MEASURING RETAIL SERVICE QUALITY IN FARM SUPPLY COOPERATIVES

by

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ABSTRACT

This study seeks to provide management of local farm supply cooperatives with suggestions that can help them meet the service quality needs of their customer base. It was hypothesized that certain customer segments have different perceptions of service quality. Hence, perceptions were examined relative to demographic and socioeconomic characteristics of the member-patrons. The customers' perceptions of service quality were measured using a scale instrument containing items from the Retail Service Quality Scale (RSQS) proposed by Dabholkar et al. (1996).

The employment of principal component analysis (PCA) revealed three customer segments. The relative risk ratio and marginal effects of the multinomial logit model illuminated the characteristics of those belonging to a given segment. The results of the analysis showed homeowners were likely to deem customer service and personal interaction as important. Customers who consider appearance and accessibility as important were those with higher education, receiving most of their household income from farming, and wildlife enthusiasts. Older patrons and wildlife enthusiasts were likely to view the stores policies and reliability as an important factor of service quality.

Finally, the RSQS scale-items and PCA Groups were found to have excellent internal consistency, which provides management with a mechanism to regularly assess progress toward meeting the service quality desires of their member-patrons, as well as new clientele.

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LIST OF ABBREVIATIONS

AFC Alabama Farmers Cooperative

CFA Confirmatory Factor Analysis

EFA Exploratory Factor Analysis

MLE Maximum Likelihood Estimation

NGC New Generation Cooperative

OLS Ordinary Least Squares

PCA Principal Component Analysis

RRR Relative Risk Ratio

RSQS Retail Service Quality Scale (Dabholkar et al. 1996).

TDM Tailored Design Method (Dillman 2007)

I. INTRODUCTION

On a daily basis consumers are positively affected by cooperatives without understanding their history, organizational structure, or economic importance. Cooperatives serve many patrons in industries such as utilities, groceries, financial services, health care, transportation, renewable fuels and farm supply (Deller 2009). As is the case with all business structures, cooperatives have evolved over time to continue to meet their patrons' needs.

Farm supply cooperatives in Alabama have also evolved as their customer demands have changed. They originally organized to assist farms in obtaining low cost fertilizer. Subsequently, they slowly began offering other products such as seed, crop protectants[1], feed, and farm hardware and application services. The change in product offerings and services necessitate 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), 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. To facilitate the analysis, a survey instrument was developed from items derived from a previously tested scale known as Retail Service Quality Scale (RSQS) (Dabholkar

[1] Crop protectants are products used to control pests; such as insects, weeds, and fungus; that damage crops.

et al. 1996). The instrument was sent to 5,000 patrons of 10 local cooperatives. Principal Component Analysis (PCA) was used to group respondents based on their service preferences. A multinomial logit model was utilized to determine characteristics of customers in groups determined by PCA.

This study focuses on service quality of local cooperatives for several reasons. The marketing literature, which suggests 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 economies and communities. To better understand cooperatives in the U.S. and locally, the following discussion provides an overview of the economic importance, structure, and role of cooperatives.

Economic Importance of Cooperatives

The University of Wisconsin Center for Cooperative (UWCC) recently published an economic impact study of cooperatives in the United States (Deller 2009). The UWCC concluded that there are 30,000 cooperatives in the United States operating at 73,000 locations. Cooperatives own approximately $3 trillion in assets, produce $5 billion in revenue and distribute $25 billion in wages. Cooperatives also account for approximately two million jobs (Deller 2009).

The researchers also concluded that Americans hold roughly 350 million memberships in cooperatives with most of the memberships being in consumer cooperatives. These memberships generate nearly $79 billion in total impact from patronage refunds and dividends (Deller 2009).

Farm Supply and Marketing Cooperatives were found to have $40 billion in assets, roughly $120 billion in sales revenue, and their payroll accounted for $6 billion. These firms have nearly 2.5 million farmer memberships and employ 150,000 people. The UWCC concluded that the total economic impact of these firms was nearly $130 billion in revenue, 200,000 jobs, nearly $9 billion in wages and roughly $10 billion in valued-added income (Deller 2009).

Agricultural Cooperatives

As the previous information demonstrates, the economic role of cooperatives is significant in the U.S. economy. In contrast to other firms, the structure of cooperatives differs from a typical business model. To better understand the business structure and role of agricultural cooperatives, a brief history and discussion of these organizations follows.

Cooperatives enable farmers to organize and collectively bargain for market access and lower input costs. The *Capper-Volstead Act of 1922* ensures the rights of farmers to organize and market their products collectively as long as the association conducts at least half of its business with member-patrons[2] and no member of the association has more than one vote or the association limits dividends on stock to eight percent. This legislation was important because it allowed farmers to act as collective bargaining units without fear of being prosecuted under antitrust legislation such as the Sherman Anti-Trust Act of 1890 (Erickson et al. 2002).

Agricultural cooperatives are organizations that allow farmers to pool their resources and products. This member-owned business is democratically controlled and operated for

[2] A principle of cooperatives is that it must be owned and controlled by the people who conduct business with them. The term that is used to describe a person who is both an owner and as well as a customer is member-patron (Erickson et al. 2002).

the mutual benefit of its member-patrons. Membership is open[3] to those who use its services. A cooperative can return net margins to members based upon patronage but the legal nature of a cooperative limits its return on equity (Erickson et al. 2002).

Agricultural cooperatives are classified by their major function. The three main classifications are supply, marketing and service. Supply cooperatives sell products such as animal health, feeds, farm equipment, building materials, seed, crop nutrients, crop protectants, lawn & garden supplies, and other goods that member-patrons demand. Marketing cooperatives transform, package, distribute, and market farmer produced products such as grain, vegetables, dairy, and livestock. Service cooperatives provide a specialized service to their patrons such as trucking, storage and plant nutrient application (Erickson et al. 2002).

Cooperatives are also classified by their organizational structure. Depending on the geographic locations to which a cooperative provides services, it is classified as either a local or a regional cooperative. Local agricultural cooperatives meet the needs of the local community[4]. Member-patrons elect a board of directors from the membership. The board of directors, in turn, selects a manager. The manager is responsible for the day-to-day activities of the cooperative. It is important to note that the personnel report directly to the manager and the manger reports to the board of directors (Erickson et al. 2002).

[3] In more recent times another structure of cooperatives has been formed that limits membership. A New Generation Cooperatives (NGC) is a "closed" cooperative; that is, after the initial stock offer no new member can enter unless they buy a current member's shares. Investment in the NGC is based on the member's anticipated level of patronage. All members of a NGC adhere to legal binding agreement (Erickson et al. 2002).

[4] Over time, local cooperatives can grow and serve more than one community. The term given to these cooperatives are "super-locals" (Erickson et al. 2002).

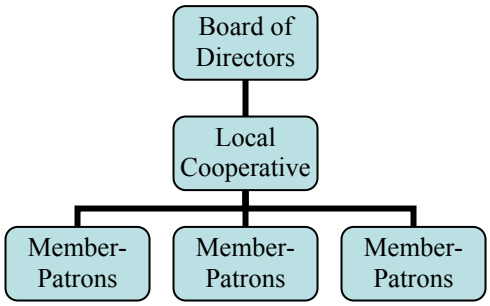

Figure 1: Organization of a Local Cooperative

A regional cooperative generally serves a large geographic area and its primary purpose is to provide products and services (accounting, information technology, training, etc.) to the local cooperatives. The regional cooperative offers local cooperatives the advantage of purchasing power. The two basic types of regional cooperatives are federated and centralized (Erickson et al. 2002).

A local cooperative, in conjunction with other local cooperatives, own the regional, federated cooperatives. The control is from the bottom up with regional cooperatives responding to the needs of local cooperatives. It is then the duty of the local cooperative to meet the needs of their member-patron (Erickson et al. 2002).

