	Employed, part-time	16.6%	13.9%	16.4%	19.2%
	Homemaker	6.7%	5.6%	6.8%	7.7%
	Student	7.1%	2.8%	6.8%	11.5%
	Retired	3.6%	2.8%	5.5%	2.6%
	Unemployed	4.9%	1.4%	2.7%	10.3%
	Other	14.3%	1.4%	28.8%	12.8%
Ethnicity	White/Caucasian	58.7%	44.4%	64.4%	66.7%
	Black/African American	30.5%	48.6%	24.7%	19.2%
	Other	10.8%	7.0%	10.9%	14.1%
Age of Children in Home	No children	49.8%	44.4%	49.3%	55.1%
	Under age 2	8.1%	5.6%	11.0%	7.7%
	Ages 2 to 5	12.1%	9.7%	12.3%	14.1%
	Ages 6 to 12	25.6%	31.9%	27.4%	18.0%
	Ages 13 to 18	22.0%	25.0%	19.2%	21.8%

Table 1. Continued

Variable	Description	Total	Baltimore	Chicago	Tampa
Behavioral Variables:					
Shopping Percent	Approximately half More than half All (100%)	23.8% 18.8% 57.4%	25.0% 16.7% 58.3%	24.7% 19.2% 56.2%	21.8% 20.5% 57.7%
Purchased in last 30-days:					
Orange Juice		92.8%	94.4%	91.8%	92.3%
Grapefruit Juice		44.4%	51.4%	37.0%	44.9%
Oranges		94.2%	98.6%	98.6%	85.9%
Grapefruits		38.1%	52.8%	32.9%	29.5%
Tangerines		60.5%	77.8%	50.7%	53.9%
Apples		80.7%	81.9%	82.9%	78.2%
Grapes		81.6%	79.2%	83.6%	82.1%
Other Fruits		62.8%	58.3%	60.3%	69.2%
Consumed in last 3 months:					
Orange Juice		89.7%	91.7%	93.2%	84.6%
Grapefruit juice		41.7%	47.2%	34.3%	43.6%
Oranges		96.4%	97.2%	98.6%	93.6%
Tangerines		69.1%	77.8%	52.1%	76.9%
Apples		78.0%	79.2%	78.1%	76.9%
Grapes		78.5%	79.2%	80.8%	75.6%
Fresh Citrus Consumption Frequency:					
	Less than once per month	3.1%	1.0%	5.4%	3.8%
	Once a month	15.7%	16.7%	20.6%	10.3%
	Once every 2 or 3 weeks	31.4%	30.6%	27.4%	35.9%
	Once a week or more	49.8%	52.8%	46.6%	50.0%

Appendix 2

Table 3. Parameter Estimates of Ordered Probit Model of Fresh Citrus Attributes

	Freshness	Appearance	Flavor	Juiciness	Size	Price	Peeing	Seeds
Intercept	2.27	-1.06	1.35	0.03	-0.96	1.06	-2.50**	-1.62
<i>Demographics</i>								
Baltimore	0.30	0.86**	0.35	0.73**	0.95**	0.83**	0.80**	1.00
Chicago	-0.05	0.17	-0.03	0.51**	0.33	0.72**	0.25	0.53**
Age	-0.03**	-0.02**	-0.01	-0.01	-0.01	0.00	-0.01	0.00
Male	-0.06	0.30	-0.41	0.15	0.18	0.04	0.46**	0.17
Household Size	-0.10	0.07	-0.03	-0.15*	0.05	-0.04	0.01	0.03
<i>Income Level (grouped category = \$100,000 and above)</i>								
1 < \$30k	0.21	0.40	-0.04	1.06**	1.07**	0.16	0.74*	0.48
30K <= 2 < \$50K	0.30	0.53	-0.56	0.61*	0.73**	0.01	0.46	0.37
50K <= 3 < \$75K	0.00	0.51	-0.29	0.34	0.41	-0.42	-0.05	-0.11
\$75K <= 4 < \$100K	-0.64	0.50	-0.99*	0.19	0.41	-0.67*	0.11	0.27
<i>Marital Status (dropped category = other)</i>								
Single	0.03	0.27	0.18	-0.23	0.16	0.26	0.27	0.01
Married	1.22**	0.88**	0.78**	0.10	0.58**	0.52**	0.66**	0.37
<i>Education Level (dropped category = High School degree or lower)</i>								
Some University	0.21	0.24	0.06	0.06	0.12	-0.11	0.01	-0.05
2-year College Diploma	1.20	0.45	0.20	0.10	0.38	0.34	0.57*	0.76**
Undergraduate or Graduate Degree	0.05	0.28	-0.83*	-0.57	0.06	0.48	-0.11	-0.03
<i>Employment Status (dropped category = other)</i>								
Employed, Full Time	-0.12	0.08	-0.12	-0.25	-0.14	0.07	-0.29	0.55*
Employed, Part Time	-0.45	-0.06	-0.14	0.02	-0.02	0.25	-0.10	0.66**
Homeowner	0.98	0.22	0.50	1.02*	0.34	0.89**	0.12	1.10**
Student	-0.97	0.06	0.12	-0.32	0.29	0.19	0.23	0.87**
Retired	-0.58	0.02	-1.70**	-0.53	-0.27	0.04	-1.18**	-0.08
Unemployed	-0.14	1.52**	-0.25	0.09	-0.39	-0.35	-0.38	0.31
<i>Ethnicity (dropped category = other)</i>								
White/Caucasian	0.29	0.33	0.89**	0.30	0.08	-0.28	0.08	0.17
African American	-0.07	0.15	0.46	-0.19	0.21	-0.50	0.04	-0.23

Table 3. Continued

	Freshness	Appearance	Flavor	Juiciness	Size	Price	Peeling	Seeds
Intercept	2.27	-1.06	1.35	0.03	-0.96	1.06	-2.50**	-1.62
<i>Demographics</i>								
<i>Age Structure of Children in Household (dropped category = no children)</i>								
Children Under 2	0.58	-0.08	0.47	-0.16	-0.37	-0.31	-0.40	-0.25
Children 2 to 5	0.61	-0.13	1.02	1.07**	0.08	0.69**	0.14	0.43
Children 6 to 12	0.30	0.09	0.89**	0.14	-0.10	0.28	0.07	-0.36*
Children 13 to 18	-0.02	0.02	-0.54*	-0.10	-0.17	-0.29	-0.26	-0.09
<i>Purchase Behavior</i>								
Shopping Percent	0.59**	0.37**	0.33**	0.14	0.36**	0.29**	0.45**	0.25**
Orange Juice	0.32	0.02	-0.05	1.21**	0.42	0.35	0.72**	0.48
Grapefruit Juice	1.06*	-0.11	0.49	0.28	0.20	-0.47	-0.43	-0.52*
Orange	-0.77	-0.54	-0.67	-0.55	-0.75*	-1.23**	-0.91**	-1.33**
Grapefruit	0.20	0.74**	0.88**	0.21	0.27	0.48*	0.32	0.36
Tangerine	-0.56	0.22	-0.47	0.21	0.23	0.03	0.43*	0.51**
Apple	0.82*	-0.41	0.10	-0.03	0.56*	0.24	0.14	0.14
Grape	-0.87	0.13	0.08	-1.13**	-0.32	0.10	-0.02	-0.63**
<i>Consumption Behavior</i>								
Orange Juice	0.88	0.57	1.43**	0.25	0.21	-0.21	0.32	0.49
Grapefruit Juice	-0.10	0.25	0.40	-0.03	-0.01	0.69**	0.6*	0.53
Orange	-0.26	-0.16	-0.21	0.46	-0.25	0.04	0.85*	1.22**
Grapefruit	-0.80	-0.77**	-1.2**	0.15	0.06	-0.35	-0.34	-0.02
Tangerine	0.34	-0.41	0.01	-0.44	-0.34	-0.40	-0.51**	-0.71**
Apple	0.26	0.29	0.50	0.23	-0.04	-0.07	-0.24	-0.01
Grape	-0.87	-0.30	-1.36**	-0.17	-0.09	-0.04	-0.07	-0.01
<i>Fresh Citrus Consumption</i>								
Frequency	0.09	-0.25**	-0.02	-0.25**	-0.03	-0.03	-0.09	0.04
Limit2	1.84**	0.99**	1.81**	0.95**	1.32**	1.27**	1.18**	0.63**
Limit3		2.45**		2.45	2.07**	2.09**	2.10**	1.42**
# of Obs	223	223	223	223	223	223	223	223
Log Likelihood	-77.51	-148.56	-92.77	-156.21	-236.15	-225.80	-247.09	-250.69

Problem Statement

Food markets are becoming increasingly globalized. Over the last few decades, the global food supply chain has transformed from a series of shorter and independent product transfers to more unified, coherent, longer term and larger scale operations with transparent relationships among supply chain actors (Bourlakis and Weightman, 2004). At the same time, local food is viewed as a potential source of value by different actors in the food supply chain (Forsman and Paananen, 2002). There exists a substantial discussion in the literature regarding the importance of sourcing local food products. Despite a number of caveats (e.g., Saunders, et al. 2009), there is a perception that local food production and consumption is more environmentally sustainable (e.g., Born and Purcell, 2006). There is also an argument that localized flow of food products within the supply chain enhances health, food security and well-being of individuals and communities (e.g., Winter, 2003; Guptill and Wilkins, 2002). This emphasizes that a wide range of perceived social, economic and environmental benefits are claimed to be driving developments in local food systems. Consequently, a number of consumers are changing their food consumption habits seeking local food products for a variety of reasons (Adams and Salois, 2010). This has led to the emergence of local food systems that encompass the production, processing, distribution and consumption of local food products. Despite these trends, however, some authors (e.g., Born and Purcell, 2006) question the sustainability of the local food systems, and the strict focus on local that could confuse “ends with means” leading to what they call “the local trap” (p. 196).

This paper examines and explores the role of the conventional supply chain in sourcing local food products. Research on the food supply chain until now has been devoted to multi-national collaborations or the supply chain for relatively large food businesses and industries. In contrast, relatively little attention has been directed towards the local food supply chain. Conceptually, both the conventional supply chain (retailers, wholesalers and processors) and the emerging alternative supply chain (e.g., farmers’ markets, Community Supported Agriculture (CSA) initiatives, and institutional markets) can play a significant role in developing a local food system. Empirical studies in this area have either been focused on specialized or niche market dimensions of local food systems or on the nature and form of a local food system from the perspective of few segments of the retail sector (e.g., Ilbery and Maye, 2005a; Morris and Buller, 2003; Guptill and Wilkins, 2002). As a result, an increasing number of researchers in this area emphasize the need for and importance of conducting more empirical studies related to the supply chain for local food products.

Winter (2003) and Guptill and Wilkins (2002) suggest the need for more research to uncover and explore the patterns of local food purchasing, in particular, the dynamics in the retail landscaping, the motivation of local food purchasers and the consequences of their actions. Ilbery and Maye (2005a), in their empirical study that examined the retailing and processing aspects of local food products, underscore the importance of both the conventional and alternative supply chains in creating a market for local foods. They conclude their findings by emphasizing the need for future research to critically evaluate and assess the market potentials for these products and to better understand the supply chain especially from a retail perspective. Reviewing relevant literature on local food systems, Born and Purcell (2006) also recommend more empirical studies to explore questions especially related to the local food concept, its benefits, and the scale of participation by different supply chain actors.

Objectives

The purpose of the present paper is to examine and discuss the relationships and linkages between the conventional supply chain actors and the producers and/or suppliers of local food products. Specific objectives are to assess food supply chain actors, specifically conventional wholesalers' and retailers' perceptions and understandings of the local food concept, their experience in buying and selling local foods, perceived benefits and risks associated with sourcing these products, scope and form of emerging relationships and collaborations with local food producers, and future local food supply chain trends. The study will help researchers and practitioners understand the scale and form of local food sourcing practices, and potential market opportunities and challenges for the conventional supply chain actors to participate within the local food system. This would enrich the debate over and contribute towards the development of pertinent conceptual and empirical approaches in investigating and understanding the local food systems.

Conceptual Framework: The “Local” Concept and the Supply Chain for Local Foods

In this study, we applied the following conceptual frameworks and approaches that potentially provide the theoretical and empirical basis for analyzing the supply chain for local food products. The first approach discusses the relevant school of thoughts that focused on describing and conceptualizing the local food systems. The second and third approaches include the concept of customer value and supply chain management, which involve understanding the complexities of customer value perceptions and management of supply sources, flow of products and information, as well as supply relationship building (Woodruff, 1997; Flint, 2004). The fourth approach focuses on the Short Food Supply Chain (SFSC), a conceptual framework designed to address supply chain issues related to local foods.

1. A number of authors have recently attempted to conceptualize local foods and recognize their economic importance. Some studies use terms such as alternative food systems or networks (Renting et al., 2003; Holloway et al., 2007), community food systems (Peters, 1997), or civic and demographic agriculture (DeLind, 2002) to frame and conceptualize local food systems and economies. Despite these efforts, there appears to be no generally agreed and widely accepted definition of local food. One school of thought emphasizes local food to be food that is produced, processed, marketed and consumed within a geographically circumscribed area (Morris and Buller, 2003). The criticism towards this approach is that, although local food is defined in terms of distance between producers and consumers, there is no clear agreement on the limiting distance and the geographical boundaries (Jones et al., 2004). There is also a challenge to map these spatial relations onto specific social or environmental relations (Hinrichs, 2003).

A second school of thought focuses on “locality food” looking into “locality” as value added for a broader market, and distinguishing the concept from “local food” that focuses on geographical dimensions (Murdoch, et al. 2000; Renting, et al., 2003). In this context, the concept of “locality food” defines local based on the “quality” dimension. The product has an identifiable geographical region but it is not necessarily consumed in the

same region or locality. It can be sold through different market outlets at the national or international level promoting primarily its unique characteristics attached to its source or production process. Products are identified and distinguished using product labels, certification systems and other production parameters such as artisanal, traditional, farm based, organic or natural to define and differentiate the quality of the specific product coming from a specific geographic area. One other related approach is based around the environmental, social and cultural dimension of local food rather than focusing on geographical distances, administrative boundaries or specific quality dimensions (Ilbery and Maye, 2005a). Here more important is the linkage and networking within a given community (Feagan, 2007; Jones et al., 2004) and the creation of environmentally and ecologically sound production and marketing practices (O'Hara and Stagl, 2001). These conceptual variations in defining local food reflect the theoretical and methodological challenges to understand and analyze local food systems, and the potential dissimilarities of local food systems among different groups, regions and localities caused by a combination of socio-economic and environmental factors. In the present study, the geographical dimension has been the conceptual framework applied in assessing and analyzing the supply chain for local food products.

