

Segmenting Agribusiness Customers on Their Capital Expenditures

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Marketing Capital Supplies to Agriculture Customers More Efficiently

Agricultural input suppliers are dealing with a consolidating customer base. Serving a smaller base of firms that are larger will pose its own unique challenges in contrast with the more traditional base of farmers that once existed. Larger farmers might be in a better bargaining position relative to local and national suppliers of inputs. Larger farmers might rely less on salespersons to bring information about competing products, i.e. the products' performance and prices. Now is an optimal time for agricultural input suppliers to reassess their customer base and how to best serve that base.

The problem is that agricultural input suppliers, specifically suppliers of capital items like equipment, have relied on a set of distribution channels, salespersons, and marketing strategies that was suited to serving a large, relatively concentrated number of small agriculture operations. As agriculture production consolidates it is an opportune time for many of these suppliers to reconsider their sales strategies. Perhaps the most logical place to begin this process is to improve their understanding of the existing base, forecast the appearance of the future customer base, and design strategies that most efficiently and profitably serve this emerging base.

Consider for example that often suppliers of inputs would organize their sales force around geographic regions. Often a regional sales manager would oversee the activities of a few salespersons, each with their own share of the region. This system was efficient with so many farms to cover. However, now as the number of farms dwindles fewer sales associates will be needed. This presents the opportunity to suppliers to reorganize the sales force to increase revenues while controlling costs.

This opportunity extends beyond just the sales force and includes the whole marketing strategy. Understanding what is important to producers of certain buying behaviors will allow the supplier to more efficiently deliver the information that is most influential for that customer.

This includes the salesperson assigned to the account, the informational and promotional material that is provided to the producer, and a system for pricing products and services. This should allow more efficient allocation of marketing resources.

The main objective of this research is to help agricultural input suppliers develop greater understanding of how best to serve existing and potential clients. Research regarding the opportunities to minimize the cost of product delivery while maintaining a satisfactory level of service will be important for agribusinesses as they compete for customers. To achieve this objective, we first segment purchasers of capital items such as equipment using marketing theory and cluster analysis. Next, this information is used to help create scorecards that are the basis for identifying to which segment a customer belongs. Finally, we suggest how customer segments can be linked to the profitability of the agribusiness supplier and how this can drive the sales process.

The foundation of the buying behavior scorecard lies in similar tactics that have been used by lenders for several years, i.e. a credit scorecard. In a credit scorecard, banks identify measures of solvency, repayment capacity, profitability, liquidity, and financial efficiency that are robust indicators of the amount of credit risk inherent in a potential loan. The key drivers of buyer behavior are closely related to customer demographics and psychographics. We present a scorecard that allows existing salespersons to rank customers on a scale of 1 to 5 on these characteristics. Key farmers characteristics such size of operation, what percentage of her time the owner/operator dedicates to farming, age of owner/operator, education, sophistication with the internet, use of farm accounting software, etc. are evaluated. Furthermore, behavioral factors such as customer loyalty, product adoption rates, and their sensitivity to price are also powerful explanatory factors in determining to which segment these customers belong.

These results are used to perform a customer profitability analysis. It is the onus of the marketing and sales managers to work together to identify the drivers of profitability for each segment. Essential variables include the total market size, market share, sales volume, and percent margin on sales. Finally, uniting the sales persons' scorecards and the profitability analysis of each segment drives marketing strategies, key account management, and sales activity.

Buying Behavior of Agriculture Producers

Agriculture producers are a unique set of purchasers in that they often display both consumer buying behavior and business buying behavior (Vacek, 2000; Kool, 1994). This makes it more difficult for input suppliers to truly understand their customer base and to serve them in an efficient manner. Therefore, this research will focus on improving the understanding the characteristics of agriculture customers that tend to dictate their buying behavior.

Downey has suggested that generally there are three types of buyers when their buying behavior is considered: economic buyers, relationship buyers, and business buyers. The economic buyer is one that is principally concerned with finding the lowest price for a specific product. The buyer likely is willing to sacrifice some level of customer service and support activities in order to achieve the lowest price on the product, so it is clear that a supplier would pursue a low-price marketing strategy for this particular customer. Alternatively relationship buyers tend to focus more on the additional services and support that are provided by the supplier. This might cause a supplier of capital goods to develop a marketing strategy around its well-respected equipment repair team, financial services, and additional services. Finally, the business buyers are focused on the performance of the product. Focused less on price and more on value, this customer requires a strategy that brings large of amounts of data regarding product trials for this and competing products.