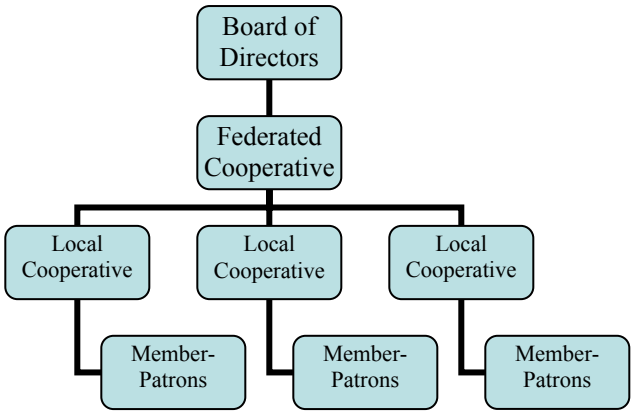

Figure 2: Organization of a Federated Cooperative

In a centralized cooperative, the local cooperative store is controlled by the regional cooperative rather than a local board of directors. In this case, the local member-patrons elect regional directors who direct the regional cooperative. These cooperatives have no local board, per se. Instead, these cooperatives usually have a local advisory committee that communicates with local management.

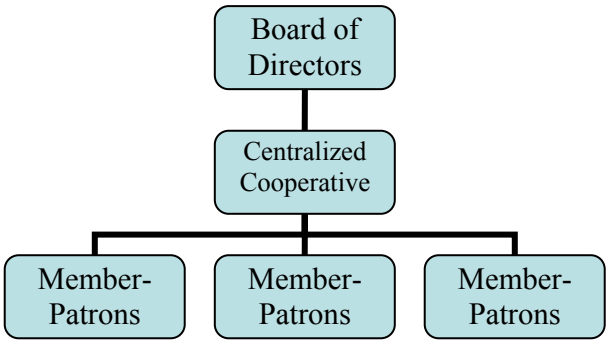

Figure 3: Organization of a Centralized Cooperative

In addition to the two basic types of regional cooperatives, a combination of the two types is called a *mixed cooperative.* These cooperatives have both local cooperatives and farmers as members. This structure, as the name implies, is a combination of a federated and centralized regional cooperative.

Cooperative governance and operation is based on the values of self-help, democracy, equality, equity, solidarity, honesty, openness, social responsibility and caring for others (ICA 2009). In 1844, the Rochdale Society of Equitable Pioneers developed a set of ideals of operation of cooperatives (Erickson et al. 2002). These ideals, known as the Rochdale Principles, have been revised by International Co-operative Alliance (ICA 2009). The cooperative principles are guidelines by which cooperatives put their values into practice.

1. **Voluntary and Open Membership[5].** Cooperatives are open to all persons able to use their services and willing to accept the responsibilities of membership (ICA 2009).

2. **Democratic Member Control.** Cooperatives are democratically controlled by their members through the elected board of directors, who set policies and make decisions with concern for the welfare of the membership. These elected representatives are accountable to the membership. In local cooperatives, members have equal voting rights (one member, one vote) and cooperatives at other levels are also organized in a democratic manner (ICA 2009).

3. **Member Economic Participation.** Members contribute equitably to, and democratically control, the capital of their cooperative. Members may allocate net margins to developing their cooperative, building reserves, paying patronage, and supporting other activities approved by the membership (ICA 2009).

4. **Autonomy and Independence.** Cooperatives are autonomous, self-help organizations controlled by their members. If they enter into agreements with other organizations, including governments, or raise capital from external sources, they do so on terms that ensure democratic control by their members and maintain their cooperative autonomy (ICA 2009).

5. **Education, Training and Information.** Cooperatives provide education and training for their members, elected representatives, managers and employees so

[5] An exception to open membership is the New Generation Cooperative; see footnote 3 for further discussion.

they can contribute effectively to the development of their cooperatives. They inform the general public about the nature and benefits of cooperation (ICA 2009).

6. **Cooperation among Cooperatives.** Cooperatives serve their members most effectively, and strengthen the cooperative movement, by working together through other local, national, regional, and international cooperative structures (ICA 2009).

7. **Concern for Community.** Cooperatives work for the sustainable development of their communities through policies approved by their members (ICA 2009).

Alabama Farmers Cooperative (AFC)

The previous discussion briefly described the functionality of agricultural cooperatives. With an understanding of the economic importance and structure of cooperatives, an overview of AFC is essential for understanding federation and the local member cooperatives on which this study focuses.

AFC is a regional, federated, supply and marketing agricultural cooperative that provides its members with products and services. AFC has a long tradition of being deeply involved with the farmers of 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, AFC 2009).

In 1936, Tennessee Valley Fertilizer (TVF) Co-op was formed when a group of farmers pooled their money to buy fertilizer in bulk in order to obtain a better price. By the 1940s, TVF began making feed for local cattle and hog farmers and began cleaning and processing seed for local growers (Allen 2009, AFC 2009).

By the 1950s, TVF was selling tires, lubricants and tools, and began marketing grain grown by North Alabama producers. Though seed is no longer processed, the cooperative now owns or manages 17 granaries and merchandizes grain for several other facilities (Allen 2009, AFC 2009).

In 1961, TVF became Alabama Farmers Cooperative and at that time the cooperative became more accessible to the general public when it acquired Farmers Marketing and Exchange stores. Today, there are 44 member cooperatives with approximately 80 locations in the system serving the needs of both farmers and homeowners. In 1969, AFC acquired Anderson's Peanuts, a large food grade and seed peanut processor headquartered in Opp, AL. AFC sold Anderson's Peanuts in March 2007 to Birdsong Peanuts (Allen 2009, AFC 2009).

Bonnie Plants, headquartered in Union Springs, AL, was obtained by AFC in 1975. Bonnie supplies vegetable, herb and flowering annuals to retail outlets in every state in the continental U.S and, as of 2008, they entered the Canadian market. As of 2009, Bonnie had 62 greenhouse facilities across the U.S. and approximately 450 sales representatives that serviced over 13,000 accounts (Allen 2009, AFC 2009, Bonnie Plants 2009).

In 1989, AFC completed a feed mill in Demopolis, AL. Its primary purpose was to manufacture catfish feed to satisfy the demands of the growing catfish industry. In

1996, Black Belt Aquaculture fingerling farm, in Hale County, was completed to supply small (fry) fish to catfish producers. In 1999, SouthFresh Aquaculture, LLC was formed to provided feed, fingerlings, processing and marketing for catfish farmers in Alabama and Mississippi. This LLC is a joint venture between AFC and SouthFresh Farms in Indianola, MS (Allen 2009, AFC 2009).

Universal Seed & Supply Inc., in Trussville, AL, became an affiliate of AFC in the 1990s. Universal ECS Inc. was established as the erosion control division of Universal. ECS is a quality supplier of geotextiles, geogrids and erosion control products meeting the requirements for private, commercial, and Alabama Department of Transportation projects. On March 1, 2009, the companies merged and became a division of AFC (Allen 2009, AFC 2009).

In order to provide financing options (both seasonal and long-term) to member cooperatives, AFC created a financing subsidiary in 1993. The entity was named Cooperative Financial Services (CFS). In 1997, AFC bought the Currie Gin which is located in McCullough, AL. In the 1990s, the gin averaged 50,000 bales of cotton per year (Allen 2009, AFC 2009).

In 2003, Agri-AFC, LLC, was formed to purchase crop protectants, crop nutrients and seed at competitive prices for local member cooperatives. AFC and WinField Solutions (a subsidiary of Land O' Lakes) are the joint venture partners of Agri-AFC (Allen 2009, AFC 2009).

AFC formed a joint venture with Mossy Oak's BioLogic division in 2005. Headquartered in West Point, MS, BioLogic develops products such, as feed and seed, for wildlife ranging from deer and turkey to fish and waterfowl. In 2008, BioLogic

successfully introduced *Farming for Wildlife*, a quarterly magazine focused on game and farm management (Allen 2009, AFC 2009).

In 2008, AFC launched *Time Well Spent,* a television program devoted solely to "Rural Alabama." Each episode provides informative and educational segments on people, places and events (Allen 2009, AFC 2009).

