Understanding How Farmers Evaluate and Value Services

Michael Gunderson
Ph.D. Candidate
Department of Agricultural Economics
Purdue University

Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Long Beach, California, July 23-26, 2006

Service: The New Differentiator

Researchers in marketing have suggested that the only way to differentiate oneself in a fiercely competitive marketplace is to provide superior service (Parasuraman, Zeithaml, and Berry 1988; Cohen and Whang 1997). In agriculture this might mean providing customer spraying of herbicides and insecticides in the spring during planting; repairing a combine in the field in the autumn during harvest; assisting a farmer with financial recordkeeping and monitoring throughout the year; or simply managing the inventory of hay for a dairy producer. What exactly is service though? And which services are truly demanded in the agricultural inputs marketplace?

Defining Service and Measuring Service Quality

As early as the 1960s the marketing literature recognized that providing services is very different from providing physical goods. Judd (1964) characterized market services as "a market transaction by an enterprise or entrepreneur where the object of the market transaction is other than the transfer of ownership (and title, if any) of a tangible commodity." He himself admitted that his definition is more about what service is not rather than what service is.

Today the American Marketing Association (AMA) (2006) defines services as "products that are intangible or at least substantially so." Services tend to be exchanged directly from producer to user and are almost immediately perishable, which eliminates the opportunity for transportation or storage. This direct exchange also makes services difficult to identify. Services are often composed of several inseparable, intangible elements. Services also typically require some level of customer participation, especially if the delivery of services is to meet the customer's desires. Frequently products are partly tangible and partly intangible; AMA suggests using the dominant form to classify them as either goods or services.

Simply delivering service will not be sufficient, however, to create, provide, and capture value. Though intangible, services should be evaluated to improve the value created for customers just as products have been. Marketing researchers have begun conceptualizing and measuring service quality, though there is some disagreement about what is the relevant conceptualization (Brady and Cronin 2001). Recent efforts have focused on integrating the differing conceptualizations rather than competing for one 'correct' conceptualization. A hierarchical approach has emerged that is grounded in theory and supported by empirical results.

Most industries offer services either ala carte or as part of a bundle of products and services. Because so many industries can benefit from evaluating service, many published and unpublished studies have empirically evaluated the theoretical underpinnings set forth in the marketing literature (Buttle 1996). Those industries whose evaluations have been published include tire retailing, dental services, hotels, travel and tourism, car servicing, business schools, higher education, hospitality, business-to-business channel partners, accounting firms, architectural services, recreational services, hospitals, airline catering, banking, apparel retailing, and local government. There appears to be no published evaluation of services in the agribusiness industries, despite agribusinesses offering many services to their customers. This naturally leads one to inquire if farmers are unique in their evaluation of services.

Delivering Services to Agricultural Producers

Rapid consolidation in production agriculture makes this a particular opportune time for input suppliers to evaluate their decision to provide service (Boehlje, Doehring, and Sonka 2005). As farm numbers become smaller and farm acreage becomes larger, purchase decisions will become concentrated among buyers. Providing only the service and support that the producers of the

future truly desire will fatten revenues, cut costs, and ultimately enhance profitability for the input supplier.

When considering production agriculture, service can be a difficult part of the relationship with farmers because it often adds value that might be difficult for suppliers to capture. The novelty in agriculture is that production is dominated by relatively smaller, family-owned-and-operated enterprises. Also of interest in agriculture is the rapid consolidation of farms, which might suggest that the relationship the producers has with his suppliers is increasingly more similar to a business-to-business transaction and less similar to a business-to-consumer transaction. This shift would have major implications for the future strategies of agricultural input suppliers, particularly as it relates to the marketing of products and services.

Research suggests that farmers are not homogenous in their assessment of value (Akridge, et al. 2004). Some farmers tend to put a large amount of emphasis on price when making decisions about which products to buy. Other farmers are interested in additional elements of the value bundle rather than simply the lowest price. About 17 percent of commercial producers in the Purdue survey indicated they tend to value service more so than other attributes such as convenience and product performance. It will be the onus of the input supplier to clearly differentiate themselves from competitors and capture the value that they create in so doing.

Agribusinesses engage in each type of the broad areas defined by Judd (1964). Equipment manufacturers lease equipment to farmers (rented goods services), have repair capabilities for equipment that farmers own (owned goods services), and provide training for the use of global position technology (non-goods services). As suggested by the AMA (2006) definition of service, many services are often bundled with the physical good. This is true in

production agriculture as well. For example, at Cargill Animal Nutrition feed salespersons are not referred to as such, rather they are termed Dairy Management Consultants. The Dairy Management Consultant spends a portion of his time evaluating factors of success on the dairy operation that are unrelated to nutrition such as cow comfort, milking equipment, and animal health. Cargill Animal Nutrition provides these services in conjunction with delivering feed ingredients to the operation.

It will be important for agribusinesses to understand the additional revenues and market share garnered from improved service quality. They will also need to be cognizant of the additional costs of marginal improvements in service quality and the impact that this has on firm profits. Thus, it will be important for agribusinesses to assess not only the level of service quality they provide, but if they earn a return on investing in that service quality (Rust, Zahorik, and Keiningham 1995).