2. In recent years, the supply chain management literature has focused on supply chain collaboration approaches and supply source selection criteria to improve product movements and value to the consumer. Some authors emphasize the need for increased collaboration between supply chain actors at various levels in order to create a more efficient and responsive supply chain that could provide additional value to the end customer (Gunasekaran et al., 2001; Matopoulos et al., 2007). Collaboration is viewed as a departure from “normal commercial relationships” or “spot market transactions” to a “relational exchange” (Matopoulos et al., 2007, p. 178). Matopoulos et al. (2007) distinguish two pillars in the framework for the supply chain collaboration. The first pillar focuses on the design and governance of supply chain activities. This includes elements such as decision making on how to select appropriate partners, activities on which collaboration will be established (collaboration width), and identification of the level of collaboration (collaboration depth). The level of combination of these elements measures the degree and intensity of collaboration. The second pillar is related to the establishment and maintenance of the supply chain relationships and the associated benefits, risks, and reward sharing. These elements are also crucial in determining the level of collaboration. Studies on supply chain collaborations have until now mainly focused on large multinational companies. However, some recent studies indicate that successful and simple collaborative relationships can be created among smaller firms. Cadilhon and Fearn (2005), for instance, report on a long-term successful relationship between a relatively small produce distribution company and its local produce suppliers. The relationship that focused on sharing of basic information and supply coordination practices has led to an efficient produce distribution system.
3. Customer value creation is a prerequisite for a competitive advantage, and it is created when the benefits to the customer associated with a product or service exceed the offering's costs to the customer (Slater and Narver, 2000). A position of superior customer value is achieved when the seller creates more value for the customer than does

a competitor. The literature indicates product quality and market services as two of the numerous sources of customer value (Slater, 1997). Food products from small suppliers are usually associated with concepts such as differentiated products, niche products, value-added products or local food, which is expected to provide consumers and supply chain actors with added value in terms of an increased transparency of the food supply chain (Forsman and Paananen, 2007).

4. In recent literature, supply chains for local food products are mainly discussed within the framework of the Short Food Supply Chain (SFSC) (Ilbery and Maye, 2005b). Marsden et al. (2000) use this term to describe the supply chain for local food products. Key characteristics of the SFSC include the following (Sage, 2003; Marsden et al.2000; Renting et al. 2003; Ilbery and Maye, 2005b): (a) Products that pass through the SFSC channel are commonly defined by the locality, region or by a specific producer. (b) The perception is that the consumer receives the products embedded with information about the mode of production, origin of the product, regional imagery and specific quality. This would help the consumer to make value-judgments about the product, and to create connections with the people producing it. (c) The distance between the primary producer and the end-consumer is reduced. It is perceived that successful communication with the end-consumer will help develop mutual trust and differentiate local products from other conventional and non-local products (Sage, 2003).

Marsden et al. (2000) identify the following three types of SFSCs.

- I. Face-to-face, where producers sell their products directly to the consumer on a face-to-face basis. Here the focus appears to be on local foods (geographical dimension) rather than on locality foods (quality dimension).
- II. Spatial proximity, where local food products are sold through local market channels including farm retail markets, food service outlets, and local food retailers and supermarkets.
- III. Spatially extended, where products are sold not only to consumers in the locality but also to consumers in other regions including online food retailing. Labeling and certification programs could be used to differentiate these products emphasizing the quality dimension.

The aforementioned literature review provides the basis to understand and assess the local food conceptualizations and supply chain operations in the study area. In particular, these conceptual frameworks will be applied to examine and assess the role of the conventional supply chain actors in building relationships with the local producers, as well as the dimensions, consequences, advantages and risks of sourcing local foods as perceived by these chain actors.

Methodology

The study applies a case study conducted in 2007 and 2008 in a six-county region of Southeast Michigan. This includes Genesee County and the counties of Jackson, Monroe, Lenawee, Washtenaw and Wayne that established a Food System Economic Partnership (FSEP). FSEP is an urban-rural collaboration devoted to enhancing community viability and catalyzing changes to

help create a local food system. Collaboration of urban and rural community leaders, farm business organizations and resource providers in the five-county region led to the formation of FSEP in 2005. FSEP currently provides research, education and outreach services and programs that help develop a local food economy. Some of FSEP’s recent activities, services and technical assistance programs include (1) business and product development services to new entrepreneurs and existing businesses in collaboration with the Michigan State University Product Center for Agriculture and Natural Resources, (2) services that could create linkages and relationships to increase sales of local food items through established retailers, (3) studies focusing on market development and retail and distribution networks for local foods in the region, and (4) services that support the development of alternative market outlets including farmers’ markets, CSAs, and farm-to-college/farm-to-school initiatives to increase local food sourcing by colleges, universities and schools in the area. Genesee County is in the process of establishing its own local food system.

Since the traditional research strategies are too limited in applicability and scope, the qualitative research paradigm including the case study has recently been recognized as an important research approach for the agri-business sector (Bitsch, 2005; Sterns et al., 1998). A case study approach enables researchers to identify, explore, describe and understand a complex phenomena, situation or event (Yin, 2009). The approach makes it possible to take a closer look at the phenomenon and consider it from a holistic perspective in order to study its unique features and commonality (Riege, 2003; Stake, 1995). Therefore, the case study approach was deemed appropriate for this study, because it helps explore and examine the supply chain actors’ roles, experiences and perceptions about local foods.

Data were collected from supply chain actors focusing on conventional retailers and wholesalers in the region (Table 1). Since the study pursued a case study approach, a sampling approach was not considered to identify target interviewees, rather interviewed retailers and wholesalers were selected from a list available from the region. In total, a list of 95 wholesalers, 149 independent grocery stores including convenience stores and 37 supermarket chain stores has been used to systematically identify and select case study retailers and wholesalers. For retailers, the study included local independent grocery stores, convenience stores and a supermarket chain store.

Table 1. Selected Case Study Conventional Retailers and Wholesalers

Retailers	Wholesalers
Supermarket chain store (1)	National wholesale distributor (1)
Independent grocery stores (7)	Ethnic-based wholesalers (3)
Convenience stores (3)	Wholesale-retail operation (1)
	Produce packer-shipper (1)

Interviewed retailers included one supermarket store, seven local independent grocery stores and three convenience stores. In the paper, wherever it is applicable, the term “local retail stores” will be used to refer to local independent grocery stores and the convenience stores as a group. Interviewed wholesalers include one large national distributor, one regional produce packer-shipper, three regional ethnic-based wholesalers and one wholesale-retail operation located in the region. In order to be considered for the study, (1) potential interviewees had to fit into one of the selected retail or wholesale categories, and (2) they should have an operation within the six-

county region. Interviewees were contacted by email and/or phone. All interviews were conducted in person at the interviewee's place of business. Interviews lasted in most cases between one and two hours.

Interview questions for both retailers and wholesalers included current food product sources, the local food concept, experience in sourcing local foods, future prospects for sourcing local food, relationships and linkages with local food producers/suppliers, as well as benefits, risks and challenges associated with sourcing local food. Following are some of the key questions interviewees were asked about local foods.

- What do you understand under the term local food?
- What are your past experiences in sourcing local foods?
- What types of relationships do you have with local producers?
- What type of local products do you normally buy?
- What are the major reasons for buying local?
- In the future, what factors would determine your purchase of local food products and your relationship with local food producers?

The interviews in each supply chain actor group were analyzed separately and then combined into themes based on interview protocols and frameworks designed for the study. Validity in the study process was enhanced by interviewing supply chain actors from different retail and wholesale categories that potentially have experiences of buying and selling local foods. Reliability was increased through the use of consistent semi-structured questionnaires in the interview process that led to the development of appropriate themes and comparable results in the study. Overall, despite the small number of cases used for the study, validity and reliability of the findings from the study stems from the following: (1) a systematic approach has been followed to select the cases considering the different segments of the retail and wholesale sectors. (2) Considerable time has been taken during the interview sessions to collect accurate information from each interviewee using the semi-structured questionnaire. (3) The same interview guidelines have been applied for retailers or wholesalers to compare and contrast their responses. This approach enabled the researchers to establish a chain of relevant information and evidence in the data collection phase. Triangulation of information from the different interviews in the analysis has contributed to reduce research bias.

Limitation of the study: Despite the validity and reliability of the findings from the study, the approach has some limitations. First, due to the limited number of cases and absence of a quantitative analysis, the present study will not lead to comprehensive analytical and/or statistical generalizations. Second, it is difficult to establish a cause and effect relationship in a case study approach. This makes it difficult to establish applicable correlations between variables. This is in line with the main concerns of a case study approach (Yin, 2009; Shugan, 2006; Tellis, 1997). In addition, due to the limited geographical scope of the study, the conclusions and recommendations from the study may not be generalizable and applicable in other areas with different socio-economic structures as well as environmental and ecological conditions. Despite these limitations, however, the present study contributes towards the local food debate and a better understanding of the relationships between the conventional supply chain actors and local food producers.

Description of the Case Studies

Retailers

The interviewed supermarket chain store is a chain with more than ten stores located in different parts of the country. The local *independent grocery* stores are much smaller retail stores compared to the case study supermarket store. Each interviewed independent grocery store has between one and three stores at various locations in Southeast Michigan. The annual estimated gross income per case study independent grocery store ranges between \$4 million and \$10 million. Some of these stores have an inventory of up to 3,000 different kinds of food and consumer products. The *convenience stores* are stores that are relatively small in size and provide a limited line of durable and packaged food products. They carry a very small amount of fresh produce.

Wholesalers

The large national distributor has its own product delivery systems and distribution centers that supply products to the distributor's individual stores and other markets in a given state or region. The distribution center carries a wide range of raw, processed and packaged food products, and the chain's operations cover a large geographical area. Food products from the distribution centers are sold to a wide range of retailers, food service outlets, institutional markets and other wholesalers.

The *regional packer-shipper* markets a variety of vegetables and grain products. Sales include what is produced on its own farm and produce delivered from the surrounding small farmers. It buys mainly vegetables and fruits, and packaging is done mainly on vegetables including potatoes, sweet corn, pepper and cabbage. It also provides different services to other farmers in the area. This includes a storage service if product is going to be marketed through its channel. It sells containers, bags, pallets, etc. to these farmers. About half of the vegetables are sold through brokers to large mass merchandisers and grocery stores in the region. The remaining half goes to smaller local grocery stores, restaurants and small distributors. The packer-shipper's preference is to strengthen its relationships with local grocery stores and small distributors.

The *regional ethnic-based wholesalers* are specialized in distributing food items (fresh produce and imported ethnic food products) within the region to ethnic markets, restaurants, small food specialty retail stores and other regional food service outlets. Their products are not sold through large supermarket chains. These wholesalers buy and sell a number of products including products that are not necessarily carried by large national distributors. Due to lack of adequate storage space to store large quantities of products for a longer period of time, some of these wholesalers are in some cases providing market services as a broker. Distribution of products is limited to Michigan locations, and in most cases to buyers within a few miles radius from the location of the distribution center. In order to meet special demands of their ethnic-based customers, these wholesalers are importing some food products from other countries.

The *regional wholesale-retail operation* is characterized by a large selection of food products and owns a packaging operation. Compared to the other regional wholesalers, it is relatively

small in size, and its operation focuses on sales to independent grocery stores and regional wholesalers.

In this paper, wherever applicable, the term “regional wholesalers” will be applied to refer to the regional packer-shipper, the wholesale-retail operation and the ethnic-based wholesalers as a group.

Results and Discussion

Based on their organizational structures and operations, interviewed conventional retailers and wholesalers have different perceptions and understandings of the local food systems. Table 2 presents these discrepancies based on the following thematic areas: (1) The local food concept, (2) preferred local food products and producers, (3) local food experience, (4) benefits of buying local, and (5) future prospects for buying local. The following sections present and discuss the findings in these areas.

Table 2. Summary Results from Interviewed Supply Chain Actors

Local food concept	Food produced and marketed within a given county including products from neighboring counties	Food produced and marketed within a given state including products from neighboring states	Food produced and marketed within a given state including products from neighboring states	Food produced and marketed within a given state including products from neighboring states
Types of local food products	Fresh produce (fruits and vegetables)	Fresh produce and specialty livestock products including dairy products	Fresh produce (fruits and vegetables)	Fresh produce (fruits and vegetables)
Types of local food producers	Small-to-medium size producers	Small-to-medium size producers	Small-to-medium size producers	Small-to-medium size producers
Local food experience	Buy local food products; have direct contact with producers; limited purchase	Very limited contact with local producers	None	Participate through farmers’ markets and the regional terminal market
Benefits of buying local	“Local” not seen as a product differentiation factor; “local” helps in improving relationship with the local community	The “quality” dimension (differentiated and niche products - organic, natural, etc.) seen as a key factor in creating economic benefits	No economic or social benefit seen by actors; no information flow to product buyers or end-consumer	No information flow to product buyers or end-consumer; no unique economic or social benefit seen by actors
Future prospects for buying local	Priority to conventionally produced fresh produce; limited opportunity for buying and selling niche/specialty products	Priority to organic, natural or niche/specialty products; requires additional market services from producers/suppliers	Product could come from surrounding states, and price, volume and product quality will determine purchase activity	Wants to see large-size producers, and a regional wholesale market operation to enhance their local food purchase

Conceptualizing “Local”

There are divergent views among the supply chain actors in conceptualizing, defining and describing local food.

Retailers: For local independent retailers with just one store, local foods are food items produced, sold and consumed within a very small radius, mostly within a given neighborhood. For local retailers with two to three stores, local food represents food that is produced, processed and sold within a given county, including products from neighboring counties. For large regional and national wholesalers and supermarket chains, local food means food produced and sold within a given state including products from neighboring states. This indicates the existence of divergent views between the large chains and the local independent retailers in conceptualizing local foods. Local foods are viewed by most of the local retail stores and the regional wholesalers as food items produced by small-to-medium size producers who mainly supply fresh produce (fruits and vegetables). The supermarket views local food to include fresh produce as well as specialty livestock and dairy products including niche products from small local manufacturers.

Wholesalers: For the large national distributor, local food means food that is produced and marketed in relatively large geographical areas at the regional level. The interviewee from this distributor, for example, considers food imported from neighboring Canada to be local. For ethnic-based wholesalers, local food represents fresh produce that can be ordered and delivered from a local supplier, in some cases, over a 24-48 hour period. These wholesalers want to have their suppliers located very close within a few miles radius. For example, one ethnic-based wholesaler located in Detroit has the desire to source local produce from suppliers located within the city limit. Their buyers are mostly restaurants and other food service providers located very close to the distribution facility. For the wholesale-retail operation, if something is not produced in the locality, but imported from other areas within the state, that could be considered local. For the packer-shipper, local food represents buying food items supplied from neighboring farmers and counties.

This divergence in defining and understanding local food has an impact on the role and participation of each supply chain actor in the local food system. For the supermarket, the quality or “locality” dimension appears to be critical in buying local foods, while the geographical dimension appears to be more important for the local retailers and wholesalers. Most interviewed retailers and wholesalers, except the supermarket, consider fresh produce (fruits and vegetables) as the primary local food products they can purchase from the local producers. In terms of the types of local food producers, all interviewed retailers and wholesalers have the perception that the local food concept is primarily designed to help small- and medium-size producers.

Experience in Sourcing Local Foods

The interviewed supply chain actors did not provide actual figures on their purchases and sales of local food products. However, most of them indicated that local food accounts for a very small portion of food items sold through their channels.