AFC Member Cooperatives

AFC's 44 member local cooperatives, with approximately 80 locations, provide products and services to a wide array of clientele in their local communities. In the calendar year of 2008, AFC member cooperatives had combined sales of approximately $160 million. 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 fisherman, 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 enthusiast, 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.

II. LITERATURE REVIEW

Service Quality

Service quality is multifaceted and thus when one first begins to define it, many statements can emerge. Some might believe that having the product, when a customer wants it, at the price they expect is service quality. Others believe having knowledgeable and courteous sales staff to assist customers with their purchases is needed to meet service quality goals.

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 being proposed and evaluated. Three of the more popular models for measuring service quality are discussed.

SERVQUAL

Parasuraman et al. (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 et al. (1988) developed an empirical method they dubbed SERVQUAL.

Initially, Parasuraman et al. (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 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".

Parasuraman et al., (1988) began with an instrument containing 97 items in 10 dimensions. Through two stages of scale purification SERVQUAL was refined into five dimensions and 22 items. The 5 key dimensions:

1. Tangibles: Physical facilities, equipment, appearance, and personnel
2. Reliability: Ability to perform the promised service dependably and accurately.
3. Responsiveness: Willingness to help customers and provide prompt service.
4. Assurance: Knowledge and courtesy of employees and their ability to inspire trust and confidence.
5. Empathy: Caring, individual attention the firm provides to its customers

SERVQUAL measures service quality by finding the difference between customer perceptions (P) and expectations (E). This difference is the service quality gap (Q = P-E) (Parasuraman et al., 1985; 1988). The wider the gap, the poorer the service

quality is viewed by the customer. An organization should use this information to re-prioritize and to use resources to improve the most critical service attributes in order to meet the expectations of customers better.

After SERVQUAL's inception, other researchers used the instrument in their own studies to determine its validity and usefulness. Gaur (2006) found SERVQUAL had been adapted and used in a variety of settings such as in a appliance repair and maintenance firm, several retail banks, a long distance telephone provider, a security broker, credit card companies, hospitals, a business school placement center, a tire store, a dental school patient clinic and acute care hospital, discount and departmental stores, and others.

Although SERVQUAL has been applied in the study of different types of service industries, the scale itself possesses some serious shortcomings that limit its usefulness (Brown et al., 1993). According to Guar (2006) "SERVQUAL fails to provide an accurate and effective measure of service quality in retail settings" and "care must be taken when applying SERVQUAL."

Additionally, concern has risen on the appropriateness of operationalizing service quality as the performances-expectations gap score, and the scale's applicability to a retail setting (Finn and Lamb, 1991; Reeves and Bednar 1994; Carman, 1990). The length of the SERVQUAL instrument has also been given scrutiny and hence Parasuraman et al. (1991, 1994) later reassessed and refined SERVQUAL to address the cumbersomeness of the instrument.

Parasuraman et al. (1988) offers other potential applications of SERVQUAL. One can use regression analysis to analyze the overall quality perception scores in order to

determine the relative importance of the five dimensions in influencing customers' overall quality perceptions. The instrument can also be used to segment a firm's customer based on their individual scores. These customer segments could then be analyzed by using demographic and other appropriate profiles.

SERVPREF

In contrast to the gap score used in SERVQUAL, Cronin and Taylor (1992) propose their performance-based measure of service quality named SERVPERF. The SERVPERF scale consists of 22 perception items and is different from SERVQUAL because SERVPERF examines only the perceptions of service quality and gives no consideration to customers' expectations. Brady et el. (2002) show that SERVPREF is a better instrument for determining service quality, but the continued use of and reference to SERVQUAL in marketing literature suggests that "consensus has not yet been reached relative to the superiority of performance-only measures of service quality" (Brady et al. 2002, p.18).

SERVPERF is viewed as a better choice in predicting purchase intentions and consumer loyalty than SERVQUAL; that is, the SERVPERF instrument explains more of the variation in service quality than SERVQUAL (Brady et al. 2002; Cronin & Taylor, 1992; 1994). In contract to SERVQUAL's gap measure, SERVPREF has increased predictive power due to its performance only measurements. SERRPREF's increased predictive power may be due to it avoiding potential psychometric problems resulting from the use of difference scores (Brown et al. 1993). Zeithaml (2000) considers

examining perceptions more appropriate in measuring service quality when consumers may have trouble developing particular expectations about services prior to use.

Retail Service Quality Scale (RSQS)

Dabholkar et al. (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 were derived from SERVQUAL and the additional 11 items were added from existing literature and qualitative research. Dabholkar et al. (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:

i. Physical aspects: Store layout, appearance, and convenience,
ii. Reliability: Keeping promises and performing services correctly (doing it right),
iii. Personal interaction: Personnel being courteous, helpful, and inspiring confidence in customers,
iv. Problem solving: The handling of returns and exchanges as well as complaints, and

v. 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. Mehta et al. (2000) conducted research on service quality in the contexts of supermarkets and electronic good retailers in Singapore. The results showed that "RSQS was superior within the context of more good and less service environment, i.e. a supermarket, while SERVPERF was better for a retailing context where the service element becomes more important, i.e. an electronic goods retailer" (Mehta et al, 2000, page 62).

Agricultural Economics Literature Review

A search was preformed to determine whether the above-mentioned scales had been used in agricultural economics literature. Only two peer-reviewed articles were located that had used any of the aforementioned scales in their study.

Eastwood, Brooker, and Smith (2005) used SERVQUAL to assess the shopping experiences patrons had at green grocers. The survey was composed of 24 statements, from eight subgroups, that were to be rated from one (not very important to me) to five (very important to me). The researchers preformed a test of independence to determine if there were any significant differences between the store averages and overall averages. Separate regressions were then estimated for each of the eight subgroups. The researchers used this model because they assumed that a person's scores were determined

independently and there was no reason to assume a common set of variables affected the eight subgroups.

McNeil and Wilson (1997) used SERVQUAL's gap method to examine the wholesaler–retailer relationship in the red meat market in Western Australia. The researchers also used principal components analysis to determine if there were underlying factors affecting the perception of service quality and to minimize the potential risk of multicollinearity. The study identified factors that lead to high levels of satisfaction by retailers when dealing with their major suppliers.

III. METHODOLOGY

Sample

A mailed instrument was sent to member-patrons of ten AFC member cooperative stores. The patrons selected had their name and address in the stores' computer system, and the patron had made a purchase in the 2008 calendar year. Due to budget constraints, a total of 5,000 surveys were mailed. Some stores had several thousand addresses in their database and others had only a few hundred. The database was first examined for valid mailing addresses. A total number of valid addresses were calculated for the entire database and for each store. Then the database was sorted in ascending order by street address. Taking the total number of valid addresses for each store and dividing it by 5,000 gave a weighted average of participants for each store. Then potential participants were selected to the nearest row. This procedure allowed for complete randomization.

A mailed, paper-based survey (Appendix A) was chosen for several reasons. First, the stores did not have e-mail addresses for their patrons. A postcard could have been sent to them with a website address, but that would bring us to our second difficulty. The patrons live in rural areas and it was assumed that they are typically older. Based on the previous assumption it was further assumed that an older customer base is not as familiar or comfortable with web-based data gathering. Thus, the internet was not an option that would provide a sufficient number of responses.

An in-person survey (intercept survey) could have been conducted with customers after making a purchase. The benefit of this is the survey would reflect fresh experiences with service quality. However, in-person surveys have problems relative to the mailed surveys. Some customers are assumed to only patronize a store at certain times of the year based on his or her needs. That is, row crop agriculturalists are assumed to shop in the spring for seed, crop protectant, and crop nutrients; whereas livestock producers would shop mainly in the fall for feed. Due to store hours, a working profession may only visit the store on Saturdays, so in-person surveys have an inherit bias. To avoid this bias, sampling would need to take place at various times and days during the week and virtually the entire year. A mailed survey allows for more diverse customer segments to be reached regardless of when these customers shop.

The timing of the survey implementation was considered based on the Tailored Design Method (Dillman 2007). The survey was mailed in late fall. Depending on an agriculturalists' occupation (row-crop or livestock), this time is potentially their slowest time of the year, which was expected to allow the respondent to give more attention to the survey.