So even if agribusinesses know customers' perceptions regarding quality, it is not known if they are willing to pay for these service quality improvements. That is, even if the customer can recognize quality service delivery, it may be of little or no value to them. Willingness-to-pay estimation techniques in economics can be used to reveal the value that farmers place upon various elements of goods and services to help in such an evaluation (Lusk and Hudson 2004).

Delivering the inputs and services desired by farmers most efficiently has the opportunity to enhance the relationship. This can create a cooperative relationship that will improve resource allocation for the input supplier and the farmer. Additionally, there exist opportunities for the agribusiness to redirect resources from activities that generate little value for farmers to activities that would be more beneficial for producers.

Agricultural economists have traditionally sought out theories of other closely related fields such as economics, econometrics, and psychology to test with empirical data. This research is no different in that it draws from the marketing literature to improve the understanding of the relationship the production agriculture firm has with its input suppliers. Furthermore, this research will draw upon these marketing concepts to inform the economics of delivering service. Therefore, using marketing and economic theories and models, the goal of this research is to inform and improve how agricultural input suppliers serve their farming customers and generate profits by doing so.

Problem Statement and Objectives

The problem is that suppliers of agriculture inputs do not accurately know how agricultural producers value the latent elements of service. This might cause agribusiness suppliers to inefficiently deliver services because they are focusing on less important factors. Of interest to agribusinesses will be how farmers determine service quality and the value they associate with marginal improvements in the elements of service quality.

For these reasons, there are three primary objectives of this research:

1. test the applicability of the hierarchical model of service quality in an agribusiness setting,
2. identify the elements of service that are most important to agricultural producers, and
3. discover the trade-off that farmers make between price and marginal improvements in each of the elements of service.

This research will adapt the well-developed SERVQUAL instrument to assess farmers' perceptions of service quality (Parasuraman, Zeithaml, and Berry 1988). The first objective is to

empirically evaluate the hierarchical model of service quality presented in the marketing literature (Brady and Cronin 2001). It has been hypothesized that service quality is determined by three dimensions: Interaction Quality, Physical Environment Quality, and Outcome Quality. Each of these dimensions has three underlying dimensions: Attitude, Behavior, and Expertise; Ambient Conditions, Design, and Social Factors; and Waiting Time, Tangibles, and Valence, respectively. The first testable hypothesis is:

H_1: Agricultural producers assess service quality using three primary dimensions, each with three sub-dimensions.

The second objective is to understand the elements of service that are important to agricultural producers. It is likely that agricultural producers differ in their perception of value for dimensions of service. Thus, the hypothesis related to this objective of understanding the important dimensions of service for farmers is:

H_3: Agricultural producers will evaluate outcome quality as the most important dimension of service quality and physical environment the least important.

There are several applications of the results garnered from this instrument. Very generally agribusinesses will be able to understand the relative importance of the dimensions of service quality and will be able to prioritize resources (e.g., training) on the areas of most importance. Second, agribusinesses will be able to classify customers into segments of perceived service quality based upon a farmer's individual scores. Another application would be for agribusinesses using independent distributors to access the end customer, to compare SERVQUAL scores across distributors to evaluate their relative performance. Finally, the instrument can be designed to elicit scores for several firms, allowing an agribusiness to compare itself to competitors.

The final objective will continue to build upon the results of the SERVQUAL instrument. Now the focus will be quantifying the value that each of these dimensions represent for agricultural producers. That is, how do farmers make trade-offs regarding the marginal improvements in any one dimension with price? This trade-off is important for agribusiness in evaluating the optimal level of each dimension to provide. Therefore, the hypothesis related to this objective is:

H_3: Agricultural producers will value outcome quality the most and physical environment the least.

This element of the research will use experimental economics and econometric techniques to elicit the willingness-to-pay for the dimensions of service quality and associated marginal improvements. This will be valuable to agribusinesses in identifying the potential return on investment for improved service quality. It will illustrate the trade-off between each of the dimensions of service quality and price. This will allow agribusinesses to consider optimal bundling and pricing strategies.

One underlying goal of this research is explain how marketing and economics inform each other as it relates to serving consumers. This should enhance the understanding of the costs and benefits of improving the quality of service offered to farmers. Put another way, it should inform the understanding of the supply of and demand for quality customer service.

The next section reviews the existing literature on service quality and its application in agribusiness. Additionally the literature regarding choice experiments, the self-explicated approach, and willingness-to-pay are assessed as a basis for evaluating the price and service quality trade-off.

Theoretical Models of Service Quality

The study of service delivery and quality is growing as the service sector accounts for a large percentage of the U.S. economy (Lohr 2006). The combination of technology, math, management, and engineering expertise are intersecting to improve the delivery and quality of services. Models used to evaluate products have been adapted to measure and analyze less tangible service offerings. Increasingly business school researchers are conducting research regarding services and as a result are increasing the reliability of service quality models. There remains, however, a plethora of questions to consider (Zeithaml 2000).

Agricultural economists have traditionally sought out theories of other closely related fields such as economics, econometrics, and psychology to test with empirical data. This research is no different in that it draws from the marketing literature to improve the understanding of the relationship the production agriculture firm has with its input suppliers. The marketing literature has developed tools and theories regarding the delivery of service and its quality. In addition, economics (agricultural economics in particular) has developed theories and tools for assessing the value that consumers assign to different products and latent attributes of those products.