Retailers: The supermarket has its own distribution centers that collect and deliver food products to individual retail stores. It sources food products from suppliers including large producers that meet its insurance, food safety and bidding requirements. Potentially, local food producers could supply products directly to a nearby store or a distribution center. But, until now, the supermarket's store has very limited contacts with local food producers and sourcing of these products is almost non-existent.

The local independent grocery stores use regional distributors to source food products. These retailers prefer to use these suppliers for the following reasons:

- The retailers have long term relationships with the distributors that led to the development of trust in sourcing food products.
- Price in most cases appears to be within an acceptable range.
- Logistics and delivery arrangements meet the retailers' volume requirements in a timely manner.
- Some retailers perceive that their suppliers have extended and excellent product selection. For the retailers, established reputation and name recognition play an important role in selecting suppliers.

Some of the independent retailers use what they call "back-up" sources for some products. Products are sourced from these sources if they are not available from the current distributor or retailers use these arrangements to purchase products from local producers during the growing seasons. In the latter case, the retailers need to have special arrangements and agreements with their established distributors in order to allow them to buy products from these other suppliers or producers. The interviews indicate that the local retailers (with the exception of some convenience stores) have experience in buying local. Some of them have local food promotional activities during the summer time using local newspapers, in-store flyers and signs. One local retail store advertises local farmers' produce by adding farmers' names on in-store produce signs. In some cases, names of farms are printed on product packages. Fresh produce including melons, tomatoes, sweet corn, asparagus, squash, potatoes, pumpkins, apples, small leafy vegetables, strawberries, raspberries, and flowers/plants are the most common items purchased by the retailers. Interviewees have the perception that the total volume of locally grown fresh produce sold through their channel is very small and limited to seasonal availability. In the past, some of the local independent retail stores had long-term local food sourcing agreements with the local producers. For example, one local retail store used to source produce from more than ten local farmers. However, in recent years, the number of local producers selling through this channel has been steadily declining. From the perspective of the local independent retailers, reasons for the low local food purchase performances through their channels include the following:

- A relatively small size of the produce department in their stores to handle a variety of fresh produce (for example, one local retail store estimated per week fresh produce sales per store to be \$35,000. Total fresh produce market share for the store is estimated at 3%. A second retail store estimated per week fresh produce sales at \$6,000 - \$7,000).
- The perception that their customers are not coming to the stores to primarily buy fresh produce.

- Inconsistent product labeling, packaging, supply and delivery by the local producers.
- The need for a significant amount of time and resource to find a local food supplier, and risks associated with frequently changing supply sources.
- Farm exits.
- Competition from the growing number of alternative market outlets (e.g., farmers' markets). The retailers also have an increasing liability and food safety related concerns to establish direct relationships with potential local food producers.

Wholesalers: Most of the interviewed wholesalers, except the packer-shipper, mentioned that their local purchase is very small. In addition, except the packer-shipper, the other wholesalers do not have direct contact and relationship with the local producers. The packer-shipper used to source fresh produce (mainly vegetables) from twelve local producers in recent years. Some of these farms are not selling produce through this channel anymore. The ethnic-based wholesalers buy fresh produce from a regional warehouse (wholesale market) where local producers are also selling their products. Some are buying at farmers' markets during the summer time. Although those selling in such markets at times could include non-locals, the wholesalers believe that what they are buying in these markets is mostly local.

Future Prospects for Buying Local

Retailers: From the perspective of the supermarket, future priority will be given to organic, natural or niche/specialty products with some purchase of the conventionally grown local fresh produce items during the summer time, when they are available from the region. Local producers need to provide additional market services to sell their products through this channel (e.g., use of standard packages, as well as meeting specific volume, quality and food safety requirements). For the conventional food products that come from local food producers, prices should be comparable with that of non-local products. However, the supermarket is willing to pay premium prices for value-added local food products. The supermarket's general preference is for purchasing high volume food products from fewer, larger producers or through local food aggregators in order to remain price competitive and to ensure product quality and quantity minimizing product safety related risks.

The local independent retailers are interested to continue buying conventional local food products. Following are some of their views regarding the issues associated with their local purchase in the future.

1. Future priority will be given to fresh fruits and vegetables. The major challenge, in this regard, will remain finding a way that enables them to source these products when they are available from local sources without affecting the relationships and agreements with their current suppliers. One option, as suggested by one interviewee, to minimize risk and the number of switches between suppliers is to work with local producers who can "be the first and the last to supply in season" – that means working with those local producers who can cover a longer supply season. The local producers should also be consistent and reliable in meeting price, quality, logistics and delivery arrangements as required by the retailers.

2. They want to pay competitive prices, preferably prices comparable with the wholesale market.
3. The retailers have the perception that organic, natural or niche/specialty food products would have very limited market opportunities through their channels. This contradicts some current assumptions about the benefit of such purchases through these channels. For example, Forsman and Paananen (2007) assume that small independent retail stores can use value added local food products to differentiate themselves from large chain stores. The retailers in the study area think that they are disadvantaged in terms of location and consumer demographics to carry these products. The case study region includes metropolitan areas such as Detroit and Ann Arbor. However, Since Detroit is a food desert area with no grocery stores in most neighborhoods, most of the interviewed independent retail stores are located in rural areas where consumers apparently have limited purchasing capacity. Therefore, the retailers do not see the benefits of carrying high priced value added local food products. They have the perception that the consumers coming into their stores are not willing to pay high prices for these products.
4. Interviewed local retailers indicated that in previous times local producers or suppliers initiated most purchases through their stores. Therefore, from their perspective, producers need to take the first step to initiate contact and establish linkages to increase sales through their channel. They have the perception that recruiting new local food producers would entail unnecessary risk and additional cost for them in terms of time and money until they find the right supplier that meets their purchase requirements and fits within the philosophy of their retail operation.
5. As long as basic purchase and procurement requirements such as price, quality and consistency in delivery are met, some local retailers perceive that volume will not be the decisive factor in making decisions to buy local. Since their fresh produce departments in store are relatively small, purchasing small amounts of produce items from individual producers would sometimes even be a good fit for their operation. But producers should be in a position to supply on a regular basis and supply should run for one week, one month or for part of the season as agreed upon. However, some other local retailers want to see a relatively large volume of supply that could run through an extended period of time covering a significant part of the supply season. These are large volume purchasers and also want to have long term relationships with large local farmers or local produce aggregators who can meet their supply requirements.

Wholesalers: Most of the interviewed wholesalers have interest in purchasing local produce items. For the large national wholesaler, product price, quality, volume, and supply consistency are the key factors that should be met in order to expand its involvement in the local food system. These are also important factors for the ethnic-based wholesalers. As mentioned above, the packer-shipper has an established relationship with some local farmers, although the number of farmers selling through this channel declined in recent years. It wants to keep this relationship, but it has less interest in recruiting new local producers. Except for the packer-shipper, the other wholesalers do not see the opportunity to buy local food directly from local producers unless they are large-size producers or products come through local food aggregators. Most of them

suggest improvements in the regional wholesale/terminal market operation to enhance their local food purchase.

Benefits of Buying Local

Economic factors and social interactions (e.g., local ties, trust) are assumed to be vital for the success of local food systems (Ilbery and Maye, 2005a). Respondents from the case studies differentiate between economic factors and social factors in determining future purchases of local foods. The local independent retail stores do not associate the term “local” with some kind of differentiated, value-added or niche product. But they perceive it as part of a community building effort, which can create a positive image for their operation. This is in line with some findings in previous related studies. Guptill and Wilkins (2002), for example, hypothesize that food retailers do take on certain identities with the communities they serve, and that these identities play a role in shaping the assortment of products they offer. The interviewed local retailers view the importance of sourcing local foods particularly in terms of improving their relationship with the local community. Otherwise, perceived economic benefits from carrying local foods are assumed to be limited, particularly considering the small share of the products in store, as well as associated risks and costs in terms of time and resources that could emerge as a result of frequent switches between suppliers. However, compared to the wholesaler and supermarket chains, the local independent retailers still tend to consider local foods as a potential source of competitive advantage. Therefore, these chain actors still have better relationships with selected local producers than the large chains.

For the supermarket, the quality dimension of local food products appears to be a key factor in creating economic benefits. Thus, focus would be on buying differentiated and value-added products from larger regional suppliers for a broader market. Otherwise, from its perspective, the supermarket would add some conventionally produced local food items to its product selection, if there is the perception that this action would help strengthen relationships and linkages with the local community. As in the case of the local independent retailers, it is aware of the need for carrying certain local food product lines to keep some of its current loyal customer base. If the local producer has some reputation and his/her products are expected to meet some of the standards in terms of product price, quality, delivery, and logistics, the supermarket would like to work with this producer to source local foods, not necessarily because of the unique economic benefits from carrying the products, but to increase social interaction and gain some respect from those loyal customers who are looking for local food products in the store or from local food support groups within the community. Otherwise, although there is an interest in buying local, the supermarket’s commitment to local food purchase appears insignificant. It still does not have an established local food focused marketing and promotion efforts. This indicates that, currently, customers are not receiving information through the conventional retail channel that enables them to make decisions and judgments about the value of local food. This also shows that the retailers do not see an added value from promoting local. The situation at the wholesale level is not much different. There is virtually no information flow through this channel to the buyer or the end-consumer about local food. In this regard, it can also be argued that the wholesale supply chain actors do not see significant economic and social benefits from carrying and promoting local.

Overall, besides price, volume and quality, the following factors appear to be equally and, in some cases, more important for the interviewed retailers and wholesalers to purchase and sell local food products through their channels.

1. Currently, social interactions and benefits appear to be much more important than economic benefits for these supply chain actors to participate in the local food system in the study area. In the long term, this would potentially support the development and expansion of economic interactions and benefits both for the producers and the supply chain actors. However, it is still challenging for the supply chain actors to identify and communicate the value of local foods with other downstream supply chain actors and the end-consumer.
2. A wide range of literature has been devoted to the importance of supplier reliability in the selection of supply sources (e.g., Katsikeas et al. 2004; Cox et al. 2007). Interviewed chain actors highlighted honesty and integrity of local food producers as one of the key factors in sourcing local foods. Inconsistent supply and delivery are among the factors that made local food purchase difficult for some of these conventional retailers and wholesalers. These buyers perceive that local food producers cannot deliver products and services on time with the features agreed upon. This incurs additional transaction and logistics costs for the buyers resulting in losses of money and trust.
3. Relationship building with local food producers appears to be the other key factor that affects local food purchase decisions. It seems that there is currently a gap to nurture new relationships between the supply chain actors and local food producers in the region. Apparently, both buyers and local food producers are not acting proactively to develop relationships. Almost all interviewed supply chain actors prefer to buy food products from local producers or other local suppliers who have long term relationships with them. These wholesalers and retailers mentioned that management of relationship-building is the most difficult part in buying local. Their main argument is that they lack the capability and resources to manage relationship-building with many local food producers. They also perceive that many local food producers do not have the capability to share valid information on supply, price and delivery arrangements and to build and maintain an effective relationship with their buyers.

Conclusions

A case study approach was applied to examine and explore relationships and linkages between local food producers and conventional food buyers from the perspective of retailers and wholesalers. The study identified that local food is desirable and interviewed retailers and wholesalers show an interest in sourcing these food products. There are, however, discrepancies among interviewed retailers and wholesalers in defining and conceptualizing local foods, and in the extent of local food sourcing experiences and practices. Local food for interviewed large supermarket and wholesale chains is food produced and sold within a broader geographic area including food products from neighboring states. For interviewed local retail stores, local food is food produced and sold within a given locality including neighboring counties. These divergent views and complexities in the perceptions of “local” indicate (1) the uncertainty surrounding

sourcing of local foods by the conventional supply chain actors, and (2) the challenges in analyzing and understanding the local food systems. These are in line with the findings in previous studies that point out the complexities and conflicting meanings of local tied with food products (e.g., Feagan, 2007, Allen et al.; 2003; Allen, 2004).

Interviewed retailers and wholesalers are sourcing local food products in varying degrees. In comparison to supermarket and wholesale chains, most interviewed independent local retailers have a good deal of experience in sourcing local foods. The amount of local food products purchased by these retailers, however, appears to be very small. This is attributed to a number of factors including store size, liability and food safety concerns, as well as product quality and logistical and delivery related issues. In addition, their current long term relationships with the regional suppliers are seen as major hindrances to create new relationships with the local food producers. For the interviewed supermarket and wholesalers, lack of suitable intermediaries to aggregate and deliver large volume local food products appears to be the main challenge in sourcing local foods. In addition, for the supermarket, sourcing of specialized local food products tend to be the focus, which cannot be supplied in large volumes by the local producers. In this context, it is still difficult to predict the future role of the supermarket in sourcing niche and specialized products from a given locality.

Overall, the findings indicate that market access for local food products are mainly based on existing relationships and linkages between the supply chain actors and the local food producers. In the literature, trust has been considered as one of the driving forces to improve seller-buyer relationships. Some authors describe trust as an important coordination mechanism that reduces uncertainty, and as a prerequisite to attaining superior performance and competitive advantage (e.g., Cox et al., 2007). The results indicate that local food market success within the conventional food supply chain depends not only on the traditional supplier selection criteria such as price, volume and quality, but also on factors such as trust, reliability and information-sharing that affects long-term relationships. Thus it can be argued and hypothesized that creating a viable market access for local food products through the conventional supply chain will primarily require enhancement of the information-sharing capability of the local food producers and the establishment of trust-based relationships and linkages with their buyers. It can also be hypothesized from present findings that, in comparison, at least in the study area, local foods have better market access through local independent retail stores than large supermarket and wholesale chains. However, one important signal from this study has been the steady decline in the number of producers who supply local produce items to the local retailers. It appears that these retailers are now facing competition from emerging alternative market outlets for local food products in the region (e.g., farmers' markets). This may suggest emerging tensions between the conventional food retailers and alternative market outlets for local food products, at least in the short-to-medium term.

Local foods also retain some differences in values for the interviewed supply chain actors. For most interviewed retailers and wholesalers, local food sourcing is important to gain some positive images among loyal customers and to enhance social interaction with community members who support the local food movement. In this regard, as Guptill and Wilkins (2002) point out, local foods could be used by the conventional retailers and wholesalers to meet demands of some of their sophisticated and loyal customer bases. Despite this, the results

indicate that the economic benefits from these products are limited and local foods are not viewed as differentiated products by most interviewed supply chain actors. Overall, although the findings from the present cases are not leading to the development and construction of theories or methodological approaches, the study helped in developing relevant hypotheses for future research works regarding the relationships and linkages between local food producers and the conventional supply chain actors including their local food purchasing experiences and practices.

Implications for Managers and Producers

In order to establish a sustainable long-term market channel for their products and a better relationship with retailers, local food producers and suppliers need to gain trust and reputation from their buyers. Producers can build upon the current momentum through the retail channel by being proactive, developing trust-based relationships, and providing timely and valid information on supply and delivery arrangements. Local food producers can particularly increase their market share through local retail channels by taking over some of the value-added functions (e.g., preliminary product sorting, grading and packaging) that is being provided by other chain actors. Production capacity and logistical arrangements will continue to be a challenge for most small-to-medium size local food producers. Advance purchase arrangements would help some of these farmers to pool resources to provide a range of products in sufficient quantities. For example, local retail stores can make arrangements with local food producers that they produce/plant specific items that are needed by their customers. In the long term, local food producers may need to collaborate to provide sufficient quantities of food items that meet their buyers' needs. One approach could be to form an association, a cooperative or a network that helps them pool their resources to market their products through different channels. Buying from these farm organizations or cooperatives will help buyers to reduce the time and resources spent on the administrative tasks involved in ordering, invoicing and making payment and delivery arrangements.