Evaluating and Segmenting the Customer Base

First, respondents to a survey are clustered on their response to the following question:

When you choose a supplier for either capital items like equipment, how is your decision influenced by the following factors? Assign a percentage value to each factor based on its importance in the decision. The percentages should add to 100.

Convenience/Location

Customer service/Information (responsiveness, follow-up, advice)

Personal Factors (trust, working relationship)

Price

Product Performance (yield, durability, rate of gain)

Support service (delivery, repair, application, etc.)

This provided some cursory information about how farmers make capital expenditures decisions.

Response Choices Statistics

Large commercial agriculture producers were mailed a survey based on a desired response rate.

Producers were selected according to their gross sales, primary enterprise, and geographic location. Responses rates were near 20 percent for the survey, resulting in more than 2,000 usable responses in 2003¹. The survey asked a comprehensive set of more than 30 questions regarding the operation and operator, as well as the operators' views on the future of their operations, production agriculture in general and purchase decisions.

The question regarding emphasis placed on six key areas of purchasing behavior is asked in such a way that it is possible to identify typical tradeoffs between the responses. This is because the weights must sum to 100 percent. Thus, assessing how the producers tended to respond to this particular question should provide some insight into the general buying behaviors of the large commercial agriculture producers. One major insight that can be gleaned from the summary statistics (Table 1) is that price often receives the greatest weight on average, but with larger standard deviation than the other areas. However, relative to its mean it has the least variance, suggesting perhaps the price is often considered at least to some degree by most

¹ For a more detailed description of the survey, response rates, and of the respondents please see Foley.

farmers with some outliers influencing the variation. The nature of the data, specifically being truncated at zero percent, also skews positively the distributions of all the response choices.

Product and convenience are the next areas that have the highest means, with less allocated on average to customer service, support service, and personal factors. Some might mistake this as meaning that these 'relationship' factors are less important than price and product performance. However the correlation between responses points toward these factors being valued together as a bundle rather than individually.

Response Choices Correlations

The correlation matrix of the responses to this question indicates that most of the variables are negatively correlated, as would be expected (Table 2). Because a respondent must take allocation from one response to give to another, one would anticipate that the responses would tend to be negatively correlated. More simply, if a producer faced equal allocation to each response, which group will receive less importance to give more importance to another factor?

It is notable that personal factors such as trust tend to receive greater importance weights when customer service does as well (correlation=0.111). This makes some intuitive sense as the satisfaction with customer service will depend to some degree upon the relationship with those providing said service. Some of the other responses are slightly positively correlated, likely suggesting that these groups do not tend to pull allocation from one another among typical respondents.

Rather it is the groups with large negative correlations that are most heavily pulling from one group to give to another. For example, if respondents putting greater weight on convenience tend to draw that allocation from the price or product responses. In fact, putting greater weight on convenience, customer service, or personal factors tends to draw from price. This result is compatible with the hypothesis that there are 'relationship buyers' that are less sensitive to price.

From another perspective, price buyers (economic buyers) are unwilling to pay for things like trust and service, but rather focus on finding the cheapest price for a good of comparable quality.

The two responses with the most negative correlation are product performance and convenience. Clearly, to the group most heavily weighting product performance is more interested in purchasing something that works reliably than purchasing an inferior product from someone close nearby. If you are a national supplier of products and services, this would be of great importance to your marketing strategy. It will not be necessary to have a retail outlet near this particular customer segment, rather a superior performing product.

The high correlations among convenience, customer service, support services, and personal factors strongly indicated that the respondents choosing these groups were among the relationship buyers described by Downey. Therefore, the weights for these four factors were combined to make one 'relationship' factor in addition to the price and product performance factors. The percentages to these three groups were used to determine the customer segments in the cluster analysis.

Buying Clusters

Among the responses 180 farmers chose the emphasis on the relationship percentages to be in the range of 45 to 55 percent and shared the remaining emphasis between price and product performance. This set of farmers is considered to be the balanced segment of customers, i.e. members of this segment desire each of the attributes similarly to the mean of the responses. We cluster the respondents around these choices to see which factors influence a buyer moving from the balanced segment to another one of the buyer segments, viz. relationship, economic, and business buyers (Figure 1). All of the clustering processes were completed in SAS[®] v9.1 using a non-hierarchical clustering algorithm, specifically the k-means procedure (Aldenderfer and Blashfield).