The first part of this section is a review of the marketing literature as it relates to measuring perceived service quality, in particular the SERVQUAL instrument. This tool has been applied in several different industries with modifications for each. Next, the review will be concerned with the relation of the SERVQUAL scores with the willingness-to-pay for the dimensions of perceived service quality. There are ubiquitous applications of willingness-to-pay (WTP) estimates in economics (environmental economics in particular) and there have been

applications of WTP as it relates to service delivery in other fields. Finally, the literature related to the bundling of goods and services is considered.

Linking Service Quality and Profits

Increasingly firms are realizing that, like many investments, the additional resources dedicated to improved quality earned diminishing returns. This has caused some to pose the obvious question, how does one begin to measure the return on investment in service quality. Rust, Zahorik, and Keiningham (1995) posit the following four tenets of service quality:

1. Quality is an investment;
2. Quality efforts must be financially accountable;
3. It is possible to spend too much on quality; and
4. Not all quality expenditures are equally valid.

Rust, Zahorik, and Keiningham (1995) also created a model of service quality improvement and profitability (Figure 2.1). The model recognizes that improvements in service influence both customer retention and customer attraction, both of which influence revenues and market shares. The uniqueness of this model is the recognition that firms are not necessarily in the quest for market share, but rather profits. This is the reason for explicitly including 'cost reductions' in the model.

Models of Service Quality

The evaluation of service marketing has only recently gained recognition as a field separate from product marketing (Fisk, Brown, and Bitner 1993). A review of the literature indicates that the first efforts to differentiate service marketing from product marketing occurred in the 1950s and continued through the 1970s. Fisk, Brown, and Bitner suggest that in the early 1980s the service

marketing research pioneers graduated from arguing that product and service marketing are different to laying a foundation for the service marketing literature. This foundation consisted of organized symposia and markedly greater published output, including four articles in the prominent *Journal of Marketing*. Fisk, Brown, and Bitner aver that service marketing literature has entered a period of 'walking erect,' where the volume of published output concerning service marketing continues to flourish with increasing empirical and theoretical rigor.

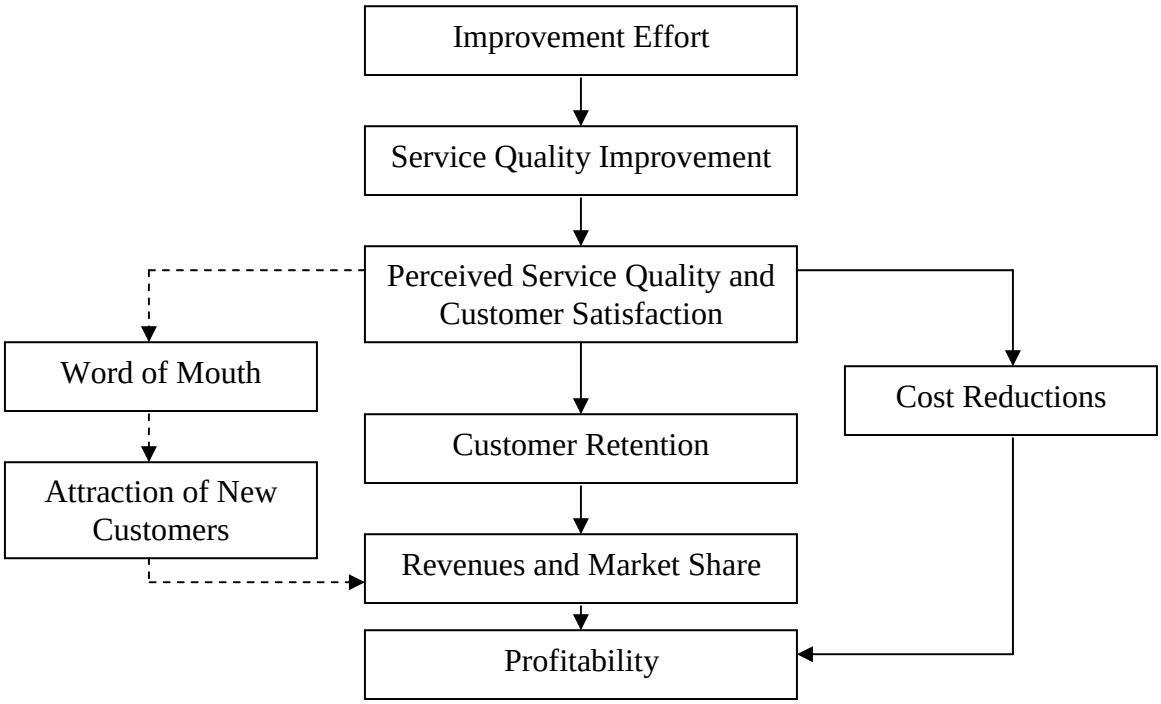

Figure 1 A Model of Service Quality Improvement and Profitability

Researchers considering service quality, which is just one part of service marketing, have generally adopted one of two competing models (Brady and Cronin 2001). There is the Nordic model of service quality, introduced in 1984 by Grönroos, and the American model of service quality, introduced in 1988 by Parasuraman, Zeithaml, and Berry. Each of these models has received considerable attention as marketing researchers and service firms have tried to understand how customers perceive and evaluate services and service quality.