Buyers could also increase their participation in local food systems, if they develop and apply market-specific "local product purchasing specifications and guidelines" that help create a clear understanding about their demands with regard to local foods. Such guidelines and specifications would be useful in order to streamline the "local" supply and meet each buyer's need (wholesaler, retailer, food service producer or institutional market representative). Details of the guidelines could include listing of specific buyers' requirements that need to be met by each producer (e.g., formalities and procedures on contractual agreements, bidding, product quality, pricing, food safety, liability, delivery arrangements) when supplying local food products to individual stores or establishments.

References

- Adams, D.C., and Salois, M.J. 2010. Local versus organic: A turn in consumer preferences and willingness-to-pay. *Renewable Agriculture and Food Systems*: 25(4): 331–341
- Allen, P. 2004. *Together at the Table: Sustainability and Sustenance in the American Agrifood System*. Philadelphia: Pennsylvania State University Press.

- Allen, P., FitzSimmons, M., Goodman, M. and Warner, K. 2003. Shifting Plates in the Agrifood Landscape: The Tectonics of Alternative Agrifood Initiatives in California. *Journal of Rural Studies* 19: 61–75.
- Bitsch, V. 2005. Qualitative Research: A Grounded Theory Example and Evaluation Criteria. *Journal of Agribusiness*, 23(1): 75-91.
- Born, B. and Purcell, M. 2006. Avoiding the Local Trap. Scale and Food Systems in Planning Research. *Journal of Planning Education and Research*, 26(2): 195-207.
- Bourlakis, A. and Weightman, P.W.H. 2004. *Food Supply Chain Management*. Blackwell: Oxford/UK.
- Cadilhon, J.J. and Fearne, A.P. 2005. Lessons in Collaboration: A Case Study from Vietnam. *Supply Chain Management Review* 9(4): 11-12.
- Cox, A., Chicksand, D., and Yang, T. 2007. The Proactive Alignment of Sourcing with Marketing and Branding Strategies: A Food Service Case. *Supply Chain management: An International Journal* 12(5): 321-333.
- DeLind, L.B. 2002. Place, Work, and Civic Agriculture: Common Fields for Cultivation. *Agriculture and Human Value* 19: 217-224.
- Feagan, R. 2007. The Place of Food: Mapping Out the “Local” in Local Food Systems. *Progress in Human Geography* 31: 23-42
- Flint, D. 2004. Strategic Marketing in Global Supply Chains: Four Challenges. *Industrial Marketing Management* 33(1): 45-50.
- Forsman, S. and Paananen, J. 2002. Local Food Supply Chain: A Case of Rural Food Processing Firms and Catering Business in Finland. Available Online: http://orgprints.org/6180/01/dar_3.pdf Accessed September 30, 2007.
- Forsman, S. and Paananen, J. 2007. Value Creation in Local Food Supply Chains: Market Opportunities and Challenges. Available Online: <http://www.ifama.org/conferences/2004Conference/Papers/Forsman1038.pdf>. Accessed September 30, 2007.
- Gunashekar, A., Patel, C. and Tirtiroglou, E. 2001. Performance Measure and Metrics in a Supply Chain Environment. *International Journal of Operations and Production Management* 21(1/2): 71-87.
- Guptill, A. and Wilkins, J.L. 2002. Buying into the Food System. Trends in Food Retailing in the US. And Implications for Local Foods. *Agriculture and Human Values* 19: 39-51.

- Hinrichs, C.C. 2003. The Practice and Politics of Food System Localization. *Journal of Rural Studies* 19: 33-45.
- Holloway, L., Kneafsey, M., Venn, L, Cox, R. Dowler, E. and Tuomainen, H. 2007 Possible Food Economies: A Methodological Framework for Exploring Food Production-Consumption Relationships. *Sociologia Ruralis* 47: 1-19.
- Ilbery, B. and Maye, D. 2005a. Food Supply Chains and Sustainability: Evidence from Specialist Food Producers in the Scottish/English Border. *Land Use Policy* 22(4): 331-344.
- Ilbery, B. and Maye, D. 2005b. Alternative (Shorter) Food Supply Chains and Specialist Livestock Products in the Scottish – English Border. *Environment and Planning A* 37: 823-844.
- Jones, P., Comfort, D. and Hillier D. 2004. A Case Study of Local Food and its Routes to Market in the UK. *British Food Journal* 106: 328-335
- Katsikeas C., Papanoidamis, N.G., and Katsikea, E. 2004. Supply Source Selection Criteria: The Impact of Supplier Performance on Distributor Performance. *Industrial Marketing Management* 33(8): 755-764.
- Marsden, T. Banks, J. and Bristow, G. 2000. Food Supply Chain Approaches: Exploring their Role in Rural Development. *Soicologia Ruralis* 40: 424-438.
- Matopoulos, A., Vlachopoulou, M., Manthou, V. and Manos, B. 2007. A Conceptual Framework for Supply Chain Collaboration: Empirical Evidence from the Agri-Food Industry. *Supply Chain Management: An International Journal* 12/3: 177-186
- Morris, C. and Buller, H. 2003. The Local Food Sector: A preliminary Assessment of its Form and Impact in Gloucestershire. *British Food Journal* 105: 559-566.
- Murdoch, I., Marsden, T., and Banks, J. 2000. Quality, Nature and Embeddedness: Some Theoretical Considerations in the Context of the Food Sector. *Economic Geography* 76 (2): 107-125.
- O'Hara, S.U. and Stagl, S. 2001. Global Food Markets and Their Local Alternatives: A Socio-ecological Economic Perspective. *Population and Environment* 22: 533-554.
- Peters, J. 1997. Community Food Systems Working Toward a Sustainable Future. *Journal of American Dietetic Association* 97(9): 955-956.
- Renting, H., Marsden, T. and Banks, J. 2003. Understanding Alternative Food Networks Exploring the Role of Short Food Supply Chains in Rural Development, *Environment and Planning A* 35: 393–411.

- Riege, A.M. 2003. Validity and Reliability Tests in Case Study Research: A Literature Review with “Hands-on” Applications for Each Research Phase.
- Sage, C. 2003. Social Embeddedness and Relations of Regard Alternative ‘Good Food’ M Networks in South-West Ireland. *Journal of Rural Studies* 19: 47-60.
- Saunders, C., Barber, A. and Sorenson, L.C. 2009. Food Miles, Carbon Footprinting and Their Potential Impact on Trade. Paper Presented at AARES 53rd Annual Conference at Cairns 10th to 13th February 2009 Add web address).
- Shugan, S.M. 2006. Editorial: Save Research—Abandon the Case Method of Teaching. *Marketing Science* 25(2) 109–115.
- Slater, S. 1997. Developing a customer value-based theory of the firm. *Journal of Academy of Marketing Science* 25(2): 162-167.
- Slater, S.F. and Narver, J.C. 2000. Intelligence Generation and Superior Customer Value. *Journal of the Academy of Marketing Science* 28(1): 120-127.
- Stake, R. 1995. The art of case research. Thousand Oaks, CA: Sage Publications.
- Sterns, J.A., Schweikhardt, D.B. and Peterson, H.C. 1998. Using Case Studies as an Approach for Conducting Agribusiness Research. *International Food and Agribusiness Management Review* 1(3): 311-327.
- Tellis, W. 1997. Application of a Case Study Methodology. *The Qualitative Report*, 3(3). Available at <http://www.nova.edu/ssss/QR/QR3-3/tellis2.html> Accessed 01/05/2010.
- Winter, M. 2003. Embeddedness, the New Food Economy and Defensive Localism. *Journal of Rural Studies* 19: 23–32.
- Woodruff, R.B. 1997. Customer Value: The Next Source for Competitive Advantage. *Journal of the Academy of Marketing Science* 25(2): 139-153.
- Yin, R.K. 2009. *Case Study Research: Design and Methods*, 4rd ed., Sage: London.



International Food and Agribusiness Management Review
Volume 14, Issue 1, 2011

Processed Chili Peppers for Export Markets: A Capital Budgeting Study on the AgroFood Company

Ayman A. Shelaby^a, Wael M. Semida^b, Daniel F. Warnock^{Ⓞc}, and David Hahn^d

^a*Assistant Professor, Faculty of Agriculture - Fayoum University, Department of Agricultural Economics
Fayoum, 63514, Egypt.*

^b*Assistant Lecturer, Faculty of Agriculture, Fayoum University, Orchards Department, Fayoum, 63514, Egypt.*

^{Ⓞc}*Associate Professor, Department of Crop Sciences, University of Illinois, 1201 South Dorner Drive,
Urbana, Illinois, 61801, U.S.A.*

^d*Professor, Department of Agricultural, Environmental and Development Economics, Ohio State University,
Agriculture Administration Building, 2120 Fyffe Road, Columbus, Ohio, 43210, U.S.A.*

Abstract

The AgroFood Company, which currently exports fresh chili peppers to European clients, desires to expand the product mix offered. The company, as it expands its production of fresh peppers for export, has an increasing supply of grade 2 peppers that are unmarketable in Egypt. However, an attractive market for processed frozen chili peppers exists in Europe. To expand their client base, capitalize on a value added product, and minimize product waste, the AgroFood Company desires to develop processing practices for chili peppers produced in Egypt. The AgroFood Company would like to identify its options in the processed pepper market. An analysis of the company, competition, consumer, market channel, and conditions, provides insight into possible solutions to the challenges faced by the farm management. Designed for undergraduate classroom use, this case will provide students with an opportunity to evaluate the merits of business expansion into a high capacity, automated mechanical processing facility for grade 2 vegetables.

Keywords: Decision case, horticulture, agriculture economics, chili pepper production, protected vegetable production

[Ⓞ]Corresponding author: Tel: + 1 636.737.3109 Email: daniel.f.warnock@monsanto.com
Other contact information: A. A. Shelaby: aymanshelaby@yahoo.com; W. E. Semida: wms00@fayoum.edu.eg
D. Hahn: Hahn.1@osu.edu

IFAMA Agribusiness Case 14.1A

This case was prepared for class discussion rather than to illustrate either effective or ineffective handling of an agribusiness management situation. The author(s) may have disguised names and other identifying information presented in the case in order to protect confidentiality. IFAMA prohibits any form of reproduction, storage or transmittal without its written permission. To request Teaching Notes, order copies or request permission to reproduce, Please contact the IFAMA Business Office.

61

Introduction

In Egypt at the corporate headquarters of AgroFood Company, a discussion is taking place between the company owners, Mr. Salah Hegazy, Mr. Ahmed Farrag, and Ms. Nada Polis. The company has significantly increased their production of fresh chili peppers to meet European Union (EU) client requests. The increased production has resulted in a surplus of grade 2 peppers. The discussion is about how to capitalize on what is normally a wasted product by adding value to the grade 2 peppers through processing and packaging.

“The demand for AgroFood chili peppers is a little overwhelming. I knew the market was attractive, but never thought it would expand so rapidly. Our production facilities are running at capacity.” said Salah.

“Yes, the chili pepper products are a great opportunity for the company. I am concerned however with the amount of peppers that do not meet export standards for the fresh market. We’re doing a great job of keeping the percentage of grade 2 product low, but our increase in production level is generating a fairly large tonnage of grade 2 peppers. I wonder if there might be a way to capitalize on these cull peppers. Nada, did you connect with the local restaurants and hotels to see if they might be interested in processed frozen chili pepper?” said Ahmed.

“I not only contacted local outlets, I was able to connect with a potato processing company to determine if we may be able to partner with them for distribution of processed frozen chili peppers to European clients. After discussions with the potato company owners and potential clients in Europe, I believe that we can fill a niche for organically produced, processed, and frozen chili peppers. We need to determine if our pilot program for processing the grade 2 peppers should be expanded to a highly automated system.” said Nada.

“We need to analyze the situation a bit more before we commit to the expansion. After that, I think we will be able to determine if this opportunity is financially beneficial to the AgroFood Company.” said Salah.

After this conversation, the management of AgroFood Company embarked upon a fact finding expedition to determine if expansion into processed and frozen vegetables was in the company’s best interest.

The Case

Company Background: The AgroFood Company was established in 1992 by three partners, two Egyptians, Mr. Salah Hegazy and Mr. Ahmed Farrag, and one Italian, Mr. M. Simaria, with each partner taking responsibility for a different operation within the company. Mr. Hegazy oversaw general affairs and communications with import companies, Mr. Farrag was responsible for the production of fruit and vegetables, and Mr. Simaria took care of marketing. Upon the death of Mr. Simaria in 2004, his wife, Mrs. Nada Polis, acquired her husband’s portion of the AgroFood Company and maintains an active role in company management.

In the beginning, the firm exported only fava beans, but it quickly expanded its operations to include the exportation of potatoes to Turkey. The owners then discovered that potato exportation to the European Union (EU) market was profitable and expanded their potato cultivation accordingly. The company has altered its product mix over several years to meet market requirements and fill market niches. Because of this, the AgroFood Company is now one of the leading Egyptian agricultural firms exporting potatoes and onions to the EU market.

The AgroFood Company believes that the EU market is a key to future success of the company. With a population of more than 491 million people, the EU market is considered the largest market to which products may be exported from the AgroFood Company. The EU market is geographically close to Egypt and has limited raw materials and production capacity (EuroStat, 2008). Consumers in the EU market have tremendous purchasing power (GDP per capital = 23,500 €), healthy lifestyles, and enjoy convenient ready-to-use products. Dolan and Humphrey (2000) state that retail supermarkets have emphasized fresh, healthy food, ease of preparation and innovation to attract consumers. In many instances, processed frozen vegetables meet consumer expectations when fresh vegetables are unavailable.

The AgroFood Company owners have witnessed the dramatic change in marketing channels that has occurred recently within the EU market. The development of tightly knit supply chains where EU retail outlets, such as supermarkets, drive production in and exportation from African countries has resulted in major multinational food companies gaining a larger percentage of the market, while smaller retailers are forced out of the market (Dolan and Humphrey, 2000; 2004). To ensure product quality and integrity, large retailers are increasingly specifying the parameters that must be followed along the value chain including how products are grown, harvested, processed, transported, and stored (Dolan and Humphrey, 2004). Companies wanting to increase their market share in the EU must develop detailed production guidelines, invest in cold storage/processing facilities, and rapid transportation routes (Dolan and Humphrey, 2004). Success in the current EU market requires a significant paradigm shift for many specialty crop producers towards large-scale production.