If budget had not been an issue, an incentive would have been offered to assist in increasing responses. It was also decided that the limited funds would be better spent on a postcard reminder (Appendix B). The postcards were mailed a month after the survey was sent. The postcard thanked the participant if they had already returned their survey. For those that had not returned their survey, they were encouraged to complete the survey so their thoughts could be conveyed to local management. The postcard also gave instructions for those who had lost their survey; that is, they could contact the survey

administers by phone, and the respondent would be mailed a replacement or a respondent could also have the survey e-mailed to them if they preferred. Only three respondents chose the e-mail method, further substantiating the assumption that most patrons of AFC member cooperatives choose to communicate by mail.

Instrument

The instrument contained 28-items from the RSQS scale as proposed by Dabholkar et al. (1996). An additional item was added which asked the respondent about patronage paid to the patron from the local cooperative. A seven-point Likert scale, where "7" signified "Strongly Agree" and "1" signified "Strongly Disagree" was used with the 29 items.

Dabholkar et al. (1996) only analyzed perception data “to avoid psychometric problems with different scores.” In their study they did note that the disconfirmation approach, which is employed in SERVQUAL, could be used to determine gaps in service quality. Since literature could not be found which measured service quality for farm supply cooperatives, and since academic researchers in service quality note that scales must be modified for each industry, the scale used in this study asked patrons about their “realistic expectations” (expectations) of a farm supply store as well as their “experiences” (perceptions).

In addition to the RSQS questions, the instrument included additional items to better explain their responses. These items were worded and structured according to TDM (Dillman 2007). Respondents were asked the distance to the store from their home, the last time they visited the store, and the last time they made a purchase from the

particular store identified. Respondents were also asked to identify the product category (department) that most attracted them to shop at the store indicated, rather than shopping at a competing store. In addition, they were asked to identify the department in which they spent the most money. These questions were posed since a customer might choose to shop at a store because they carry a product that cannot be found nearby, but they may spend a greater dollar amount in a different category; i.e., a customer may be a row crop producer but also may have a horse. Thus, they will spend the greatest dollar amount on seed, crop protectants or crop nutrients, but may find the co-op store has equine related products that a competitor does not stock. Given the department they spent the greatest dollar amount on, the respondents were asked what factor (convenience, location, quality, customer service, price, variety) was most important in purchasing from the co-op store. Finally, the respondents were asked where he/she would obtain the indicated products if he/she did not purchase from the stated cooperative.

Respondents were also questioned relative to what service was most important to them and which service they spent the greatest dollar amount. As stated earlier, cooperative stores are unique in that they can be viewed as wholesale, retail, and as a service provider.

To allow this study, or future research, to explore revealed versus stated preferences, the respondents were asked which characteristic (physical aspects, reliability, personal interaction, problem solving, policies) were most important to them with regard to the particular cooperative identified. The characteristics given are the five dimensions of RSQS. Based on the selections the respondents made in the expectation

section of the instrument and their given preference for a characteristic, it is believed a preference indicator could be identified.

Finally, the respondents were asked to provide demographic and socioeconomic information. In the analysis of the respondent's preferences, it was hypothesized that certain groups of people have different expectations and perceptions than others. Thus perceptions were examined relative to demographic and socioeconomic characteristics of the member-patrons.

Scale Reliability

Reliability tests of the survey instrument are important when variables are to be derived from the scale and then used for predictive analyses. To determining the reliability of the survey instrument, Cronbach's alpha is employed. If the scale is determined to have poor reliability, then items within the scale must be examined and modified or deleted (Santos 1999).

The closer alpha is to one, the higher the reliability estimate of the instrument. Santos (1999) suggests that an alpha of 0.70, or greater, is an acceptable level of reliability but lower thresholds have used in the literature. George and Mallery (2003) suggest a rule of thumb where an alpha greater than 0.90 is viewed as "excellent", an alpha above 0.80 is considered "good", and above 0.70 is "acceptable". Anything less that 0.70 should either be deemed as questionable or unacceptable. Since RSQS items are grouped by dimensions, reliability was estimated using internal consistency.

Factor Analysis (FA)

Factor analysis (FA) is an area of multivariate statistics which can be used to reduce a set of observed variables into a smaller number of variables (dimensions) that have common characteristics with little loss of information (Harris 2001, Pett 2003). Factor analysis assumes that the observed variables are linear combinations of some underlying (hypothetical or unobservable) factors. The factors are assumed to be common to two or more variables and some are unique to each variable (Kim 1978). Factor analysis can be used for instrument development, assessment of the construct validity of an established survey instrument, and identification of external variables that appear to be related to the model of interest (Pett 2003). Depending upon the goal of the researcher, there are mainly two types of factor analysis: exploratory and confirmatory (Kim 1978, Pett 2003).

Exploratory factor analysis (EFA) is used when the researcher is unaware of the number of factors needed to explain the relationship among a set of variables and the factors loadings—that is, EFA is used to explore the underlying dimensions of the model of interest (Kim 1978, Pett 2003). EFA is a method of identifying the number and nature of latent variables that explain variance among the observed variables (Preacher 2003).

Confirmatory factor analysis (CFA) is used when the researcher has knowledge of the underling structure of the model being examined or it can be used to test dimensions of a model that has been identified using EFA (Pett 2003). In contrast to EFA, the researcher hypothesizes the model (the factors and loadings) *a priori* when using CFA (Kim 1978, Pett 2003).

Principal Component Analysis (PCA)

Principal Component Analysis (PCA) is used to describe data in 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). A researcher can also inspect the eigenvectors to learn more about the underlying structure of the data (Stata 2008). The usefulness of PCA lies in data reduction, especially when a researcher wants to identify as much variance as possible (Preacher 2003).

Researchers differ on whether PCA is a true method of factor analysis (Costello 2005, Harris 2001). "PCA and EFA may seem superficially similar, but they are very different" (Preacher 2003, p. 20). Conceptually and mathematically, PCA and EFA are quite different (Preacher 2003). PCA decomposes the correlation matrix without consideration of the underlying model, and it does not distinguish between common and unique variance, like factor analysis, but focuses on explaining the total variation in the observed variables. In contrast, EFA has an underlying statistical model, which rests on key assumptions, that partitions the total variance into common and unique variances (Dunteman 1989). PCA summarizes data by means of linear combinations of measured data while EFA represents the covariance structure (Kim 1978).

Factor Extraction Procedure

Whether the researcher chooses EFA or PCA, the steps for obtaining dimensions is relatively the same. One considers the following steps when using EFA or PCA: 1) factor extraction method, 2) number of factors to retain, 3) rotation, and 4) appropriate sample size (Costello 2005; Kim 1978; Preacher 2003).

Factor extraction method

When choosing a factor extraction method, the researcher can choose PCA or a plethora of EFA methods, which include: least squares, maximum likelihood, alpha factoring, image analysis, or principal axis factoring (Costello 2005; Kim 1978). Information on the strengths or weaknesses of the aforementioned EFA methods is scarce and there are no standardized names for several of the techniques (Costello 2005).

Factors to retain

The number of factors to retain in the analysis is subjective (Preacher 2003). There are several techniques that can be used to retain factors. The first two mentioned are the more widely used. This preference may be because most statistical software packages do not contain other methods or default to the techniques most used (Costello 2005).

The most popular choice is the Kaiser criterion, which is also called the "greater-than-one" method (Kim 1978). When the Kaiser criterion is implemented, components with eigenvalues less than 1.0 are dropped (Dunteman 1989). Some researchers have found the Kaiser criterion to be problematic since it arbitrarily cuts off data that is less than 1.0 (Preacher 2003), and some go so far to say it is the least accurate method in determining what factors to retain (Costello 2005).

A second choice for retaining factors is the scree plot. When using this method, a scatter plot of eigenvalues is plotted against their ranks in magnitude (Preacher 2003). The researcher then examines a plot of eigenvalues and looks for the natural bend or break. When the break is identified, the data points above it are retained. Although some favor this method over the Kaiser criterion, it is viewed as a subjective test (Costello

2005, Dunteman 1989, Kim 1978, Preacher 2003). In contrast to the subjective scree test, a more objective version is the Cattell-Nelson-Gorsuch (CNG) scree test. This method compares simple regression slopes for a cluster of eigenvalues (Preacher 2003).