The Nordic Model of Service Quality

The original model of service quality introduce in the literature was introduced by Grönroos (1984). He was concerned that too many researchers were suggesting that service firms would have to develop the quality of services without ever properly defining how service quality is perceived by customers and influenced by managers. As a result he posited a model of service quality that incorporated the disconfirmation paradigm used in the physical goods literature (Brady and Cronin 2001). That is, customers perceived service quality is measured by the difference between expected service and perceived service received.

Grönroos (1984) also introduced the idea of technical and functional aspects of service quality. The technical aspects of service quality are the outcomes of service. The functional aspects are concerned with how the customer gets the technical aspects of service quality. He suggests just as physical products are evaluated based on their technical outcomes, so too are services. Services, however, also will be evaluated on the means that the technical aspects are functionally transferred to the user. Thus, the interactions of the user with the employees and environment in which services are delivered will be just as influential in determining service quality as technical aspects. In fact, Grönroos suggests that functional aspects are more influential assuming that technical quality is on a satisfactory level. No empirical support is lent excepting informal case studies.

The only empirical support lent to this model by Grönroos was a survey of service firm executives from myriad service industries (1984). Respondents to this survey tended to affirm the notion that functional quality is more important than technical quality. In fact, some of the respondents indicated that superior functional quality could potentially compensate for lower overall technical quality. While the results are intriguing, it is peculiar that Grönroos did not test

the model with consumers rather than with executives. The exploratory nature of the study is likely due to this being among very first research to consider a model of service quality.

The absence of a survey for consumers to test their model makes it difficult for one to replicate Grönroos's study, particularly for managers of service firms that he initially was determined to help. This might be why this article was seminal in nature but not nearly was widely cited or tested as the American Model. The American Model does not ignore Grönroos's contribution, but does propose a different structure to their model. The primary contribution of the American Model, however, was the development of a survey for service consumers/customers that would become widely adopted by researchers and service firms.

The American Model of Service Quality

Parasuraman, Zeithaml, and Berry wrote the seminal piece for the American Model of Service Quality in the Journal of Retailing in 1988. Calling their multiple-item scale for measuring service quality SERVQUAL, the instrument has been used and improved by both academics and service firms. This innovation provided managers with the ability to identify weaknesses in service quality and direct efforts to improve them.

Recognizing that businesses were increasingly using service to differentiate themselves, Parasuraman, Zeithaml, and Berry developed the SERVQUAL instrument to measure customers' perceptions of quality. Using 11 steps and responses to 4 surveys with more than 200 participants each, the authors developed a 22 item scale that ultimately represented 5 dimensions of perceived service quality. These five dimensions are: (1) tangibles, (2) reliability, (3) responsiveness, (4) assurance, and (5) empathy.

The first dimension, tangibles, reflects the appearance of equipment and personnel associated with service delivery, e.g., the cleanliness of equipment or the attire of salespersons.

Reliability refers to the ability of the firm to perform the promised service dependably and accurately. Responsiveness reflects the willingness of firms to help their customers in a timely manner. The last two dimensions captured items that representing seven originally hypothesized dimensions. Assurance refers to the knowledge and courtesy of employees and their ability to inspire trust and confidence in customers, while empathy refers to the individualized attention that the firm provides to its customers.

One facet of the SERVQUAL scale that is criticized often is its reliance upon difference scores (van Dyke, Kappelman, and Prybutok 1997). That is, the survey asks respondents to rate their desired level of each dimension and assign their experienced level of each dimension. Then the score is calculated by taking their differences. The developers of the SERVQUAL scale defend this design as superior because it is more informative for managers of businesses who are interested in comparing their service level with other firms or across distribution outlets (Parasuraman, Zeithaml, and Berry 1994). The authors improved on their original model by using a three-column format that asked respondents for their desired and adequate level of service and the level of service they perceived that a particular firm provided. While this three-column approach provided superior diagnostic capabilities, the length remained a concern.

This model of service quality has been tested in several industries, often with inconsistent factor structure results (Brady and Cronin 2001). Despite these shortcomings, the survey is often adapted to particular industries and implemented by firms to evaluate their service offerings. Dabholkar, Thorpe, and Rentz (1996) tested the SERVQUAL scale for retail stores and found the results to be unsatisfactory. As a result they reevaluated the literature and proposed a unique hierarchical structure that Brady and Cronin (2001) would borrow in an attempt to create a general service quality model structure.

A Hierarchical Model of Service Quality

More recently Brady and Cronin (2001) tried to unite the competing, though not mutually exclusive, Nordic and American Models of service quality structure. In their research they discuss the nature of the two models' similarities and differences. They arrive at the conclusion that the models are not competing, but rather are compatible and able to be placed into a single, hierarchical model similar to the one developed by Dabholkar, Thorpe, and Rentz (1996).

Figure 2.2 illustrates the hierarchical model proposed by Brady and Cronin. It consists of three dimensions of service quality (interaction quality, physical environment quality, and outcome quality) each with three sub-dimensions of their own. This portion of the hierarchical model is consistent with the Nordic Model and refinements of that model made by Rust and Oliver (1994). Brady and Cronin then incorporate the dimensions identified in the SERVQUAL scale (reliability, responsiveness, and empathy) as modifiers of the nine sub-dimensions.