The exception in the tendency toward tightly knit supply chains and large scale production is in organic produce. For organic produce, the EU supply base is fragmented and smaller companies, including Egyptian companies, can fill the unmet market demand (Dolan and Humphrey, 2000). With sales near 1.83 million United States Dollars (USD)¹, the AgroFood Company is considered a small vegetable processing company by the Union of Producers and Exporters of Horticultural Crops² (UPEHC, 2007). Recently, due to changing market demands, the AgroFood Company started organic production of high value specialty crops, such as peas, colored chili peppers, green chili peppers, green beans, broccoli, and cucumbers.

When asked to describe their reasoning for shifting production towards specialty vegetable crops under organic conditions, the company owners identified the following points:

¹Local currency of Egyptian pound (L.E.) converted to USD (\$) for publication. Conversion factor of one L.E. = 0.174 USD in November 2006 when information was collected for case.

² UPEHC categories of large, medium, and small processors are based upon sales and capital expenditures of ≥ 8.7 million USD, 2.6 to 8.6 million USD, and < 2.6 million USD, respectively.

1. Brown rot, a fungal disease which exists in some Egyptian potatoes, is unacceptable in the EU making the production of alternative crops (i.e., crops other than potatoes) more attractive.
2. Commodity products, such as potatoes and onions, are subject to tremendous price fluctuations based on supply and demand.
3. EU supermarkets are demanding more specialty crops, including organically produced products, on a year-round basis.
4. Consolidation in the EU market has necessitated the development of partnerships and contracts for some high value specialty vegetables.

Company Strengths: In light of the stated goals and justifications for shifting production towards specialty vegetable crops, the owners of the firm were asked “*What are specific strategies or strengths currently within the company that will assist you in achieving your stated goals?*” In response, the owners and managers indicated that the AgroFood Company has adopted several strategies to maintain its position as a leading producer and exporter of Egyptian vegetable products. First, the firm has adopted organic cultivation methods as prices of organic products are about 25% higher than products produced using non-organic methods. Opportunities in the organic fruit and vegetable market for developing countries, including Egypt, arise from the fact that they have advantages in land and labor, and often climatic conditions and product seasonality, compared with other countries. Partnerships with Expo Link, Industrial Modernization Center (IMC), Chamber of Food Industries (CFI), and Horticultural Export Improvement Association (HEIA) provide increased market exposure. These partnerships also provide Hazard Analysis and Critical Control Points (HACCP) analysis, gap analysis, and employee training to ensure that organic certification requirements are met by the AgroFood Company. Egyptian exporters and growers are using these advantages to become competitive in the global economy even when the overall trend of prices for organic products is decreasing due to an increased supply of products.

Second, the firm has three production locations northwest of Cairo along the Cairo-Alexandria Desert road. The first is a potato production site; the second is devoted to onion cultivation; and the third location is for specialty crops. The specialty crops production site is a 40 hectares (ha)³ organic production facility with 31.5 ha of greenhouses and 8.5 ha of open fields. Cultivation of vegetables occurs in plastic covered greenhouses which allows for protected winter production by increasing the daytime air temperature (El-Sayed, 2006a; 2006b). The use of greenhouses extends the fruiting season from 2 months up to 9 months, thereby increasing vegetable crop yields compared with open field production (Exhibit 1).

Third, the AgroFood Company has positioned itself to be able to partner with clients seeking specialty vegetables and is willing to accept some of the risks associated with evaluating new crops under Egyptian conditions. Cultivation trials at the specialty crop farm near Cairo are used to determine if proposed crops are technically feasible and financially viable. As a result of these

³ The local measure of land, a Feddan, converted to hectares for manuscript. One feddan = 0.42 hectares or 1.038 acres

efforts, the AgroFood Company has seen an increase in production and exportation of nontraditional Egyptian vegetable products, such as ‘Tenderstem’ broccoli (El Sayed et al., 2010) and chili peppers, to Europe.

Finally, the firm has begun expanding its product offerings to include processed fresh vegetables. Processing is seen as a future opportunity by the company owners, who have invested significant resources into establishing a cold supply chain that meets organic certification requirements for the EU market. Company owned refrigerated trucks pick up pre-cooled field packed vegetables and deliver them to a modern processing and packinghouse that only handles organically produced crops. This AgroFood Company owned post-harvest processing and cold storage capacity facility ensures that products destined for exportation are handled in a hygienically and temperature-controlled manner meeting organic certification standards. Products, after being custom packed to meet EU client requirements, are delivered by airfreight to maximize product quality, aesthetics, and freshness. As a result of this investment, the AgroFood Company has increased their market share of packaged fresh vegetables being exported to Europe.

The Opportunity: The firm owners and management described an opportunity resulting from an increased market share and demand for an AgroFood Company product. As production of fresh chili peppers for export increases, the AgroFood Company has an increasing supply of grade 2 peppers that are unmarketable in Egypt as a fresh product. To expand their client base, capitalize on a value added product, and minimize product waste, the AgroFood Company desires to develop processing practices for organic chili peppers that can be marketed to Egyptian restaurants and hotels catering to international visitors or that can be exported to European markets. The company will continue to export the highest quality (first grade) peppers as a packaged fresh vegetable item, but the lower quality (second grade) chili peppers will be processed, packaged, and frozen for distribution to alternate markets at a later date. Currently, the company is conducting small scale processing trials with lower quality chili peppers, but has not assessed the total costs or benefits associated with expansion of this venture.

Thus, one of the first questions that must be addressed by the AgroFood Company is “*Is it feasible to use grade 2 chili peppers grown in Egypt to develop a processed and frozen specialty vegetable product for domestic and/or international markets?*” In response to this question the owners and managers of AgroFood Company provided a detailed description of current production practices in use at the specialty crops farm and their market assessment for chili peppers.

The Chili Pepper Crop: Pepper cultivation at the AgroFood Company specialty crops farm occurs in plastic covered greenhouses, which allows for production in winter, when it is impossible to produce such crops in open field (See UIUC 2008 for DVD on pepper production in Egyptian greenhouses). To meet the year-round demand for fresh products, chili pepper seedlings are transplanted on a total of 6.3 ha (3.15 ha per planting) on August 1 or April 1 for winter or summer seasons, respectively. From this area, the average total output per week is 7.5 metric tons, with 6 metric tons exported as fresh product and 1.5 metric tons (20%) considered grade 2 peppers.

The Market Potential: The value of exportable fresh peppers is 3.48 USD per kilogram in winter and 2.09 USD per kilogram in summer (AMAL, 2010). Unfortunately as a fresh product, the grade 2 peppers are not suitable for exportation and must be sold on the local market at 0.35 USD per kilogram because hot chili peppers are undesirable to most local users. The owners have decided that the optimal solution to the grade 2 pepper issue is to cut and freeze the peppers before marketing. The owners of the AgroFood Company indicated that the price of frozen pepper is 1.57 USD per kilogram for green or red chili peppers on the international market. Thus, the company has begun small scale processing and marketing of frozen grade 2 peppers to local restaurants and hotels. The firm is convinced that processing will create a more valuable product while avoiding some of the rapidly expanding competition in the world fresh vegetable products market. The AgroFood Company management has partnered with an existing potato processing company with established markets in the EU in an effort to introduce the AgroFood product to new clients.

Three Options: When asked what they considered possible options for the company to take advantage of the grade 2 peppers, the AgroFood Company management indicated there were three possible options under consideration:

1. Manually process the grade 2 peppers at the current processing facility and sell any future excess production to the local market as a fresh product;
2. Increase the volume of peppers processed by partial automation at the current processing facility; or
3. Increase the volume of peppers processed by building a larger processing facility with an automated processing line at a new location.

To determine if chili peppers could be processed at their current facility, AgroFood Company management began a pilot program for grade 2 chili peppers. The owners were asked to describe this pilot program.

AgroFood Company Pilot Program for Processing Chili Peppers: After bulk harvest and precooling to remove field heat, peppers are transported to the AgroFood Company processing facility by refrigerated trucks. Upon arrival, the peppers are washed, sorted into grade 1 and grade 2 fruit, and then packaged or processed accordingly. The first grade peppers are packaged, weighed, and sealed in plastic bags before being palletized and cold stored until shipping to fresh market clients. About 30 employees are required to process the grade 1 peppers. The second grade peppers are hand cut into small cubes by 10 workers at a rate of 1.5 metric tons per week. Workers processing vegetables are paid about 8.70 USD per week. After cutting, the processed product is packed, weighed, sealed, palletized, and frozen. The chopped chilies are stored frozen until a suitable quantity is acquired to attract a large scale buyer.

The success of chili pepper production in Egypt, the ease with which chilies can be processed at the AgroFood Company station, and the identification of buyers for the product indicated to the management that expansion to a highly mechanized processing line for vegetables may be a strategic investment. Company owners and management were asked “*What would a highly*

mechanized processing line look like and what might be the costs for expansion?” The following section highlights what can be considered a “standard” vegetable processing line and some of the initial capital investments needed to establish such a line.

Vegetable Processing Line: Vegetable processing is highly specialized and requires an integrated system from harvest to market to ensure that the delivered product meets acceptable industry and consumer standards. The standard steps for a frozen vegetable processing line from field to storage include:

1. Harvesting vegetables, presorting in the field, and bulk packaging,
2. Removing soil and field heat by washing and precooling,
3. Sorting into grades for fresh market or processing,
4. Processing
 - a. Hand trimming/coring if needed,
 - b. Sanitizing wash,
 - c. Chopping or shredding,
 - d. Blanching, and cooling
 - e. Freezing,
 - f. Packaging/labeling,
5. Storing product or shipping to client.

Vegetable processing lines must be hygienic and temperature-controlled to ensure consumer health and maintain product quality. Precoolers or hydrocoolers rapidly remove field heat from produce and significantly reduce product perishability during processing. The use of refrigerated trucks and docks will prevent the produce from warming during the transport and delivery to the processing station. The processing of vegetables involves simple physical operations such as cleaning, washing, trimming, coring, slicing, shredding, and other related steps to eliminate inedible parts. Washing the whole and cut products in sanitized water is an essential step in reducing the number of microbes on the product to meet food safety standards.

After the product has been prepped by hand and sanitized, it travels to a mechanical cutter for slicing, chopping, or shredding depending upon final product form. For frozen vegetables, blanching (scalding) at 85° C for 2 minutes is required to stop enzyme functions and mitigate pathogens. Once blanched, the processed vegetables are cooled to 30° C, individually quick frozen (IQF) to – 10° C, and then transferred to a packing station for weighing, bagging, and sealing. When IQF processing is unavailable, large freezer units are used for freezing loose, small-sized processed vegetables after packaging. These free standing freezers may also be used for storage of packaged products before shipping to clients.

Using mechanical processing allows fresh produce to be handled in an efficient and economical manner. Processing lines are often modular in nature, meaning that companies can pick and choose the specific units of equipment needed for their particular location, desired product, or price (See Exhibit 2). Processing capacity is limited by the slowest machine used in the line. Additionally, many units on the line may be used with multiple crops. This flexibility and dual-use capacity makes the initial evaluation of processing equipment a critical choice for most companies. This flexibility and dual-use capacity can also create challenges for companies

seeking to maintain organic certification, in that processing lines handling organic products must maintain spatial separation from processing lines handling non-organic products. Proper firewalls, such as separate facilities, must be in place for organic certification to be maintained.

Future Forecast: After investigating vegetable processing lines and potential equipment needs, the AgroFood Company management decided that Options 1 and 2 listed above may not be possible due to space constraints at the existing facility. A maximum of 70 employees can effectively utilize the space. Given the projected annual growth rate in production of 10%, the current facility would reach maximum capacity during year 7 when 53 employees would be needed for the fresh pepper stations and 18 employees would be needed for the processed pepper stations. Grade 2 processing stations would be unavailable after year 7 as all facility space would house grade 1 pepper stations to meet the anticipated demand for fresh chili peppers through year 10. The current facility is too small to install an automated line for processing peppers. Therefore, Option 2 is not a solution to the situation. Thus, the company needs to determine the benefits and costs of Options 1 and 3 given these constraints. The owners and managers assisted the authors in identifying essential processing line equipment, determining labor needs for the proposed line, and projecting company growth over the next ten years. With this information, individual scenarios can be calculated to identify how expansion into processed frozen chili peppers may benefit the AgroFood Company.

Essential Equipment for Expansion: For Option 1, the owners expect to purchase a minimal amount of new equipment including three trim stations and one packing station. An existing pre-cooler and a free standing freezer will be used to remove field heat and freeze the packaged product. The purchased equipment has a useful life of five years with a salvage value of five percent of the original price (See Exhibit 2). Replacement of the equipment should occur after five years and is expected to cost 25% more than the original price.

For Option 3, the Agro-Food Company desires to install a partially automated pepper processing line for their grade 2 peppers. To remove field heat, a second pre-cooler will be purchased and stationed at the AgroFood Company specialty farms production site. Cooled product will be transported to the processing facility in company owned refrigerated trucks at a cost of 5.22 USD per metric ton. The company plans to construct and equip a 500 square meter building. Building construction is projected to cost 348,000 USD (Swanson et al., 2004). This building will contain a 6-person trim station, one flume system with shaker, one mechanical cutter, a blanching system, a cooling system, a 4-person packing table, and two free standing freezers. The building and equipment have a useful life of five to ten years with salvage values of 5 to 20% of the original purchase price (See Exhibit 2). Replacement of the processing line equipment will occur after five years and is expected to cost 25% more than the original purchase price. Exhibit 2 provides readers with costs (year 1), capacity, life expectancy, and salvage value for line equipment.

In addition to capital expenses, the costs of operating this processing line will include peppers for processing, labor, and utilities. The AgroFood Company specialty crops site currently produces 390 metric tons of chili peppers annually at a cost of 161.80 USD per metric ton. Grade 2 peppers represent 78 metric tons of the total production and yield 70 metric tons of peppers suitable for processing. Additional shrinkage (10%) during processing due to trimming and

coring results in 63 metric tons of processed chili peppers. Local delivery costs are estimated at 5.22 USD per metric ton. The planned processing facility will employ eleven individuals; five product handlers at 34.80 USD per month, five equipment operators at 52.20 USD per month, and one manager at 174.00 USD per month. Processing facility utilities (electric and water) are estimated to cost 522.00 USD per month. Consumable supplies used in packaging the processed peppers are estimated to be 121.80 USD per metric ton. Once processed and packaged, the value of the product is 1,566.00 USD per metric ton when exported to the E.U.

The AgroFood Company management plans to increase chili pepper production 10% annually to meet the growing demand for fresh chili peppers. Consequently, the company estimates that the volume of peppers for processing will increase 10% per year, from 70 to 166 metric tons in 10 years. Production and packaging costs are expected to rise 10% annually. Utility, labor, and local shipping costs are expected to increase 5% annually. Exhibits 3, 4, and 5 present expected production and cost increases given the parameters set forth by AgroFood Company management.