A fourth method is parallel analysis. This technique compares a scree plot, based on the reduced correlation matrix, to one derived from random data. At the point where the two plots cross, the number of eigenvalues on the original scree plot above the intersection are retained (Costello 2005; Preacher 2003).

Methods of rotation

Rotation is used to simplify and clarify the data structure (Costello 2005). There are two basic types of rotation: orthogonal and oblique. Orthogonal rotation restricts the factors to be uncorrelated; whereas oblique rotation allows correlated factors (Costello 2005; Kim 1978, Preacher 2003). Typically, researchers choose orthogonal rotation, but depending on their goal, they may choose to use oblique.

Sample size

To make certain that the factor structure and individual items are valid, the researcher should ensure they have a proper subject-to-item ratio. The general rule-of-thumb is 10:1 (subjects to items). Although there is no consensus on the proper sample size, it is suggested that 20:1 improves the validity of the factor structures—the larger the sample the better (Costello 2005).

Logistic Regression

Regression analysis is a statistical tool that provides much explanatory power (Aldrich and Nelson 1984). Many times, when the researcher chooses to run a

regression, he/she may choose to use ordinary least squares (OLS). Aldrich and Nelson (1984) state that OLS models are popular because they are mathematically simpler than logistic models. “The point of logistic analysis is to measure the relationship between the exogenous variables and the dependent variable” (Aldrich and Nelson 1984, p. 54). In logistic regression, the outcome variable is binary or dichotomous, which is the distinguishing factor from linear regression model (Hosmer and Lemeshow 2000). The name logit was derived from the natural logarithm of the odds. The natural logarithm of the odds is the probability of falling into two categories for some variable of interest (Demaris 1992).

Logistic parameters are estimated by maximum likelihood estimation (MLE). Conceptually, the difference between OLS and MLE is, OLS picks parameter estimates that yield the smallest sum of squares errors in the fit between the model and the data while MLE picks parameter estimates that imply the highest likelihood of having obtained the observed sample. (Aldrich and Nelson 1984). One reason for the popularity of MLE is the asymptotic properties (Demaris 1992). The logistic function is continuous and can take on any value from 0 to 1, which is unlike OLS, where values must be 0 or 1 (Aldrich and Nelson 1984).

If the model is incorrectly specified, the statistical properties derived do not provide meaningful estimates. “Incorrect model specification leads to the wrong answer” (Aldrich and Nelson 1984, p. 31). In order to avoid specification error, one should ensure the following two criteria are met: 1) functional form of model is correct and 2) the model includes all relevant independent variables and no irrelevant independent variables (Menard 1995).

The logistic regression makes several assumptions (Aldrich and Nelson 1984, Demaris 1992). First, the dependent variable is assumed to be binary (0 or 1) and outcomes are assumed to be mutually exclusive. Second, the exogenous variables are assumed to account for variation in the dependent variable and the endogenous variables are statistically independent. Third, there are no exact linear dependencies that exist among the explanatory variables and individual observations are assumed to be independent from one another. Fourth, the predictors are not continuous; that is they are assumed to have a small, finite number of levels and the predictors are fixed by design or are treated as fixed. Fifth and final, the sample size is assumed to be "large." The predictive power of the logistic regression becomes better as the sample size increases, largely due to the asymptotic properties of MLE. How large should the sample be? Aldrich and Nelson (1984) suggest a rule of thumb of 50 cases per parameter while Demaris (1992) suggests 15 cases per predictor are needed to be reliable.

As with any regression analysis, logistic regression has a few indicators of model appropriateness. The likelihood ratio test and G^2 are used in testing the model's goodness-of-fit. Individual z-tests, or the Wald statistic, test the significance of individual independent variables. A pseudo R^2 statistic summarizes the strength of the relationship (Aldrich and Nelson 1984). Demaris (1992) notes that it is possible for a model to have goodness of fit but no predictive power. Logit regression used likelihood-ratio Chi-squared test statistic to test the null hypothesis (Demaris 1992). The t-statistic is used to test whether an independent variable's coefficient has no effect on the dependent variable (Aldrich and Nelson 1984).

Logit modeling is not limited to binary dependent variables. When one has more than two category pairs, multinomial logistic regression can be used (Demaris 1992). In principle, the same assumptions and methods that were discussed previously, with regard to the binary logit model, apply to the multinomial model with the exception that one exogenous variable is constrained to 1 (Hosmer and Lemeshow 2000). This constraint allows for the estimation of the intercept (Aldrich and Nelson 1984).

A goal of this study is to model the odds of PCA group choice as a function of the covariates and express the results in terms of odds ratios for choice of different PCA Groups (Hosmer and Lemeshow 2000). The multinomial model equation is the following (Greene 2000):

$$\text{Prob}(Y_i = j) = \frac{e^{\beta_j' x_i}}{\sum_{k=0}^{4} e^{\beta_k' x_i}}, j = 0, 1,...,4.$$

The probability that respondent *i* is categorized into PCA group *j* is a function of his/her personal attributes *x*, and *β* represent the parameters to be estimated.

Hypothesized Model

In order to explain which customer characteristics influence what they deem as the most important service quality of a retail cooperative store, the following model was hypothesized:

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

The following is a discussion of the variables and their hypothesized outcomes.

PCA Group. It is hypothesized that principal component analysis will yield five groups and these groups will be the same, or similar, as the dimensions of RSQS (physical aspects, reliability, personal interactions, problem solving, and policies). To order to obtain this variable, PCA with orthogonal rotation was used and the Kaiser criterion was used to retain the factors.

Age. As a person grows older, it is assumed they will prefer more personal interaction. 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, it is assumed 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. It is assumed that those with a minimum of a college degrees, 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. It is also assumed they will most likely use a credit or debit card.

Acres of land leased. It is assumed that hunters are most likely to 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. It is assumed 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.* It is assumed that as the acres of land farmed and percentage of household income from farming rises, the more likely this customer segment is engaged 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.

IV. RESULTS

Descriptive Statistics

A total of 301 surveys were collected out of the 5,000 mailed. Of those 276, were deemed usable which equates to a usable response rate of 5.52%. Of the 276 surveyed, 92.75% considered themselves white. The youngest respondent was 25 and the oldest was 87. Of the respondents, 85.5% were male. The median age of men was 60 while the median female age was 55. With regard to education, 34% stated they had either a college or advanced degree, while 38.76% had "some college" and 26% had either a high school education or less.

With regard to household composition, 85.87% were married and 68.8% had two or less living in the home. About two-thirds of the households had income greater than $50,000 per year. About 16% of the respondents had more than 61% of their household income from farming. Almost three-fourths of the respondents state farm income was less than 20% of their household income.

Principal Component Analysis (PCA) Groups

PCA with orthogonal rotation was used to summarize the actual experience Likert questions from the instrument (see Appendix A). To determine the factors to retain, the Kaiser criterion (Table 1) and the scree plot (Figure 4) were employed, and both methods pointed to three groups to be retained.

The three groups that emerged (Table 1) are named PCA Group 0 (Customer Service and Personal Interaction), PCA Group 1 (Appearance and Accessibility) and PCA Group 2 (Policies and Reliability). The items, from the instrument, that are in PCA Group 0 are 7-8 and 10-24. These items best represent customer service and personal interaction that a customer perceives receiving from employees of the store. PCA Group 1 includes items 1-6 and 25. Of these items, they best describe the appearance and accessibility of the store. PCA Group 2 is composed of items 9 and 26-29 which describe the policies and reliability of the store.