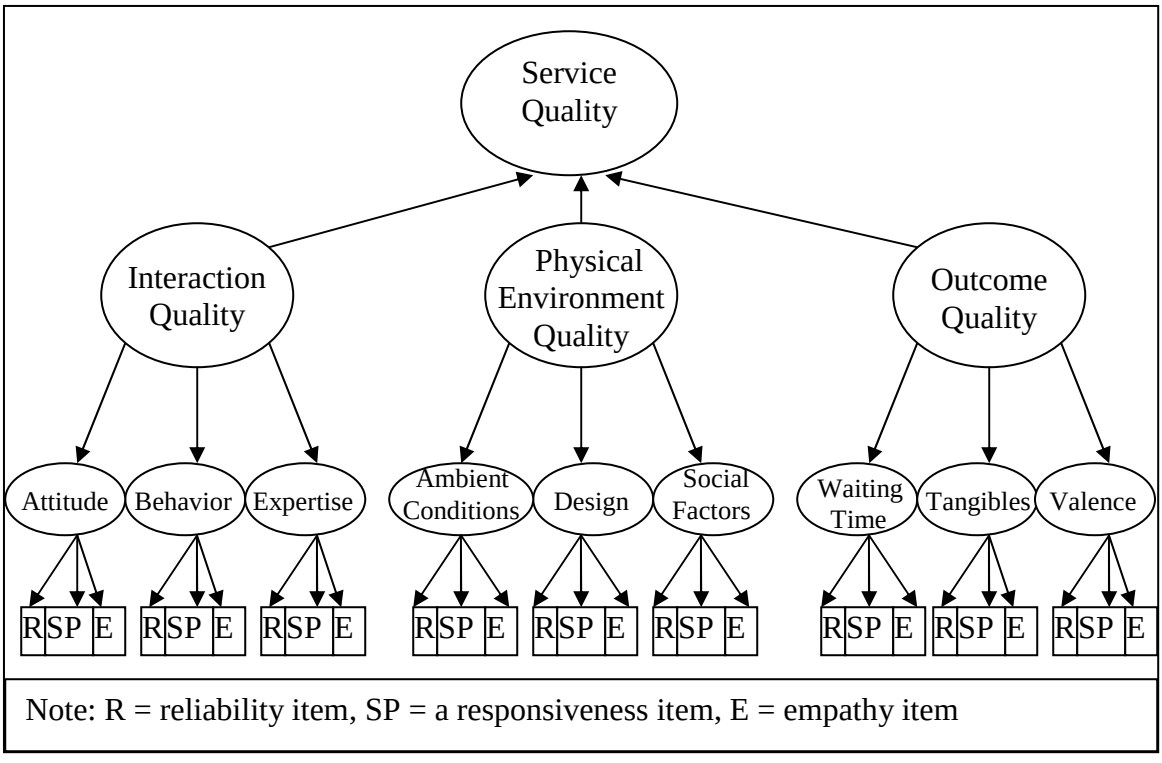

Figure 2 Hierarchical Model of Service Quality Structure

Consider first the interaction quality dimension of service quality. Interaction quality primarily deals with the experience a customer has with the individuals (i.e. employees) actually providing services for a firm. For example, are the firm's employees friendly, helpful, and knowledgeable? In fact, Shostack (1977) suggests that, "In many fields, a person is perceived to *be* the service." Interaction quality's three sub-dimensions are attitude, behavior, and expertise. Attitude refers to the personality of a service employee, e.g. are they courteous (rude), friendly (snobby), optimistic (pessimistic), etc. Behavior refers to the actions taken by a service employee to deliver service, e.g. are they helpful, patient, prompt, etc. Finally, expertise refers to the set of knowledge and skills the service employee has to offer a customer, e.g. do they know several solutions to a customer's problem, do they conduct the service delivery efficiently, are they able to answer customer's queries.

The physical environment quality dimension of service is divided into three sub-dimensions: ambient conditions, design, and social factors. It is primarily concerned with the physical and social setting in which the service firm operates. Ambient conditions refer to the appearance of the buildings and grounds from which a service firm conducts business, e.g. is the base of operations well-lit, clean, welcoming, etc. Closely related is the design of the interior of the buildings, e.g. is the layout of the base of operations convenient, logical, and cognizant of customers' personal space. Finally, social factors are the elements of the physical environment that are attributable in part to other customers, e.g. a large volume of customers might signal quality services in high demand and customers that are similar to oneself might signal high acceptance among peers.

Outcome quality refers to the technical aspects of service quality identified in the Nordic Model. This dimension's three sub-dimensions are waiting time, tangibles, and valence. Waiting

time is the most straightforward of titles, but has some important nuances. Specifically customers' tolerances for longer waits can vary by industry and even within industry by activity or time of year. At high periods of demand customers might be more understanding of longer waits that would be intolerable during lower periods of demand. Tangibles refer to the physical goods that are offered in conjunction with the service good. For example, food at restaurants, spreadsheets left by consultants, and souvenirs from a trip to a ballgame. Lastly, valence is a less specific term referring to the uncontrollable elements of service delivery that impact the outcomes for customers. For example, at the ballgame rain delays might dampen attendees' spirits or a loss by the home team might sour the event for fans.

The model proposed by Brady and Cronin has great appeal because it incorporates much of the previous research on service quality models. The model recognizes the complexity of the service experience and considers a wide array of factors that influence service quality. The model is tested empirically in the fast-food, photograph developing, amusement parks, and dry cleaning industries. Robust support is found for the structure of the model, though there is also a link from outcome quality and social factors that improves the fit of the model.