The management of the AgroFood Company is seeking assistance in identifying the best options available for this expansion and a financial assessment for the long term success (10 year outlook) of this endeavor. Using the information above, the management of the AgroFood Company would like to know:

- 1. What is the decision you would make, according to the information provided, whether to invest in a partially automated processing line or not?*
- 2. Given a 10 year time frame, do you think it is profitable to implement the expansion?*
- 3. If only half of the processed peppers can be sold to E.U. clients, what impact would selling the other half to local clients at 50% of the international price have on your decisions?*

Acknowledgements

The authors wish to thank the owners and management of the AgroFood Company, Mr. Salah Hegazy, Mr. Ahmed Farrag, Mrs. Nada Polis, Mr. Amr Hegazy, and Engineer Mohamed El-Said Ammar for their collaboration in the development of this case. We especially thank Dr. Samy Mohamed, MUCIA-AERI Linkage Project Chief of Party, for his encouragement and collaboration in the development of this case. We also thank our colleagues from the Faculties of Agriculture at Cairo University, Fayoum University, Minia University, Assiut University, and the University of Florida for their repeated evaluations of the case and for being the initial “students” for the pilot trial of the case. We thank the participants of the “Capstone Course and Case Studies: Linking the classroom and value chain” workshop held in Ein Sokhna, Egypt, August 2007 for providing a realistic classroom testing of the case. Finally, we would like to thank the MUCIA-AERI Linkage Project office personnel for their logistical support and coordination of the farm site visits needed for gathering case information.

References

- Agricultural Marketing for Small Growers Project Information System (AMAL). 2010. *Market Information: Vegetable Production in Egypt*. <http://www.amalis.org> (Accessed January 10, 2010).
- Dolan, C. and J. Humphrey. 2000. Governance and trade in fresh vegetables: the impact of UK supermarkets on the African horticulture industry. *Journal of Development Studies* 37:147-176.
- Dolan, C. and J. Humphrey. 2004. Changing governance patterns in the trade in fresh vegetables between Africa and the United Kingdom. *Environment and Planning* 36:491-509.
- El Aidy, F. and K. El Sheikh. 1990. The effect of planting date, density, variety, and shade on production of cucumber under tunnels. *Acta Horticulturae* 287:281-288.
- El Sayed, S. F. 2006a. *Fundamental of vegetable production in greenhouses and open fields in the desert soil*. Egyptian Publisher: Alexandria, Egypt. 478 pp.
- El Sayed, S. F. 2006b. *Technology of vegetable production in greenhouses and under low tunnels in the desert soil*. Egyptian Publisher: Alexandria, Egypt. 478 pp.
- El Sayed, S.F., W.Y. Sallam, D.F. Warnock, D.H. Hahn. 2010. 'Tenderstem' Broccoli for Export Markets: An Analysis Study on the AgroFood Company. *International Food and Agribusiness Management Review (IFAMR)* 13(2):137-152.
- EuroStat. 2008. *Europe in Figures – Eurostat Yearbook 2008*. eds. G. Schafer, M. Baryn, M. Fritz, A. Johansson Augier, and U. Wieland. Desktop Publishing by EuroStat - Statistical Office of the European Communities, Luxembourg. <http://epp.eurostat.ec.europa.eu> (Accessed July 9, 2009).
- Food and Agriculture Organization of the United Nations Statistics Division (FAOSTAT). 2009. *Data Archives – Production – Crops*. <http://faostat.fao.org/site/567/default.aspx#ancor> (Accessed January 18, 2010).
- Swanson, B.E., J. Vansickle, A.A. Hassan, .Y. Johnson, H. Bedawy, J. Seltzer, and Y. El-Khial. 2004. *Strengthening the cold chain in Upper Egypt to enhance horticultural exports*. USAID MUCIA AERI Institutional Linkage Project Summary. MUCIA DATABASE. 2006.
- Union of Producers and Exporters of Horticultural Crops (UPEHC). 2007. *Market information for the profitability of some crops*. <http://www.upehc.org/market/index.asp> (Accessed July 7, 2009).
- University of Illinois Urbana-Champaign (UIUC) Board of Trustees. 2008. *Greenhouse Pepper Production in Egypt*. DVD available for purchase at www.pubsplus.uiuc.edu.
- Yellow Wood Associates, Inc. 2004. *Preliminary Feasibility Study of a Fresh-Cut Produce Processing Facility for Madison, Wisconsin*. University of Wisconsin Center for Cooperatives and Home Grown. Wisconsin. U.S.A.



International Food and Agribusiness Management Review
Volume 14, Issue 1, 2011

Enterprise Risk Management at Top Agro Inc.

Francesco Braga[Ⓢ]

[Ⓢ]*Associate Professor, Department of Business, University of Guelph,
Room 209 J.D. MacLachlan Building, Guelph, Ontario, 63514, Canada.*

Abstract

Top Agro (TA - *not its real name*) is a small crop protection start-up operating in the European Union. In a relatively short period of time TA has been able to secure a reasonable profit margin and build a solid niche in the Italian crop protection market. The driving force in their success is the professional expertise of the two owners, their knowledge of the domestic market, and the highly flexible business model they've developed. Chemicals are sourced either in the Far East via a Hong Kong based commercial partner or purchased directly from other European domestic suppliers. TA is responsible for the formulation and packaging of the finished product, which is then distributed in the domestic Italian market. Although TA is now profitable, further sales growth is unlikely. One of the owners is convinced that significant benefits may be obtained by identifying and controlling the key risks that TA is exposed to, in particular by reducing the price risk in their international supply chain.

This case has been classroom tested at the senior undergraduate and MBA level with good results. It works well as opening case for an eMBA course on managing price risk, as it provides an opportunity to map the risk "opportunity set" via the ERM challenging students to reason and set intervention priorities by focusing on currency exchange rates and risk management as the most immediate and promising action.

Keywords: supply chain; enterprise risk management; currency risk management; crop protection.

[Ⓢ]Corresponding author: Tel: + 1 519.824.4120.ex.52763
Email: fbraga@uoguelph.ca

IFAMA Agribusiness Case 14.1B

This case was prepared for class discussion rather than to illustrate either effective or ineffective handling of an agribusiness management situation. The author(s) may have disguised names and other identifying information presented in the case in order to protect confidentiality. IFAMA prohibits any form of reproduction, storage or transmittal without its written permission. To request Teaching Notes, order copies or request permission to reproduce, Please contact the IFAMA Business Office.

Introduction

After working countless hours preparing for a crucial business trip to Hong Kong, George was exhausted and needed a break. The dreary November afternoon in Milan deterred him from taking his normal brisk walk through a nearby park. He settled into his chair and scrolled the financial news headlines on his laptop. George, the president of Top Agro, used this opportunity to relax and stay abreast of current global events. He felt he needed to do this in order to advance his company's long-term sustainability.

A story on a major news feed soon captured his attention. "*Globalization Concerns of a Successful Start-up*" was about a high tech company which had managed to grow exponentially thanks to excellent technical know-how and profound knowledge of the domestic market. Despite early growth, the piece explained, the company was now held back by difficulties in gaining access to convenient and reasonably priced international financial services, something that was essential to reducing costs and supporting its future expansion.

Join the crowd... thought George. After all, the story seemed similar to his own company's story and to a large extent the reason for his forthcoming business trip to Asia.

* * * *

George's company, Top Agro (TA), is a successful crop protection firm that he started with a colleague in 2000. They left a large and somewhat lethargic corporation to venture into business for themselves. Top Agro is a highly specialized company based in Milan, in the region of Lombardy, serving the entire Italian market. The company began breaking even by 2003, and six years later, enjoyed a profit margin George considered "reasonable" for a sector increasingly dominated by large multinationals. Top Agro weathered the 2008-2009 global crisis reasonably well; sales of some product lines shrunk by about 5%, and the age of receivables had increased noticeably, but "hard" losses remained below 1% of total sales.

George had reason to be proud of Top Agro's achievements. On the eve of its 10th birthday, the company had managed to grow the product line and expand into the micronutrient fertilizer market while developing, rationalizing and consolidating its network of international supply chain partners. TA's main focus was the Italian market, where the company built a profitable niche for its own brand of specialty crop chemicals. They were also sold as "no name" and "private label" products. TA had been quite successful in exploiting its production and administrative flexibility with relatively low fixed costs and had specialized in the production of higher margin products with a relatively limited market potential, too small to attract the interest of large multinationals.

The first 10 years had been a growth story. Now, as market shares stagnated in many segments, George realized it's been a struggle to maintain volumes and margins under increasing pressure. The two principals struggled to reinvent their push strategy and refine the efficiency of existing operations in order to increase profitability. They knew their company had grown thanks to their ability to merge entrepreneurialism with scientific knowledge and during the "early years. They exploited their flexible, low fixed costs company structure and used their entrepreneurial

serendipity to solve most problems, as they arose. It was clear that TA had already captured the lower hanging fruits available in the domestic market and volume growth was almost impossible. But, additional profits could be had by promoting a more efficient management of their supply chain and significant gains could be achieved through implementing better risk and cost controls throughout their supply chain.

Their chartered accountant had been asking for a sober, comprehensive assessment of all risks, something TA had never done during the forgiving and fast growth years. Perhaps, George felt, we should listen to her more carefully.

Concerns were not difficult to spot, from the tightening regulatory scenario which required increasingly expensive registration and certification protocols, to the crowding out of several independent suppliers of chemical inputs, to the worsening demographics of Top Agro's independent retail sales force, which was shrinking at an increasing pace as salespeople reached retirement age.

A lot needed to be done to streamline TA's international supply chain. During their first 10 years, Top Agro concentrated on the growth of domestic sales, happy to simplify and standardize their international supply chain which was now handled via a trusted Hong Kong partner who was responsible for sourcing chemicals primarily in China and arranging for their shipment to Milan. One of the reasons TA did not pay too much attention to their supply chain was because their Hong Kong partner had been extending extremely long terms on TA's USD payables. This was a flexible and convenient arrangement for Top Agro, resulting from several years of close collaboration and mutual trust.¹

The international financial crisis of 2008-09, and the violent increase in exchange rate volatility convinced George it was necessary to invest time and effort into improving the efficiency of TA's supply chain, and develop convenient and cost effective access to modern and competitively priced financial services. The steep appreciation of the US dollar during the second part of 2008 and the first quarter of 2009 could have had disastrous consequences for Top Agro, as the company had neither a formal exchange rate forecasting nor hedging policies in place. Quite simply TA had been basing its budget decisions on limited qualitative information provided by senior staff at local branches of regional banks. The 20% drop of the Euro relative to the US dollar during the middle of 2008 had caught Top Agro completely without any protection. This change alone could have cut TA's EBITDA in half. With a virtual gun to their head, the two partners decided to postpone all US dollar payments, gambling on their partner's patience and wait for a stronger Euro. They were fully aware of the limited sustainability of this approach.

By the end of 2009 the Euro had regained some strength and was back to a comfortable \$1.40-1.50 range which allowed the company to lock a comfortable average margin for the crop year. Top Agro had been fortunate, once more, but George now understood that a "do nothing" approach was indeed a highly speculative strategy which exposed the company to almost unbearable risks.

¹ The Hong Kong partner had recently purchased a 32% equity interest in Top Agro.

TA's accountant also considered the possible expansion into foreign markets. This was been tabled due to its complexity and high capital requirements. The two partners felt they could not transfer any competitive advantage from their core competencies. Additionally, the European crop protection market was much more concentrated than the Italian one, with much higher barriers to entry.

George was convinced that improving efficiency of TA's supply chain and reducing its costs was probably the first strategic priority at this time.

The Business: Top Agro's Global Supply Chain

Top Argo's global supply chain was reasonably simple and designed to provide the company low cost inputs from the Far East. Most chemicals were purchased in China, in USD, and shipped to the corporate warehouse in Northern Italy.

Until recently TA's Hong Kong partner satisfied over 95% of chemical input needs. This percentage had recently dropped to approximately 30%, primarily due to the new certification requirements set by the European Union that had shrunk the number of certified producers that could be reached by the partner. In the last fiscal year, the remaining 70% of inputs had been supplied by other international producers, and procured directly by Top Agro. These purchases in the Far East were crucial to securing Top Agro's long-term profitability. On average, the EU domestic prices for chemicals were 100% to 150% higher than what Top Agro was paying internationally. Obviously, within the EU, procurement strategies were much simpler for Top Agro, but because of costs, the company could afford them only for a limited share of their overall procurement needs. In the last fiscal year, approximately 70% to 80% of chemical inputs were priced in USD, with the remaining 20-30% in Euros. The Hong Kong partner was still allowing the longest payment terms and matching the age of Top Agro's receivables. Payables with other suppliers were shorter, averaging 200 days.

In order to comply with increasingly complex health and safety regulations, Top Agro relied on specialized third parties for the further processing of chemicals and final packaging. Distribution to regional wholesalers and direct delivery to a few large retail accounts was completed directly by Top Agro from their centralized warehouse.

Top Agro's products were highly crop-specific, destined mostly for fruit and horticultural crops in Southern Italy. The business was primarily seasonal, driven by farmers purchasing decisions at a specific time of year.

Inputs were purchased once per crop year, in late winter through early spring before the start of the planting season. Shipments to Milan were a rather routine activity completed through large commercial shipping companies and most of the time an uneventful commodity process. Chemicals were normally received 3 to 6 months after submitting the purchase order. Suppliers were paid an initial deposit of 15% when placing the order; another 15% when the commodity was received; and the remaining 70% of the invoice was settled in the following Fall or Winter for the supplies received from the Hong Kong partner—or 180-210 days for other suppliers. It was not unusual to have two-year payables outstanding with the Hong Kong partner.

Matching TA's payables with their receivables was a lengthy process. Normally TA received payment in Euros at the end of the crop year and then proceeded to complete payments in USD to foreign suppliers for inputs ordered about 18 months earlier. The Hong Kong partner had more than once demonstrated flexibility and significant patience on this matter and George counted on their availability to extend as needed with the age of Top Agro's payables. George knew it was these flexible terms and progressively longer payables that had financed the growing company's larger cash requirements. As a small start-up, it was practically impossible to find a bank financing in the domestic market with the flexible payment terms offered by the Hong Kong based trading company. They provided a practical and effective one stop shopping service, a true life line for the start up. As the company grew financially more established George was increasingly aware of the possible cost of this "flexible trade financing" arrangement.

Although there were large companies in Northern Europe that could provide a far shorter supply chain and significantly simplify both the procurement and regulatory compliance requirements, George was equally aware of their higher prices and rigid payment terms. It was therefore crucial for TA to be able to continue this strategy of international direct purchase. EU domestic prices for chemical inputs were 100 to 200% higher than what Top Agro was paying in the international markets. Recently George had a chance to confirm this when the last shipment of a specific chemical originating from a certified producer in China was paid eight USD/kg compared with 29 USD/Kg charged by a large EU multinational. Sure, an EU based procurement strategy would be simpler for Top Agro, but it was also not affordable.

From a strategic perspective, the key competitive decision for Top Agro was the publication and distribution of its "Crop Year Catalogue". The catalogue and price list were released late in the fall or early winter. The extreme currency volatility that followed with the 2008 sub-prime crisis, forced Top Agro to reset its prices, and this was not well received by clients who were used to considering prices quoted in the catalogue only once for an entire crop year.

