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Measuring Retail Service Quality in Farm Supply Cooperatives

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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.

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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.

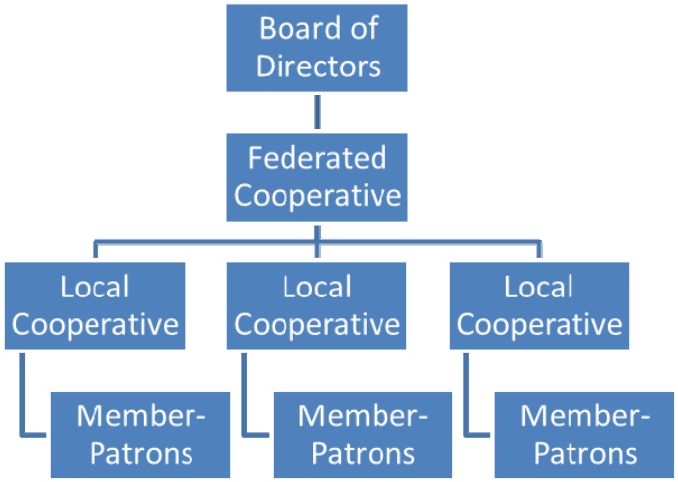

Figure 1. Organization of a Federated Cooperative

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 inherit 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 famers 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.

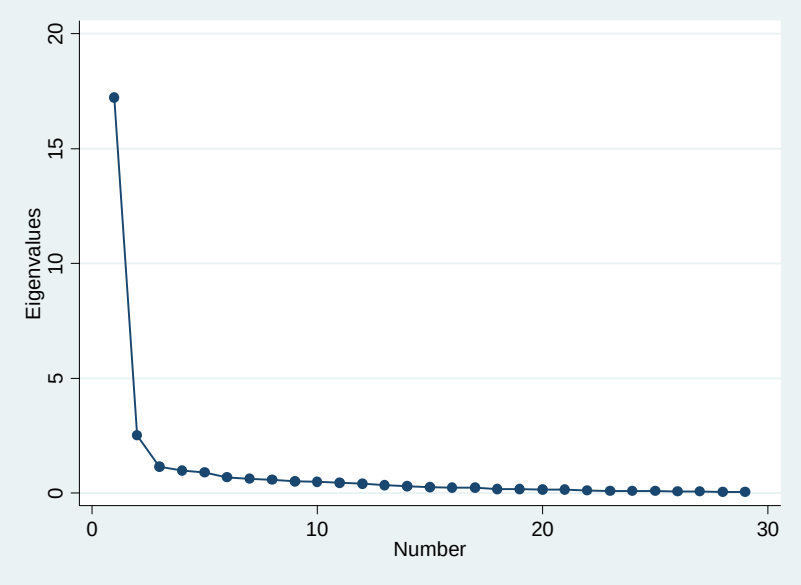

Figure 2. Scree Plot of eigenvalues after PCA

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.

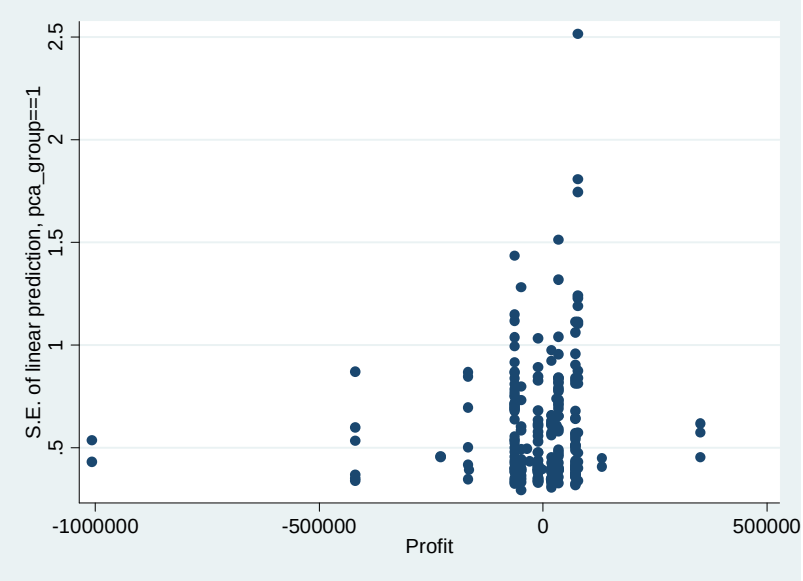

Figure 3. Heteroskedasticity

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 Group1 (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 prefect 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**	0.018	0.045**
	(-0.025)	(0.027)	(0.022)
Age squared	0.00056**	-0.00015	-0.00041**
	(0.00023)	(0.00025)	(0.00019)
Total Household Income	-0.0015	0.00065	0.00081
	(0.003)	(0.0019)	(0.0022)
Total Household Income squared	0.000013	-0.000013	0.00
	(0.00001)	(0.00001)	(0.0001)
College Education	-0.089	0.093*	-0.0035
	(0.059)	(0.053)	(0.054)
Acres Leased	-0.00018**	0.00017***	0.000018
	(0.00009)	(0.0006)	(0.00006)
Acres Farmed	0.00017	-0.000046	-0.00012
	(0.00011)	(0.00008)	(0.00008)
Percent of household income from farming	-0.0018	0.0014*	0.00045
	(0.0014)	(0.00076)	(0.0011)
Wildlife Enthusiast	-0.28***	0.042	0.24*
	(0.097)	(0.091)	(0.14)
Homeowner	0.22***	-0.11***	-0.11
	(0.084)	(0.043)	(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.

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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

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Appendix 1

Multinomial Model of PCA Groups

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