Table 1: Eigenvalues and PCA Groups

Item	Comp1	Comp2	Comp3	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

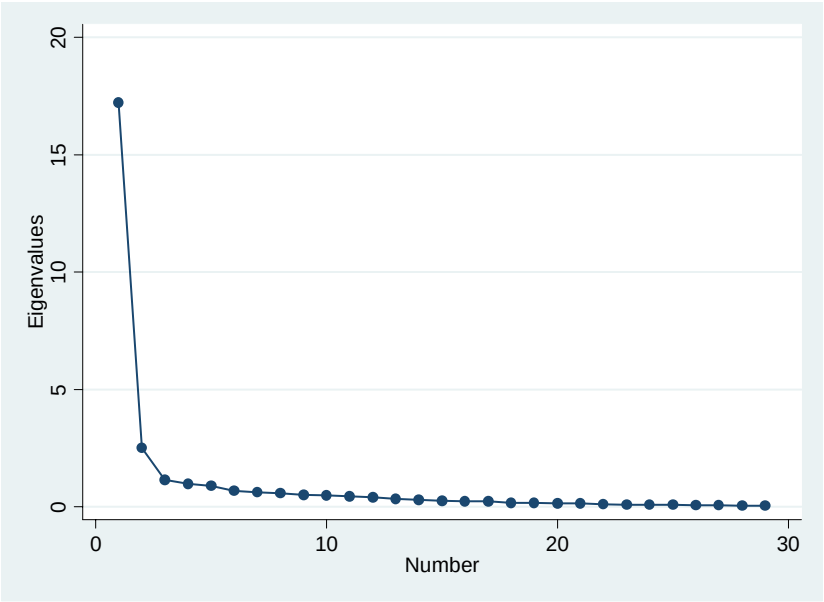

Figure 4: Scree Plot of eigenvalues after PCA

Scale Reliability

The reliability of the instrument was evaluated using internal consistency. To compute correlation values among the questions on the instruments, Cronbach's Alpha was employed. The closer the alpha is to one, the higher the reliability estimate of the instrument. Only one dimension of RSQS (Table 2) and one group of PCA groups (Table 3) have less that a 0.90 alpha. This reflects excellent reliability of the scale.

Table 2: Alpha's of "RSQS" scale

Item Numbers	RSQS Dimension	alpha
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

Table 3: PCA Alpha

Item Numbers	PCA Group	Group Name	alpha
7-8, 10-24	0	Customer Service and Personal Interaction	0.9833
1-6, 25	1	Appearance and Accessibility	0.9285
9, 26-29	2	Policies and Reliability	0.8191

Descriptive Statistic for PCA Groups

There were 195 respondents who were classed into one of the three PCA groups. The following is a brief overview of the characteristic of the PCA groups.

Customer Service and Personal Interaction. A total of 109 respondents fell into this group with 20 being female. Those respondents, who stated that they shopped at a given cooperative store as a farmer, represented 45.9% of this group. Hunters had the highest median income, which was $100,000, and homeowners had the lowest median income of $50,000.

Appearance and Accessibility. A total of 46 respondents fell into this group with five being female. The group with the youngest median age, 49.5, was hobby farmers. Farmers had the largest median income of $75,000 and hunters leased an average of 591 acres.

Policies and Reliability. A total of 40 respondents composed this category with three being female. Hunters leased, on average, 705 acres while farmers leased 40 acres in comparison to hobby farmers leasing 158 acres. Homeowners were the youngest with a median age of 50 compared to the hunters who were the oldest with a median age of 63.

In all three groups, hunters leased the most acres of land. Respondents reporting that they are farmers had the highest percentage of household income coming from farming. Self-reported farmers were also the most represented group.

Multinomial Logistic Regression

After estimating the hypothesized multinomial logit model, it was judged that heteroskedasticity may exist because the χ^2 test rejected the null hypothesis that all the variables where statistically insignificant and each individual t-test failed reject the null

hypothesis that the variable was different than zero. Therefore, the error terms were plotted against each stores' profit (see Figure 5). After determining that heteroskedasticity was affecting the results, the model was run again allowing intergroup correlation clustering by each store.

After estimating the initial hypothesized model a second time and correcting for heteroskedasticity, the marginal effects for each group were reviewed (see Tables 7 & 8 in Appendix C). It was 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, it was concluded that there was a missing variable problem, which would created biased and inconsistent results.

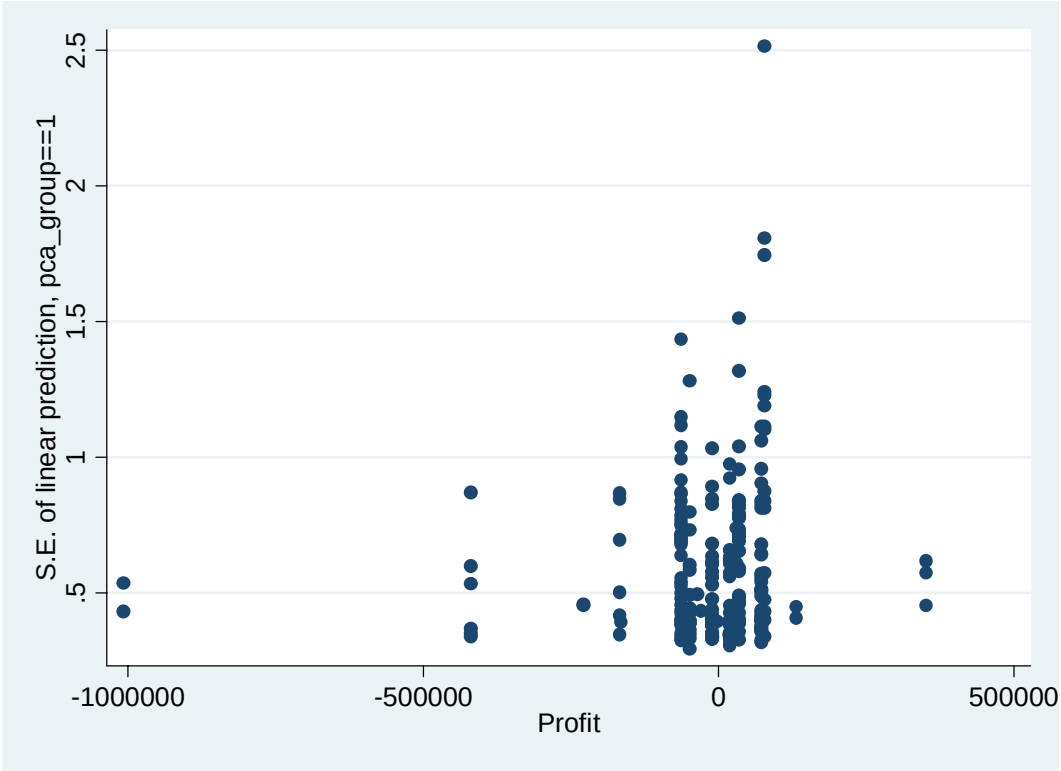

Figure 5: Heteroskedasticity

The potential missing variables were the variables that explained the activities of those respondents that called themselves homeowners and wildlife enthusiasts. Dummy variables were created from question 20 in the socioeconomic section of the instrument. Respondents were asked when shopping at a particular co-op store, what best described them: production agriculturalist (farmer), hobby farmer, homeowner, or wildlife enthusiast (hunter, fisher, etc.). From the preliminary modeling and additional testing, it was hypothesized that age and income have quadratic effects on the choice of PCA Groups. Thus, age and income squared were also included 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).

Table 9 (Appendix D) provides variable descriptions. The results of the multinomial logistic regression model are given in Table 4. Since the coefficients of the multinomial logistic model cannot be interpreted directly. The results of such models are better interpreted by viewing the relative risk ratio (RRR) and marginal effects from the logistic model. A discussion of these results follows.

Relative Risk Ratio

The relative risk ratio (RRR) provides a factor that indicates the probability of a respondent falling into the comparisons or referent group. The results of the RRR are in Table 5. The following is a brief discussion each group.