Top Agro received most purchase orders for their crop-specific products in late winter to early summer following the publication of the current catalogue. These orders were received about 12 months after placing orders for the inputs. Chemical products were delivered to clients 3 to 6 months after the orders, and payments were received from Top Agro after the harvest of the specific crop, often in the fall through winter of the following year—a full 18 to 24 months after placing the order for the chemicals. The average age of receivables for a specific crop year was about 7 to 10 months later in the fall and at the beginning of the second winter, only to drop to almost zero shortly thereafter.

Approximately 60% of sales were generated by small independent distributors, large distributors accounted for 20% of sales; direct sales to large clients accounted for the remaining 20%. Exhibit 1 illustrates the complete timeline of the FY2010 supply chain, for chemicals procured through the Hong Kong partner.

The Financials

George was proud of Top Agro, yet fully aware of the relative fragility of his company. Sales in the most recent fiscal year (FY2009) had for the first time topped 10 million Euros. The cost of imported chemicals was the single largest cost item, at 4.8 million Euros, followed by

processing and distribution at 2 million Euros; operating expenses at 0.8 million Euros; and HR at 0.7 Million Euros. Interest paid in FY 2009 was 0.5 million Euros; depreciation was 0.3 million Euros and corporate taxes were 0.36 million Euros. Net income was 0.54 million Euros. A small dividend of 0.04 million Euros was declared, with 0.5 million Euros in retained earnings.²

Exhibit 1. Global supply chain timeline: Crop Year 2009-2010, Hong Kong partner.

Spring–Summer 2008 (Start of supply chain timeline, month =0):

Raw chemical purchased in USD from Far East suppliers, for delivery 3-6 mo later.

Payment: 15% at order, 15% upon receipt at warehouse, 70% expected in fall 2009 – winter 2010. Prices set at time of order, in USD.

Late Summer–Early Fall 2008 (month=3-6):

Raw chemical received. Second payment of 15%.

Top Agro starts further processing and packaging.

Fall 2008–Winter 2009 (month=6-9):

Catalogue produced, & price list defined. Both are widely distributed.

Early Spring–Summer 2009 (month=9-12):

Orders received;

Initial shipments of crop – specific products to wholesalers; terms to the end of the specific crop year, late in fall of 2009, early winter 2010.

Process start ex novo in late winter – early spring of 2009 for the crop year 2010-2011.

Fall 2009 –Winter 2010 (month=15-18):

As age of oldest receivables grows to 6 to 9 months, the first payments are received: Retail clients pay retailers, who pay wholesalers, who pay Top Agro. Payments are received in €; further delays of up to 3 months are not unusual.

Top Argo's outstanding payables are 15-18 months old for 2008 orders and 3 – 6 months old for 2009 orders. Average age of payables hits 13-17 months (30% of invoice paid when chemicals received).

Fall 2009 –Winter 2010 (month=15-18 +):

Company completes payment of USD invoices for the summer – fall 2008 shipments.

Average age of payables drops to 4-6 months (all for 2010-2011 crop year).

Top Agro's Balance Sheet was equally simple. The 12.15 million Euros in assets included 0.5 million Euros in cash and in short term bank' deposits, and 8.64 million Euros in receivables. Long term assets included 1 million Euros in land and buildings, before cumulative depreciation of 0.1 million Euros, and 2.5 million Euros in equipment, before cumulative depreciation of 0.35 million Euros. Total liabilities were 8.35 million Euros. Short term liabilities listed 5.75 million Euros of payables (mostly USD denominated) and 0.1 million Euros of current portion of long term debt. Long term debt amounted to 2.5 million Euros. Shareholders equity included 0.5 million Euros in capital stock and 3.3 million of retained earnings.

Top Agro' statement of cash flow for FY 2009 reflected the ongoing challenges of financing a business expansion, the importance of trade financing, and the attempt by management to

² Data has been modified to protect confidentiality of TA business results.

consolidate at least part of Top Agro's corporate financial needs in long term debt. Operations had required 0.044 million Euros; Long term bank financing had provided 0.35 million Euros; Investments had required 0.25 million Euros. Cash did increase from 0.44 to 0.5 million Euros. At the end of the 2010 fiscal year, Top Agro had available an additional 1 million Euros in a short-term line of credit from local banks. Top Agro's FY 2009 Income Statement; Balance Sheet; and Statement of Cash Flow are presented in Exhibits 2, 3 and 4.

Exhibit 2. Top Agro: Income Statement, FY ending Dec. 31, 2009 (1000€)

Sales	10000
Cost of chemicals	4800
Operating margin	5200
Processing and distribution	2000
Op expenses	800
HR costs	700
EBITA	1700
Depreciation	300
Interest	500
Taxes at 40%	360
Income	540
Dividend paid	40

Note: Based on actual data, modified to protect confidentiality

Exhibit 3. Top Agro: Balance Sheet, FY ending Dec. 31, 2009 (1000 €)

Assets	
Cash and short term deposits	500
Accounts receivables	8600
Short term assets	9100
Equipment (book)	2500
Cumulative depreciation	350
Building (book)	1000
Cumulative depreciation	100
Long term assets	3050
Total assets	12150
Liabilities	
Accounts payables	5750
Current portion, long term debt	100
Short term liabilities	5850
Long term debt	2500
Long term liabilities	2500
Capital stock	500
Retained earnings	3300
Shareholders equity	3800
Total liabilities and shareholders equity	12150

Note: Based on actual data, modified to protect confidentiality

Exhibit 4. Top Agro: Statement of Cash Flow, FY ending Dec. 31, 2009(1000€)

Income & depreciation	840
Change in inventory	-1000
Change in receivables	-1700
Change in payables	1816
Cash flow, operations	-44
Equipment purchases	-250
Cash flow, investing	-250
Long term bank financing	-250
Cash flow, financing	-250
Initial cash	444
Final cash	500
Change in cash	56

Note: Based on actual data, modified to protect confidentiality

Human Resources

The company's early success resulted from the professionalism and dedication of the two senior partners, each with an advanced research degree in Crop Protection and a sound understanding of the Italian marketplace. From the beginning finances and accounting had been the responsibility of a formally trained accountant who was also the spouse of one of the partners. Two clerical secretaries and four warehouse workers completed the lean team of Top Agro.

Further processing and the packaging of the chemicals were contracted. This choice was essential in order to remain flexible and cost competitive, given the complexity of the environmental and safety regulations and the relative small scale of product batches. Third party distributors were also used. The two partners managed all finances, HR, registrations and certification requirements, purchases of raw chemicals, and coordinated wholesale and retail marketing and sales through a network of non exclusive regional salespersons.

This structure had served Top Agro well and provided a flexible and a very lean corporate structure.

The Future

The two principals agreed that further sales growth in the domestic market was almost impossible, given the increasing restrictions placed by EU's health and environmental regulations on most chemical compounds used by the company. Compliance with increasingly complex regulatory requirements was extremely expensive and time consuming; for example, certification of a single product could easily require in excess of 250,000 Euros and several months of testing and true patience. At the same time, the cost of a viable R&D pipeline was simply unaffordable for TA. This cost was the key driver of industry consolidation, and

restricted access to the latest generation of chemicals.³ The effective distribution of finished products was an increasing challenge, as distribution opportunities were shrinking given the retirements of many independent agents and small retailers.⁴

Long discussions had convinced the partners of the need to improve the efficiency and the financial performance of Top Argo's current global supply chain. Credit risk in the domestic market was expected to increase. Given the limited dimension of clients, Top Argo could not rely on information from conventional providers, and credit insurance was too expensive and rigid to be a viable alternative for Top Argo, so that the modeling and the management of this risk was largely a matter of experience and common sense more than a rational process. Very little could be done to recover credits in a timely fashion via legal action and the principals agreed that prevention and flexible negotiation were the only practical tools Top Argo had available.

Both principals felt that additional efficiencies and opportunities could be found by improving control of input costs, which largely meant improving the handling of currency and interest rate risks. Top Argo appreciated the flexible trade financing terms offered by their offshore partners and were satisfied this would continue in the future, but they also knew this patience and flexibility carried its implicit price. The financial results at Top Argo had improved their own credit rating and their direct access to a sufficient credit line. George observed the recent exchange rate fluctuations had benefited Top Argo. On the other hand, the memory of the cost of a strong dollar following the 2008 sub-prime crisis was instrumental in convincing them that currency risk would remain high and was a key challenge for TA. In fact, a large chart posted in George's office illustrated a 15 years history of the Euro-US dollar exchange rate and this chart was updated regularly. A copy of this chart is presented as Exhibit 5.

* * * *

George suddenly realized that the news story he was reading had prompted him to review several key issues for Top Argo. It was time to return to work and finalize the documents he needed for the meeting with the Far East partner. His plan was to discuss how to complete an enterprise risk management assessment for Top Argo, and identify a number of priorities that could be effectively addressed. This could improve Top Argo's credit rating and profitability. George felt this was a safe and strategic way to initiate a comprehensive discussion about the currency exposures within Top Argo's supply chain. It offered ways to reduce them, without the risk of upsetting their patient and trusted supply chain and equity partner.

As George went back to work on his documents, these key deliverables became increasingly clear: prepare a reasoned map of the many risks faced by Top Argo; identify criteria that should be used to quantify these risks; and, identify the potential tools and strategies that TA could use to control them.

³ George estimated that the cost of a complete EU regulatory dossier for a single chemical input could exceed 2 million Euros. This was simply unaffordable for Top Argo.

⁴ George estimated that the number of independent retail outlets had decreased 25% over the last 24 months.

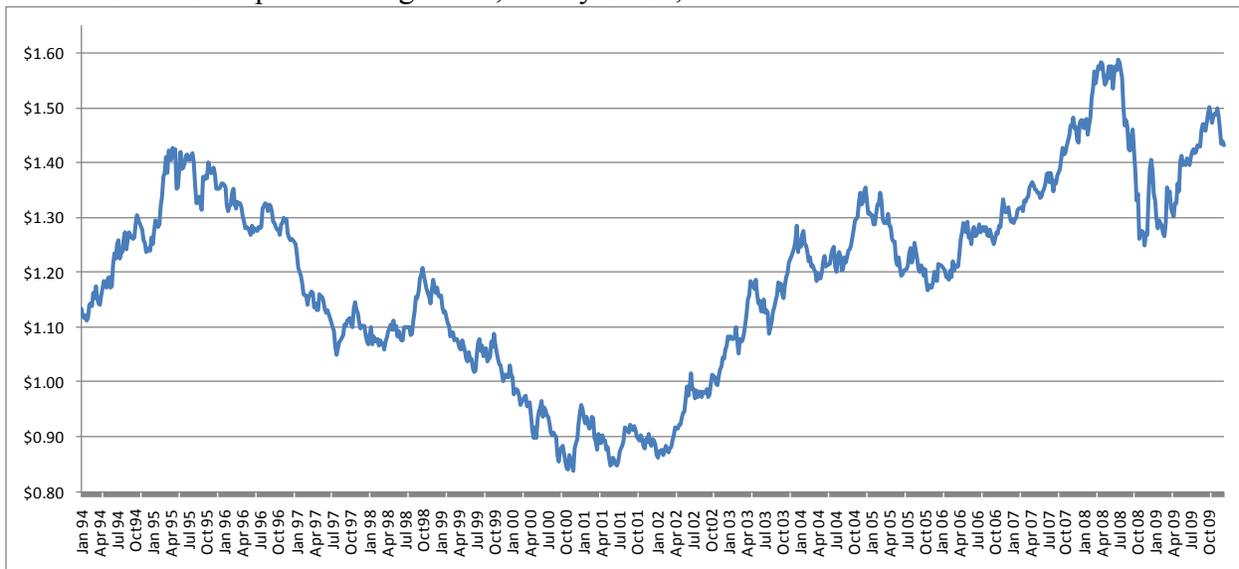
This would be complemented by a reasoned list of risk management priorities for Top Agro after having considered each exposure, the cost, and the expected effectiveness of the appropriate risk control measures that could be implemented by Top Agro.

Based on the due diligence already completed, George decided that a key request to be tabled at the meeting was the development of a transparent, efficient protocol to control exchange rate risk at Top Agro. In order to do so, George was determined to develop a detailed model of Top Argo's exposure to currency risk, detailing its timeline, the amount and type (long/short) of the exposure, and develop a currency risk management protocol for Top Agro, including the necessary policy and procedures for its safe implementation.

To this end, George gathered weekly and monthly spot exchange rate data. The monthly data are presented in Exhibit 6, with descriptive statistics for weekly percentage changes presented in Exhibit 7, and calculated the actual impact on EBITDA of the observed exchange rate fluctuations for the last 10 crop years, almost 30% in absolute value, in Exhibit 8. To illustrate the need to invest in order to improve TA's forecasting ability, George calculated the possible range of EBITDA obtained if the exchange rate had been set by perfect foresight at the best possible observed value or by complete managerial failure at the worst possible value for each crop year from 1999 to 2008; and the annual range, presented in Exhibit 9, averaged 41%. George felt confident that the meeting would be long but fruitful. Sure this was a lot to plan for in a single meeting, but it seemed absolutely necessary in order to protect the long-term competitiveness of his company.

Appendix 1.

Exhibit 5. €/USD Spot Exchange Rate, Friday Close, Jan.



Appendix 2.