The paper and subsequent research does not, however, make a hypothesis about the importance of each dimension or sub-dimension. The model also makes an implicit assumption that the customer will enter into a structure to purchase a service. There are many services when the customer might never have occasion to visit a structure, yet still purchase services from a firm. Additionally, there is an implicit assumption that each of these dimensions is important to customers. It might be the case that investments in one of the service quality dimensions or sub-dimensions are unimportant to consumers.

Economics and Service Quality

Neoclassical economists are trained to operate in price and quantity space. Demand and supply curves are estimated, own-price and cross-price elasticities are calculated for myriad commodities, and equilibriums are discovered. Economists have even pushed analysis further to explain why firms implement price discrimination schemes and bundle products.

As economists have recognized product heterogeneity, so have they attempted to estimate the appeal of latent factors that contribute to the value of products. Some of the original hedonistic valuations concerned the factors that influence the worth of national and state parks. Contingent valuation has been carried out since typically to determine the value of natural resources. It has also been used to evaluate the factors influencing the value of water quality, curbside recycling, and steak tenderness. These latent factors are always sold as a part of the product, i.e. the sale completes the transfer of ownership from the seller to the buyer.

However, less frequently have these analyses considered how tangential elements of the purchase decision (such as trust and product support) influence the consumers' willingness to pay. In the case of the perfect spot market, information is complete and the transaction horizon finite. Many everyday purchase decisions violate these assumptions simply because information is not complete. Furthermore, purchases will be made over a much larger, underdetermined time period, which creates the opportunity for trust and other relationship elements to enhance the value of one supplier's offering relative to another's, despite product homogeneity.

It is conceivable that purchase decisions are not made in the two dimensional space of price and quantity of products (with all of their underlying latent elements). Perhaps purchase decisions are made in the three-dimensional space of price, quantity, and service (or other tangential elements). Providing strong, reliable service might make the consumer less price

sensitive or, in economic terms, make the demand curve less own-price elastic. The uniqueness of these tangential elements is found in the fact that their ownership is never fully transferred from the supplier to the buyer. A restaurant with a superior wait staff maintains that superiority despite dozens of diners' purchases each evening. Alternatively, a supplier of consistently reliable commodity seeds maintains that reliability into next planting season despite farmers having purchased and planted hundreds of thousands of bags the year before.

This is a problem that businesses encounter everyday. How many resources must be allocated to ensuring that the company provides reliable products and/or superior service? Do these resources earn a return in the form of additional revenues due to selling the same quantities at a higher price? It might even be the case that suppliers of the same product pursue strategies that are very different in terms of support and service.

Agribusinesses and Service Quality

This existing literature suggests that there are differences in strategies for business-to-business (B2B) sales versus business-to-consumer (B2C) sales. Therefore, it would seem natural that the agribusiness researcher would be interested in these types of strategies as they relate to the B2B-B2C hybrid we call a farmer. However, the agribusiness literature related to customer segmentation is relatively limited.

The latter part of this review is primarily concerned with service, the role understanding customer segments play in delivering service well, and the economic trade-off between price and service. Therefore, the research done using choice experiments and conjoint analysis to value other economic trade-offs made among inherent product characteristics will be quite pertinent.

Kool suggests that farmers allocate resources to both the operation and to personal consumption. Thus, research regarding both consumer and industrial buying processes might

apply to farmers. Analysis of the relationship between large commercial producers and input suppliers is increasingly important as farms consolidate. Researchers at Purdue University suggest that the relationship between commercial producers (a rapidly growing group of producers) and suppliers is generally considered business-to-business (Akridge, et al). But they caution that this relationship is somewhat atypical because farmers are very often owner-operators.

Methods for Valuing Service

This section describes the three quantitative methods employed in the research: three order factor model and structural equations modeling, conjoint analysis, and the self-explicated approach. The three order factor model and structural equations modeling tests the validity of the structure of service quality proposed by Brady and Cronin (2001) for the agribusiness input supplier considered here. Conjoint analysis is used to provide a set of choices that mimic reality to farmers to understand better their trade-offs between many of the factors of service quality. Finally, the same trade-off is measured using the self-explicated approach in the mail and personal interview survey, where the complexity of the survey design and the time available to complete the survey are balanced for meaningful and robust analysis.

Factor Model of Service Quality

To test the validity of the proposed service quality factor structure, it is necessary to use confirmatory factor analysis with partial disaggregation. The partial disaggregation technique strikes a balance between the detailed, yet unwieldy, complete disaggregation technique, and the marginally beneficial total aggregation (Dabholkar, Thorpe, and Rentz 1996). This way the dimensions and subdimensions can be tested separately in addition to the overall model. The process implemented here is a three-step process similar to that used in Brady and Cronin (2001).

The first stage of the process tests the validity of the three theorized service quality dimensions: physical environment quality, interaction quality, and outcome quality. The second stage of the process then tests the validity of the nine theorized service quality subdimensions. Finally the entire model is tested for its validity and fit to the data. The model fit is evaluated using the comparative fit index, DELTA2 (Bollen 1989), and relative non-centrality index (RNI) (McDonald and Marsh 1990) as is suggested in Brady and Cronin.