Appearance and Accessibility. Respondents with a bachelor's (or greater) were more likely to choose appearance, over customer service, by a factor of 1.73. That is, as a respondent acquires high education their preference for a clean and accessible store increases relative to customer service. As a person leases more acres, they are also more likely to choose appearance over customer service. As the percentage of household income from farming increases, a respondent is more likely to choose appearance over customer service. The reason a farmer might be concerned with appearance and accessibility may be due to parking since they may have a trailer and need a larger area to park. A wildlife enthusiast will choose appearance over customer service by a factor of 2.23. It is logical to think wildlife enthusiasts are working professionals. Thus, they need to be able to quickly and easily shop the store to get back to work. Homeowners, by a factor of 0.39, are less likely to choose appearance over customer service. Homeowners may need more assistance with product usage, thus it makes sense this segment would choose customer service and personal interaction over appearance.

Policies and Reliability. As a person's age increases, they are more likely to choose polices over customer service by a factor of 1.41. However, this likelihood diminishes over time. Older customers may be concerned about a patronage rebate and wanting services preformed correctly the first time; thus, it is expected to see older customers chose policies. Wildlife enthusiasts are more likely to choose policies over customer service by a factor of 4.42. In this study, wildlife enthusiasts had larger median household incomes than most other groups; thus, they are most likely professionals. Professionals would be concerned with the operating hours of the store so they could

shop after work or on weekends. Also, professionals might also be more likely to carry credit cards.

Table 4: Multinomial Logistic Regression Results

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

Table 5: Relative Risk Ratio

Variables	Appearance and Accessibility	Policies and Reliability
Age	1.21 (0.18)	1.41*** (0.178)
Age squared	0.99 (0.0014)	0.99*** (0.0011)
Total Household Income	1.0054 (0.013)	1.0068 (0.016)
Total Household Income squared	0.99 (0.000067)	0.99 (0.000065)
College Education	1.73* (0.5)	1.15 (0.41)
Acres Leased	1.00** (0.00044)	1.00041 (0.00044)
Acres Farmed	0.99 (0.0005)	0.99 (0.00058)
Percent of household income from farming	1.01* (0.0051)	1.0055 (0.008)
Wildlife Enthusiast	2.24* (0.96)	4.42** (2.86)
Homeowner	0.39*** (0.12)	0.34 (0.29)

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

Marginal Effects

Marginal effects clarify the relationship between the multinomial logit parameter estimates and their associated effects. Marginal effects allow the researcher to effectively interpret the impact of explanatory variables on the dependent variables. In order to obtain marginal effects, parameter estimates are transformed (Anderson and Newell 2003). A positive sign of marginal effects indicates a greater likelihood of a consumer

choosing the PCA Group. The results for marginal effects can be seen in Table 6. A discussion of each groups characteristics follow.

Customer Service and Personal Interaction. If the customer shops at the cooperative store as a homeowner, the likelihood that customer service and personal interaction will be chosen will increase by 22%. As stated previously, homeowners may seek advice on product usage. Thu, homeowners give greater value to knowledgeable employees. As a customer's age increases, they are 6.3% less likely to choose customer service, at a decreasing rate because the income squared is negative. As a customer leases more acres of land, they are less likely to choose customer service. When the customer shops at the cooperative store as a wildlife enthusiast, the likelihood of choosing customer service falls by 28%. In this study, wildlife enthusiasts leased the most land; therefore, it is logical that both variables (acres leased and wildlife enthusiast) would indicate the same preference.

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 establishment; thus, they may be accustomed to clean and organized storefront. 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 personnel interaction so it is reasonable to conclude appearance is not as important.

Policies and Reliability. As a person's age increases, they are 4.5% more likely to choose polices, at a decreasing rate. Patronage rebates and the desire to have services preformed correctly the may be a reason older customers have a preference for policies and reliability. Wildlife enthusiasts are 24% more likely to choose policies. Wildlife enthusiasts are assumed to be career professionals and thus would be concerned about operating hours so they can purchase products and services after work or on weekends.

Suggested Management Strategies

With the employment of PCA, three groups were indentified. The RRR and marginal effects of the model gave insight into the characteristic of respondents falling into a particular group. The following is a discussion of items that a cooperative manager can consider when attempting to meet the needs of a particular customer base.

Customer Service and Personal Interaction. A local cooperative store, which has a large base of homeowners as customers, should concentrate on the customer service and personal interaction they give when this customer segment patronizes the store. The following are areas that should be considered.

Patrons who desire customer service will typically prefer high quality merchandise and it should be available when they enter the store. From a manager's point of view high quality merchandise is more expensive and in order to have the product, when demanded, inventory levels must be kept higher which can tie up resources that could be used elsewhere. Nevertheless, a balance between cost and availability should be sought.

Table 6: Marginal Effects

Variable	Customer Service and Personnel 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

Homeowners should feel they are given individual attention and, when a problem arises, they want to know the store and its employees have a sincere interest in solving it. Customers also want to feel safe in their transactions with the store. Employees should be courteous and able to answer customers' questions at the store and over the phone. The behavior of employees should be professional at all times by giving prompt service,

explaining exactly when services will be performed, making time for customers' requests, and having the ability to handle customer complaints directly and immediately. To meet the needs previously mentioned, management should ensure employees receive training when first hired and as they progress in their career. Training should focus on product knowledge, customer service, problem solving, and conflict resolution.

Finally, the store should ensure they follow through with their commitments, provide hassle-free returns and exchanges, and ensure that sales transactions are error-free. In meeting these needs, a manager should consider posting return and exchange policies and ensure all employees are knowledgeable with the point-of-sale system.

Appearance and Accessibility. Customers, who more likely to deem appearance and accessibility as important for them are those with college degrees, receiving most of the household income from farming and wildlife enthusiasts. To better meet the interest of these customers, the store should be clean, attractive, and convenient. This includes, but not limited to, areas such as showrooms, restrooms, fitting rooms, outside displays and the warehouse. Management should develop housekeeping policies and ensure that employees follow them.

Customers also want the store's physical appearance to be visually appealing. To meet this, the equipment and fixtures should be modern and the layout of the store should facilitate flow and access to the items they want. Items such as shopping bags, catalogs and/or statements should be visually appealing. Convenient parking should also be provided. In order to meet these areas, management should have a merchandising professional assist with fixture layout, product placement, and displays. Also, parking

lots should allow for easy access on and off the road as well as an area for those customers with large vehicles or trailers.

Policies and Reliability. Wildlife enthusiasts and older patrons are more likely to view the stores policies and reliability as an important factor of service quality. In order to meet these expectations, management should ensure that services are preformed "right the first time". The store should have convenient operating hours for all customers, especially for the above mentioned patrons. The store should accept most major credit cards and offer financing options. Member-patrons of this group, most likely the older customers, expect patronage returned to be adequate.

V. CONCLUSION

Farm supply cooperatives provide 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 ceased 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 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 better serve 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.

Since the RSQS scale-items and PCA Groups were found to have excellent internal consistency, management now has a mechanism which can allow them to regularly assess their progress toward meeting the service quality desires of their member-patrons, as well as new clientele. This scale should be further developed and refined to meet the unique needs and characteristics of each local cooperative.

The employment of principal component analysis determined there were three service quality groups (Customer Service & Personal Interaction, Appearance & Accessibility, and Policies & Reliability) that particular customer segments deem valuable. If, and when, a future study is conducted, it may be found that more groups emerge—especially if the response numbers are higher.

The relative risk ratio and marginal effect of the multinomial logit model illuminated the characteristics of customers who belong to a given service quality grouping. 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.

Local cooperative managers now have three customer segments to consider when seeking too improve service quality. Homeowners' service quality preferences are customer service and personal interaction. They prefer high quality merchandise that is available when demanded and error-free transactions, such as sales, returns, and exchanges. Homeowners desire individual attention from employees who are courteous, professional, prompt, and knowledgeable. Customers with higher education, production agriculturalists and wildlife enthusiasts prefer stores that are clean, accessible, and convenient. 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.

If this study were to be implemented again, the use SERVQAUL's "gap" method would be dropped to alleviate confusion among respondents. This change would also shorten the survey instrument which might also boost the response rate. Additionally, it would be appropriate to more closely follow the Tailored Design Method (TDM) to improve response rate (Dillman 2007). TDM was followed only partially due to budget constraints. Future research will seek to increases response rate.