Exhibit 6. Monthly Euro/USD Cash Exchange Rate Jan. 1999 – Dec. 2009

Month	Open	High	Low	Close	Month	Open	High	Low	Close
Jan-98	108820	111620	106090	106840	Jan-04	125470	128980	123720	124600
Feb-98	106890	109600	106450	107700	Feb-04	124630	128630	124000	124850
Mar-98	107690	108590	105500	105860	Mar-04	124800	125030	120830	123020
Apr-98	105870	109760	105370	108920	Apr-04	123700	123700	118020	119760
May-98	108930	111510	108910	109500	May-04	119550	122740	117890	122060
Jun-98	109500	110980	107640	108180	Jun-04	122320	123300	120000	121810
Jul-98	108170	110860	106730	110090	Jul-04	121680	124540	120090	120180
Aug-98	109790	112210	107870	111630	Aug-04	120600	123710	119800	121790
Sep-98	111630	117730	111010	117240	Sep-04	121710	124310	120370	124310
Oct-98	117190	123200	116950	118250	Oct-04	124020	128120	122340	127870
Nov-98	118250	118840	114090	115500	Nov-04	127510	133130	126640	132850
Dec-98	115500	119090	115500	117170	Dec-04	132920	136500	131880	135430
Jan-99	117400	118900	113430	113570	Jan-05	135100	135100	129400	130290
Feb-99	113710	113950	109340	110260	Feb-05	130320	132690	127420	132410
Mar-99	110240	110650	106850	107660	Mar-05	132190	134680	128660	129620
Apr-99	107730	108810	105500	105800	Apr-05	129610	131120	127910	128600
May-99	105900	108270	104030	104130	May-05	128580	129670	123000	123020
Jun-99	104230	105570	102660	103380	Jun-05	122480	123280	120230	121010
Jul-99	103420	107430	101120	106970	Jul-05	120840	122440	118790	121260
Aug-99	107000	108250	104100	105730	Aug-05	122160	124580	121430	123340
Sep-99	105730	107270	102900	106950	Sep-05	123810	125510	119930	120120
Oct-99	106890	109090	104370	105410	Oct-05	119290	121840	119070	119920
Nov-99	105460	105910	100400	100890	Nov-05	120160	120680	116480	117900
Dec-99	100890	102930	99920	100880	Dec-05	117530	120410	116630	118330
Jan-00	100850	104130	96750	96880	Jan-06	118800	123050	118700	121470
Feb-00	96960	100850	94060	96450	Feb-06	121030	121050	118440	119220
Mar-00	96400	97900	94810	95540	Mar-06	119390	121970	118710	121220
Apr-00	95600	97510	90340	91130	Apr-06	120640	126270	120620	126110
May-00	91060	94100	88470	93730	May-06	126270	129210	125960	128440
Jun-00	93750	96960	92850	95250	Jun-06	127390	129610	124940	127850
Jul-00	95200	95950	91960	92600	Jul-06	127990	128270	124680	127700
Aug-00	92600	92890	88430	88770	Aug-06	127640	129090	127140	128140
Sep-00	88780	90370	84430	88310	Sep-06	128140	128370	126420	126840
Oct-00	88370	88560	82300	84850	Oct-06	126960	127720	124910	127650
Nov-00	84860	87930	83750	87260	Nov-06	127530	132600	126850	132470
Dec-00	87270	94250	87050	94220	Dec-06	132470	133400	130670	131970
Jan-01	94260	95920	91170	93680	Jan-07	132750	132900	128870	130260
Feb-01	93650	94440	90200	92320	Feb-07	130170	132450	129230	132310
Mar-01	92380	93800	87590	87590	Mar-07	132230	133820	130840	133530
Apr-01	87720	90870	87040	88680	Apr-07	133650	136690	133290	136500
May-01	88680	90050	84420	84580	May-07	136470	136610	134170	134530
Jun-01	84530	86690	84140	84930	Jun-07	134360	135380	132770	135310
Jul-01	84910	88210	83520	87560	Jul-07	135900	138360	135870	136890
Aug-01	87550	92370	87400	91250	Aug-07	136560	138190	133980	136240
Sep-01	91020	93300	88270	91120	Sep-07	135850	142690	135540	142690
Oct-01	91000	92440	88650	89980	Oct-07	142180	145020	140290	145020
Nov-01	90050	91200	87370	89580	Nov-07	144240	148820	144200	146360
Dec-01	89570	90810	87430	89120	Dec-07	146590	147620	143230	146000
Jan-02	88980	90630	85740	85800	Jan-08	146890	149070	145000	148750
Feb-02	85880	87990	85650	86870	Feb-08	148850	152210	144570	151900
Mar-02	86950	88690	86330	87180	Mar-08	151980	158440	151830	157810
Apr-02	87170	90440	87130	90050	Apr-08	156750	160080	155300	156370
May-02	90030	94160	89890	93260	May-08	155180	157900	153690	155550
Jun-02	93270	99880	93040	99130	Jun-08	155160	157910	153180	157490
Jul-02	99140	102120	97160	97820	Jul-08	157800	159960	155390	155920
Aug-02	99750	99320	96240	98260	Aug-08	155740	156070	145840	146660
Sep-02	98180	100060	96100	98750	Sep-08	145130	148020	139020	140790
Oct-02	98670	99260	96880	99060	Oct-08	140740	140760	124220	127560
Nov-02	99050	101710	98810	99430	Nov-08	128250	130560	124510	127050
Dec-02	99460	105050	98630	104930	Dec-08	126330	146450	125930	139500
Jan-03	104900	109050	103360	107730	Jan-09	138650	139440	127870	127900
Feb-03	107810	109350	106670	108040	Feb-09	127670	130680	125290	126960
Mar-03	107780	110830	105040	109310	Mar-09	125850	137270	124940	132800
Apr-03	109120	111870	105620	111830	Apr-09	132530	135020	129190	132620
May-03	111800	119330	111580	117750	May-09	132790	141500	132390	141320
Jun-03	117160	119300	114000	115140	Jun-09	141960	143190	137710	140370
Jul-03	115160	116110	111160	112380	Jul-09	141290	143040	138430	142570
Aug-03	112310	114260	107940	109780	Aug-09	142560	144470	140460	143340
Sep-03	109930	117390	107640	116610	Sep-09	143320	148440	141780	146380
Oct-03	116580	118600	115350	115950	Oct-09	146420	150620	144810	147180
Nov-03	115810	120190	113770	119850	Nov-09	147200	151440	146270	150057
Dec-03	119730	126490	119380	125880	Dec-09	150050	151410	142180	143260

**Exhibit 7. Summary Data: Weekly Euro/USD
Cash Exchange Rate, Jan. 1999 – Dec. 2009**

	ER	1-wk % change
Min	0.8383	-6.13%
Max	1.5891	5.33%
Stdev	0.1983	1.4333%
Average	1.1772	0.05%

Exhibit 8. Observed impact of currency volatility on a 20% EBITDA, 1999 – 2008.

Crop Year	ER at purchase of inputs	ER at printing of finished products catalogue	ER at payment of inputs	Exchange rate fluctuation	Actual input cost given ER change (*)	Impact on a 20% EBITDA (**)
1999	108180	117240	96880	-17%	58%	-50%
2000	103380	106950	93680	-12%	55%	-34%
2001	95250	88310	85800	-3%	49%	-7%
2002	84930	91120	107730	18%	41%	37%
2003	99130	98750	124600	26%	38%	50%
2004	115140	116610	130290	12%	43%	25%
2005	121810	124310	121470	-2%	49%	-6%
2006	121010	120120	130260	8%	44%	19%
2007	127850	126840	148750	17%	41%	35%
2008	135310	142690	127900	-10%	54%	-28%
				Average	47%	4%
				Stdev	7%	34%

(*) Initial input cost -before currency fluctuation- is set to equal 48% of finished good price.

(**) Initial EBITDA -before the impact of currency fluctuation- is set at 20% of finished good price.

Exhibit 9. Range of possible impact of best and worst timing in the pricing of Exchange Rate on a 20% EBITDA, 1999 - 2009.

Crop Year	Best observed ER change, %	Worst observed ER change, %	Impact of best-worst ER on 20% EBITDA (*) (**)
1999	9%	-10%	48%
2000	3%	-18%	60%
2001	-1%	-11%	28%
2002	27%	1%	48%
2003	27%	0%	52%
2004	18%	4%	27%
2005	11%	-3%	32%
2006	9%	-3%	27%
2007	16%	-1%	36%
2008	17%	-6%	50%

(*) Initial input cost -before currency fluctuation- is set to equal 48% of finished good price.

(**) Initial EBITDA -before the impact of currency fluctuation- is set at 20% of finished good price.

Introduction

Sierra Leone is one of the world's poorest nations with a gross domestic product per capita of \$341 USD (World Bank, 2009). GDP per capita fell to \$140 USD in 2000 due to the lengthy civil war. The leading agricultural products are rice, cassava, vegetables, oil palm fruit, and ground nuts (Figure 1). Other significant grains are pigeon peas, maize, millet, and sorghum. The country is not self-sufficient in basic food stuffs as it still annually imports 150,000 mt (2008 data) of rice, 15% of what it produces, and 9,000 mt (2008 data) of palm oil, 15% of production (Figure 2).

Multilateral and non-governmental organizations, policymakers, and academics increasingly recognize how private processing and manufacturing firms provide markets, technical knowhow, and value chain integration to small agricultural producers. Agricultural policy historically focused solely on farm productivity, subsistence models of production, and independence. This has often kept small holders isolated, unproductive, and unable to climb out of the poverty trap. Policy shifts within aid organizations now seek to locally source food products instead of relying on imports. They recognize the complementarity between industrial enterprises and local agricultural producers. Replacing imported grains provides markets for local farmers, supports sustainable supply chains, utilizes adapted crops, and distributes local food products.

Besides being the name of your company, what is Bennimix?

Bahsoon: Bennimix, is the name of our leading food product. The name is derived from the creole word for sesame, benni. In the 1970's the Food and Agriculture Organization developed the formulation for nutritious complementary food: Bennimix. They created a product using local ingredients that would not require fortification. Sesame grows easily in Sierra Leone, as do rice, pigeon peas, and sugar, the other ingredients in Bennimix.

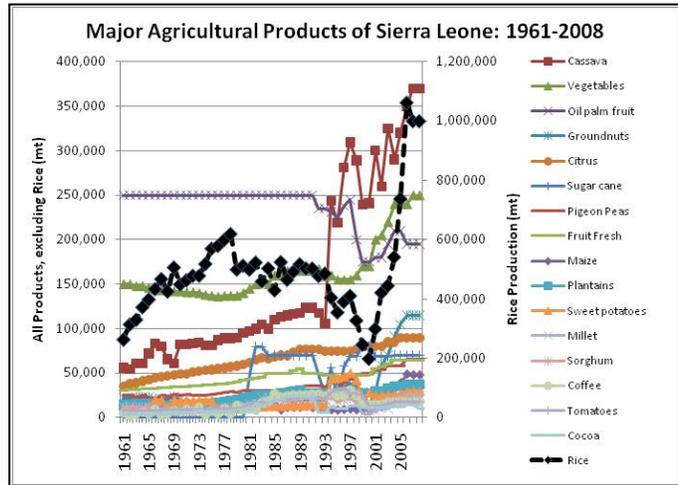


Figure 1.
Source: FAO

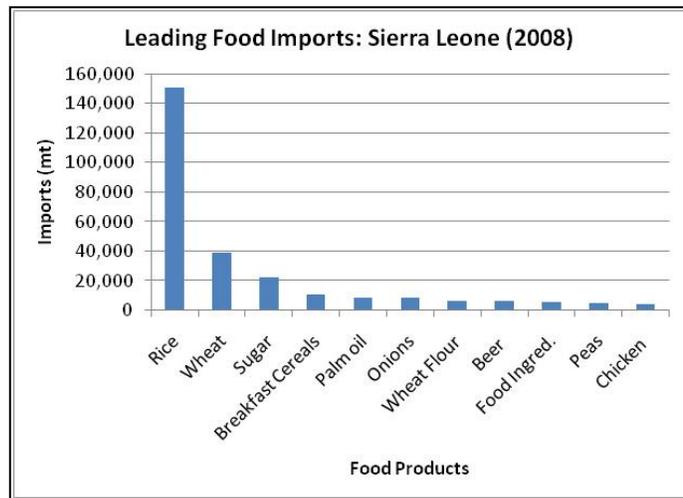


Figure 2.
Source: FAO

Let me tell you an interesting story about benni. I have a friend who is an archeologist. He recently received a grant to help restore the historic, and infamous, slave export facility on the island of Bunce, off the coast. Sierra Leone was a major source of laborers destined for the Southeast United States. Sierra Leoneans were valued for their knowledge of rice production and resistance to malaria, prevalent in South Carolina at the time. My friend has discovered a cultural link between Sierra Leone and communities in eastern South Carolina. He says you will find the word “benni” appearing in songs and stories that comprise the cultural heritage of the region.

What products do you produce?

Bahsoon: Currently we only produce Bennimix, a rice, sesame, pigeon pea, and sugar recipe. It is a complementary porridge for children 6-24 months. Shortly we will release two new products, Powermix™ and Complimix. Complimix is a wholesale product, sold in 25kg bags, to be consumed by school age children and adults. School lunch programs for example will be an important market for this product. Powemix™ is a similar product, only packaged in 50 and 400gm. packets for use in the home as a breakfast cereal. Sorghum replaces the rice in these new products as it is easy to grow and supply has been increasing. We work with the local beer brewery that likes to use sorghum in beer making. Farmers find maize being more difficult to grow and store in this humid climate. The brewery needed help assuring farmers a consistent market for sorghum. So it seemed to make sense to develop the two new products using sorghum instead of rice, which has tighter markets. We are very excited about our newest product designed and requested by the World Food Program. They have been distributing only imported grains until now, but are now willing to try our locally sourced product. They were looking for an elevated protein product for local distribution. Our WFP product contains elevated protein levels by increasing doubling the content of pigeon peas.



We are very excited about our newest product designed and requested by the World Food Program. They have been distributing only imported grains until now, but are now willing to try our locally sourced product. They were looking for an elevated protein product for local distribution. Our WFP product contains elevated protein levels by increasing doubling the content of pigeon peas.

Why sesame, rice, sorghum, sugar, and pigeon peas?

Bahsoon: All five products grow well here in Sierra Leone. Farmers know the products, especially sesame, pigeon, and rice. The crops are well adapted. Sorghum too has a long history of successful cultivation. Sugar cane is relatively new (1980's). Sierra Leone has a very harsh climate; heat, humidity, and numerous pests. These grains are relatively hardy and store with much less spoilage when compared to imported grains. Derived food products have a much

longer shelf life as well. Losses with imported foods begin as products sit in holds and demurrage mounts due to our inefficient port. Additional spoilage, cross contamination when mixing lots, and theft plague importers storing grains at the port. Then product must make the long journey inland to needy communities. Locally sourced products provide real savings when including post-harvest costs all the way to the consumer. But often food aid organizations only include CIF port costs in their calculations, and fail to account for the 30% shrinkage. Also, our local grains meet international nutritional standards without fortification. The country avoids having to import costly synthetic micro nutrients when natural and local fortification is available. People are used to eating products derived from the grains so they integrate well into local food customs and recipes. We purchase our raw inputs from over 600 farmers in quantities as low as 1kg. The payments stay in the country and are paid to those that need it most. The farmers know how to produce the crops, and they store well given the harsh climate and simple storage practices.

What is the greatest challenge procuring local grains?

Bahsoon: Procuring from small farmers was difficult post-war. We currently purchase about 120 mt of raw products annually. We have manufacturing capacity to process ten times more if we now that the agricultural sector has recovered from the war and the market is increasing. The war greatly diminished the nation's agricultural capacity. The quality we received has been poor postwar but is improving following training in HACCP by the Bennimix Food company. Farmers lacked quality control so we spent a lot of time removing sand, rocks, and foreign organic materials. Often farmers lacked clean surfaces on which to dry their grains. We have provided producers with tools, training, and materials to improve their yields and attain higher levels of quality. To be frank we lost a lot of money as producers took our assistance but failed to either produce or commercialize their crop. We are now having great success working with an NGO, ACIDI-VOCA (Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance), and their team led by program officer Ms. Sia Iscandari. Farmer groups have been organized, training has been provided, and the farmers better understand that we are partners, not adversaries. We know farmers too have had bad experiences with other unscrupulous traders. Bennimix Food Company Ltd. stands in the middle trying to meet international product standards while working with a supply chain that has little experience in international markets. It is a learning process for all of us. I am confident as I see progress every day.



Acknowledgements

A special thanks go to Dr. Bahsoon for taking the time to visit, and for the support of Dr. Paul McNamara and Dr. Abu Sesey directors of the University of Illinois-University, Njala higher education development project.

IFAMA Business Office • P.O. Box 14145 • College Station, TX 77841-4145, USA
Tel: 1-979-845-2118 • Fax: 1-979-862-1487 • E-mail: ifamr@ifama.org • Web: <http://www.ifama.org>

The IFAMR (ISSN #: 1559-2448)