Choice Experiments for Estimating Willingness-to-Pay

Choice experiments, or choice based conjoint analyses, have been used in the agricultural economics literature most frequently to understand the value of non-market goods. This same tool can be used to understand a consumer's preference for a combination of dimensions contained in a good or service. The primary appeal of the choice experiment is its similarity to reality. That is, people are always making choices among goods that likely do not have the maximum amount of positive dimensions and the minimum amount of negative dimensions. The researcher is able to offer several choices containing varying levels of each of these dimensions and request a choice by the respondent. With appropriate survey design, the respondent's choices will be similar to reality and will reveal the underlying value of each of the dimensions.

Self-Explicated Approach for Estimating Willingness-to-Pay

Conjoint analysis is a good means of evaluating trade-offs between many product or service dimensions. However, an increasing number of dimensions with many levels each will create a large and complex set of choices for statistical analysis. This unwieldy survey design is taxing for potential respondents and might create lower response rates in less committed audiences. As a result, an alternative method of estimating willingness-to-pay for dimensions of service quality is pursued to understand the views of another population. This is the self-explicated approach.

Surveying Farmers on Their Service Preferences

The overarching goal of this research is to understand agricultural producers' attitudes towards services. Thus, two surveys ground in the most recent marketing and economic literatures were developed for collecting data about producers' perceptions. Of concern was the tradeoff between the richness of information that could be elicited (closely related to the complexity of the survey) and the response rate that surveys would garner. As a result, two samples of producers' were chosen for means of comparison. This section details the two surveys, the processes of implementing both, and some summary statistics regarding the characteristics of the respondents.

Personal Interview Survey Description and Procedures

The first method used to illicit the willingness-to-pay (WTP) for the dimensions of service quality from agricultural producers was a personal survey. This survey instrument was constructed according to Dillman's Tailored Design Method (2000). The survey was based upon the SERVQUAL instrument presented in Brady and Cronin (2001), and adapted to the agronomic service sector with the assistance of experts in the field. By collaborating with an Indiana farmer cooperative, an expert in services in agricultural input industries developed interest in the survey design and delivery. They also shared their database of customers and potential customers.

The Tailored Design Method (TDM) provides a guide for researchers using mail surveys and internet surveys. It also provides guidance on personal interviews for administering surveys. The method views survey response as a social exchange where the respondents evaluate the costs and rewards of completing a questionnaire. TDM places the onus on the researcher to build trust with the potential respondents. That is the process must be implemented in such a way that the expected long run rewards will exceed the costs of filling-out the survey.

This survey used three four contacts with potential respondents. First, a letter was sent informing them to expect a call in the next couple of days from the researcher. Included were some preliminary questions for the respondent to consider, specifically the SERVQUAL questions developed in Brady and Cronin. The researcher then placed a call to the potential respondents three to four days after the letter was mailed to schedule an interview with the potential respondent. If the potential respondent declined participation in the study, then no further contact was made. If the potential respondent agreed to participate, an on-farm visit was scheduled at the respondent's convenience. Finally, a follow-up letter was mailed thanking the respondent for their participation. Table 4.1 provides a brief description of each stage and the associated timing of the mailings for this project.

Table 1 Survey Contacts and Timeline

Contact	Description	Timeline
Pre-notice Letter	A brief letter notifying to expect a phone call in a few days. Included in the mailing are the SERVQUAL questions developed by Brady and Cronin.	First contact
Phone Call	The researcher placed a phone call to the potential respondent inquiring about their desire to participate and a convenient time for an on-farm visit.	Three to four days after pre-notice letter
On-farm Visit	The researcher visited the farmer at the scheduled time and collected the SERVQUAL questions if completed. If not those were discussed in addition to the remainder of the questions.	One to seven days after phone call
Thank You Letter	A short letter extending thanks to those that have responded to the survey.	One week after on-farm visit

A collaborator on this project was selected because they had a customer offering that included both products and services, a large database of existing and potential service customers, and they were located in the state of Indiana. Management at the cooperative offered to help design and implement the survey. In addition they provided access to their database. Individual responses, however, were not released to the cooperative as part of the agreement. Summary statistics and analyses were made available upon request, including requests from competitors of the assisting cooperative that might have been listed on respondents' surveys.

Personal Interview Survey Summary Statistics

To date, June 1, pre-notice letters and phone calls have been placed to more than 70 potential respondents in east-central Indiana. The potential respondents in the sample share simply geography and all have had recent purchases of agronomic inputs – not necessarily from the cooperative that assisted in the survey design. Farm size did not enter into the selection of the potential respondents.

To date four surveys have been completed. The numbers are obviously too small to be reported at this time, but the paper will be frequently updated as new results become available.

Top Farmer Survey Description and Procedures

The Department of Agricultural Economics at Purdue University annually conducts a workshop to help commercial producers achieve their goals through improved management. Known as the Top Farmer Workshop, it is one of the longest running extension efforts in the United States. The Top Farmer workshop integrates university, private sector, and farm industry experts into a single four day program, often providing information about new farming technologies.

Participants have the opportunity to network with innovative producers, while taking part in computerized farm budgeting and yield monitor data analysis.