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.

The RSQS scale has been used by researchers in different cultural settings. Such studies have concluded the scale could not be viewed as a reliable and valid measure for cross-cultural comparisons (Gaur and Agrawal 2006). Since it seems RSQS does perform poorly in cross-cultural comparisons, could there be a difference in measuring "rural" consumers to "urban" consumers? Additionally, does the frequency at which a customer visits a retailer affect RSQS results? That is, since a "traditional" co-op customer may only visit in the spring to purchase inputs for row-crop operations and the survey is administered in the fall—how does the administrator get an accurate view of the service quality provide? Also, since a co-op could be seen as both "wholesale" by traditional customers and "retail" to the progressive customers—must an instrument be all encompassing or should two separate scales be employed?

Additional discussion could be given to future and suggested research. The aim of this study was to provide suggestions to management of local farm supply cooperatives

which can assist them in meeting the service quality needs of their customer base. Management now has 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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APPENDICES

Appendix A: Instrument

DIRECTIONS: We are interested in your ***realistic expectations*** about retail stores, such as farm supply, feed, lawn and garden, etc. Please show the extent to which you think these stores should possess 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, which begins "I realistically expect that…" Please be sure to read each statement carefully.

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

1. What is the name and city of the AFC Member Co-operative store that you patronize the most?

   _____AFC Member Co-op _____, AL

2. How many miles is this co-op store from your home? _____ miles

3. How many months ago did you last visit this co-op store? _____ months

4. How many months ago did you purchase a good or service from this co-op store? _____ months

5. Which of these product offerings cause you to shop at this co-op store rather than a competitor? **Check one.**

___Apparel	___Equine Health/Tack	___Pet
___Animal Health	___Farm Hardware	___Seed
___Crop Nutrients	___Feed	___Sporting Goods
___Crop Protectants	___Lawn & Garden	___TBA (Tires, batteries, etc.)
	___Outdoor Power Equipment	

6. In which department do you **spend** the greatest amount of money in a typical year? **Check one.**

___Apparel	___Equine Health/Tack	___Pet
___Animal Health	___Farm Hardware	___Seed
___Crop Nutrients	___Feed	___Sporting Goods
___Crop Protectants	___Lawn & Garden	___TBA (Tires, batteries, etc.)
	___Outdoor Power Equipment	

7. For the products in the department that you spend the greatest amount of money in a typical year, what is the most important factor in your choice to purchase these products from this co-op store? **Check one**.

___Convenience	___Location	___Quality
___Customer Service	___Price	___Variety

8. For the same products, if you do not purchase them from this co-op store, where are you most likely to purchase these products?

___ National Chain (e.g. Wal*Mart, Lowe's, etc.)	___ Internet
___Local Business	___Other _____

9. Which service, offered by this co-op store, is **most important** to you? **Check one.**

___Bulk Fertilizer Spreading	___Fertilizer Buggy Rentals	___Wildlife Plots
___Delivery	___Liquid Application	___Other_____
___Equipment Rental	___Small Engine Repair	___None of these

10. Which service do you **spend** the greatest amount of money in a typical year? **Check one.**

___Bulk Fertilizer Spreading	___Fertilizer Buggy Rentals	___Wildlife Plots
___Delivery	___Liquid Application	___Other_____
___Equipment Rental	___Small Engine Repair	___None of these

11. Which of the following characteristics is most important to you with regard to this co-op or similar stores? **Check one.**

___Physical aspects: The appearance and convenience of the store are appealing.
___Reliability: The store upholds their promises and does things correctly.
___Personal interaction: Employees are courteous and helpful.
___Problem solving: The store shows interest in helping the customer. The store handles customer complaints directly and immediately.
___Policies: The store carries quality merchandise, provides convenient parking, has convenient operating hours, and accepts different methods of payment.

12. In what year were you born? 19____

13. What level of formal education have you completed? **Check one.**

___Less than high school ___Some college or technical school ___Completed a
___High school graduate ___Completed a 4-yr college degree graduate degree

14. What is your total household income? **Check one.**

___Under $10,000 ___$50,000-$74,999
___$10,000-$19,999 ___$75,000-$99,999
___$20,000-$29,999 ___$100,000-$159,000
___$30,000-$39,999 ___$160,000-$249,000
___$40,000-$49,999 ___Over $250,000

15. What do you consider your race/ethnicity to be? **Check one.**

___African/ African American ___Hispanic/ Hispanic American
___Asian/ Asian American ___Native American
___Caucasian ___Other: _____

16. What is your gender? **Check one.**

___Male ___Female

17. Counting yourself, how many people are in each age category in your household?

___ 0-17 ___ 31-40 ___ 51-60 ___ Over 70
___ 18-30 ___ 41-50 ___ 61-70

18. Which best describes you? **Check one.**

___Single, never married ___Widowed ___Divorced
___Married ___Separated ___Domestic partnership

19. What is your primary occupation? _____

(Please select a category below that best identifies your primary occupation)

___Student ___Industry ___Government
___Unemployed ___Retired ___Artistic
___Legal Professional ___Technology ___Engineer
___Scientist/Researcher ___Self-employed ___Management/Business
___Teacher/Educator ___Service Industry ___Homemaker

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

What comments or questions, if any, do you have about this co-op store? *These comments will be typed and sent to this co-op store manager. No identifying information or other individual survey responses will be sent with your comments.*

The information collected in this survey will be handled by university personal (faculty, staff or students). All information will be kept confidential. If the data is published, no individual data will be used and the information will be discussed in averages and percentages so an individual's responses cannot be identified.

Please return **only the completed survey** in the self-address, postage paid envelops. If you have questions or concerns please feel free to contact us at either address below:

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Appendix B: Follow-Up Post Card

DEAR SIR OR MADAM,

Recently, you should have received a survey from Auburn University. If you have completed the survey, thank you for your assistance. Your response is a valuable contribution to the research of Auburn University, as we work to understand better rural retailers.

If you have not completed the survey, we encourage you to do so. Your experiences and comments will help us help rural retailers better serve you. We can provide you another survey if you need a new one. For the most efficient way, please send us an e-mail, and we will send you an electronic version of the survey. For any questions that you have, please feel free to contact us.

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Once again, thank you for your assistance.

Norbert

Appendix C: Results of Initial Hypothesized Model after Heteroskedasticity Correction

Table 7: Multinomial Logistic Results of Initial Hypothesized Model after Heteroskedasticity Correction

Variables	Appearance and Accessibility	Policies and Reliability
Age	0.0052 (0.016)	0.0041 (0.017)
Total Household Income	-0.0077* (0.004)	0.0039 (0.0049)
College Education	0.62** (0.31)	0.24 (0.34)
Acres Leased	0.00063* (0.00033)	0.00046 (0.00049)
Acres Farmed	-0.000014 (0.00052)	-0.00062 (0.00072)
Percent of household income from farming	0.0083* (0.0047)	0.0027 (0.0079)
Constant	-1.122 (1.00)	-1.68 (0.88)
Number of observations	187	
Wald chi2(20)	181.67	
Prob > chi2	0.00	
Pseudo R2	0.030	
Log pseudolikelihood	-178.39	

Table 8: Marginal Effects of Initial Hypothesized Model after Heteroskedasticity Correction

Variables	Customer Service	Physical Appearance	Policies
Age	-0.0011 (0.0033)	0.00072 (0.00237)	0.00042 (0.00241)
Total Household Income	0.00053 (0.00092)	-0.0015** (0.00063)	0.00097 (0.00079)
College Education	-0.11* (0.060)	0.10* (0.05624)	0.0083 (0.05408)
Acres Leased	-0.00013 (0.00009)	0.000089** (0.00004)	0.000046 (0.00007)
Acres Farmed	0.000074 (0.00014)	0.000025 (0.00007)	-0.000099 (0.0001)
Percent of household income from farming	-0.0014 (0.0013)	0.0013* (0.00077)	0.000065 (0.00121)

Appendix D: Variable Descriptions

Table 9: 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	73.03	49.09	0	250
Total Household Income squared	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