Participants of this workshop have a reputation of being leading commercial producers that frequently test innovative products and management practices. The workshop draws agricultural producers predominately from Midwest corn and soybean operations that are larger than 2,000 acres. Therefore, these respondents represent a greater geographic diversity than the mail survey, but represent a smaller diversity in terms of farm size. Workshop participants were chosen because they are a unique set of innovative producers and were easily accessible during their time on the West Lafayette, Indiana campus. The complexity of the survey required a large amount of instruction and sometimes assistance, thus an opportunity to answer questions for respondents was essential.

During the week of July 16, about 150 farmers will participate in the 39th Annual Top Farmer Crop Workshop at Purdue University.

Value of Service Attributes Assigned by Farmers

This section will discuss the results of the surveys as they relate to the objectives of the project.

Applicability of Hierarchical Service Quality Model to Agribusiness

This section will test the linkages between the nine sub-dimensions of the three dimensions of service quality.

Most Important Attributes of Service Quality

This section will discuss the ranks the dimensions and sub-dimensions of service in agribusiness.

WTP using Conjoint Analysis

This section will assign vales to the three dimensions of service quality using conjoint analysis.

WTP using Self-Explicated Approach

This section will assign vales to the three dimensions of service quality using the self-explicated approach.

Robustness of Results

This section will discuss the similarities/differences of the two approaches of estimating WTP.

Further Thoughts on Service Value

This section will provide a brief summary of the results here and set-up a discussion regarding its applications and further research ideas.

Applications in Agribusiness

This particular section emphasizes the practical applications that agribusinesses can derive from the results.

Future Research Opportunities

This section will talk about the opportunity to extend this work. It will begin by pointing out that this is an initial look at the demand side of agribusiness service.

List of References

Akridge, J.T., C. Alexander, M. Boehlje, D. Downey, A. Falwell, D. Foley, A. Gray, L. Whipker, and C. Wilson. 2004. "Serving Commercial Producers: Meeting Needs, Adding Value." Dept. of Agr. Econ. Staff Paper #04-04, Purdue University.

American Marketing Association. 2006. Available at http://www.marketingpower.com/mg-dictionary.php, accessed 11 April.

Boehlje, M.D., T. Doehring, and S.T. Sonka. 2005. "Farmers of the Future: Market Segmentation and Buying Behavior." Paper presented at the Forum of the International Food and Agribusiness Management Association, Chicago IL, 27–28 July. .

Bollen, Kenneth A. 1989. *Structural Equations with Latent Variables*. New York: John Wiley & Sons.

Brady, M.K. and J.J. Cronin, Jr. 2001. "Some New Thoughts on Conceptualizing Perceived Service Quality: A Hierarchical Approach." *Journal of Marketing* 65(3): 34-39.

Buttle, Francis. 1996. "SERVQUAL: review, critique, and research agenda." *European Journal of Marketing* 30: 8-32.

Cohen, M.A. and S. Whang. 1997. "Competing in Product and Service: A Product Life-Cycle Model." *Management Science* 43: 535-545.

Dabholkar, Pratibha A., Dayle I. Thorpe, and Joseph O. Rentz. 1996. "A Measure of Service Quality for Retail Stores: Scale Development and Validation." *Journal of the Academy of Marketing Science* 24(1): 3-16.

Dillman, D.A. 2000. *Mail and Internet Surveys: The Tailored Design Method, Second Edition*. New York: John Wiley & Sons, Inc.

Fisk, Raymond P., Stephen W. Brown, and Mary Jo Bitner. 1993. "Tracking the Evolution of the Marketing Services Literature." *Journal of Retailing* 69(1): 61-103.

Grönroos, Christian. 1984. "A Service Quality Model and Its Marketing Implications." *European Journal of Marketing* 18(4):36-44.

Judd, R.C.. 1964. "The Case for Redefining Services." *Journal of Marketing* 28: 58-59.

Lohr, S.. 2006. "Academia Dissects the Service Sector, but Is It a Science?." *New York Times* April 18.

Lusk, J.L. and D. Hudson. 2004. "Willingness-to-Pay Estimates and Their Relevance to Agribusiness Decision Making." *Review of Agricultural Economics* 26: 152-169.

McDonald, Roderick P. and Herbert W. Marsh. 1990. “Choosing a Multivariate Model: Noncentrality and Goodness of Fit.” *Psychological Bulletin* 107: 247-255.

Parasuraman, A., V.A. Zeithaml, and L.L. Berry. 1988. “SERVQUAL: A Multiple Item Scale for Measuring Consumer Perceptions of Service Quality.” *Journal of Retailing* 64: 12-40.

Rust, R.T., A.J. Zahorik, and T.L. Keiningham. 1995. “Return on Quality (ROQ): Making Service Quality Financially Accountable.” *Journal of Marketing* 59(2): 58-70.

Rust, Roland T. and Richard L. Oliver. 1994. “Service Quality: Insights and Managerial Implications from the Frontier.” *Service Quality: New Directions in Theory and Practice* In Roland T. Rust and Richard L. Oliver, eds. Thousand Oaks, CA: Sage Publications.

Shostack, G. Lynn. 1977. “Breaking Free from Product Marketing.” *Journal of Marketing* 41(2): 73-80.

van Dyke, Thomas P., Leon A. Kappleman, and Victor R. Prybutok. 1997. “Measuring Information Systems Quality: Concerns on the Use of the SERVQUAL Questionnaire.” *MIS Quarterly* 21: 195-208.

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