The data were clustered into four groups of our own design. However, the groups that are formed look very similar to the types of groups predicted by Downey. Just more than one-third of the sample considers each of the factors nearly equally, i.e. the balanced group (Table 3). Nearly 30 percent of the sample falls into the relationship segment that tends to emphasize the relationship factors of the purchase decision at least twice as much as the other two factors. Similarly, nearly one-fourth of the sample were identified as economic buyers, putting at least 44 percent of the weight of the purchase decision upon price. Finally, the business segment is the smallest at just over one-tenth the sample, placing very little emphasis on the relationship factors.

Firms that are interested in competing simply on price will serve just one fourth of the market for large commercial agriculture producers. Firms that compete by bringing a superior product or offering additional services will have a much larger market from which to work. However, a firm can compete in all of the segments, but more efficiently than treating all purchasers the same. Now marketing strategies can be tailored to the specific customer's desires. This makes it necessary to understand in which segment a particular customer belongs.

Predicting Cluster Membership

Defining and creating customer segments is relatively easily compared to determining which identifiable demographic and psychographic characteristics will influence into which segment a producer falls. Little research in agriculture has focused on identifying these factors and scant data exists on many of the relevant factors. Some studies have segmented the market and have attempted to describe the 'typical producer' in that segment (Gloy and Akridge, Hooper, Mwangi). However, predicting membership has proved to be more difficult.

The four clusters that were identified were used to complete the multinomial logit (MNL) regressions in STATA[®] v.8. Questions from the survey were selected to be part of the MNL regressions based chiefly upon their ability to be observed relatively easily by salespersons. This

way the producer could be scorecarded and her segment predicted. A set of nine variables were identified for the potential set of predictors (Table 5). The observations were weighted to the U.S. Census of Agriculture so that the survey results could provide a statistically representative profile of U.S. commercial producers in the specific enterprise categories.

All of the variables were statistically significant in predicting membership relative to the Balanced Segment in at least one of the other segments. For example, strongly agreeing with the statement that capital expenditures are made on the lowest priced capital item strongly indicates that the individual will be in the Economic Segment. Alternatively, a producer that strongly agrees with the statement that they are loyal to their local supplier is more likely to fall into the Relationship Segment and less likely to fall into either the Economic or Business Segments. The answer to these two questions might seem trivial.

However, age, size, and education all have some predictive power consistent with a priori expectations. For example, older producers have a greater tendency to fall into the Relationship Segment relative to their younger peers. Additional education tends to move producers to the Economic Segment, while less education appears to move producers into the Relationship Segment. Then again additional amounts of crop acreage appear to move producers into the Business Segment and away from the Economic and Relationship Segments.

Another set of factors, specifically psychographic or behavioral factors, are also influential. Buyers that adopt technology sooner are more likely to fall into the Business Segment that places heavy emphasis on product performance. Producers that adopt technologies later are more likely to fall into the Relationship Segment. Brand loyal producers tend to belong to the Relationship Segment as would be expected, but appears to have no statistical impact on membership in the other two segments. Peculiarly, internet use and projected growth on the

farm in the future appear to have little power in predicting segment membership. Both of these factors seem to negatively influence membership in any of the three segments relative to Balanced.

Conclusions and Future Research

This research found that respondents to a survey of large commercial agriculture producers make tradeoffs between price, product performance, and additional services associated with the input when making capital expenditures. Using cluster analysis, four segments of customers are identified and discussed in terms of their emphasis. Then multinomial logit is used to attempt to predict membership in these clusters. Results found that of the four groups more than a third of the producers tend to equally weight the three factors. About one-third of the producers were identified as Relationship Buyers, roughly one-quarter were Economic Buyers, and just over one-tenth were labeled Business Buyers.

The weighted multinomial logit identified some observable demographic and psychographic characteristics that were important in predicting segment membership. However, application of the model by an agriculture input supplier might prove to be the most reliable validation of the model. Thus, the next step in this process is to create a customer scorecard that would use these and other demographic and psychographic variables to create a customer scorecard that would compute a customer's segment score. This would allow the firm to more efficiently manage its customer base. Furthermore, it will allow the firm to assess the profitability of the four customer segments and advance its marketing strategies to improve overall profits in the customer portfolio.

Table 1. Summary Statistics for Emphasis in Purchase Decisions

| | Convenience | Customer Service | Personal Factors | Price | Product | Support Services |
|--------------------------|-------------|------------------|------------------|-------|---------|------------------|
| Range | 0-100 | 0-100 | 0-100 | 0-100 | 0-100 | 0-80 |
| Mean | 15.76 | 9.62 | 9.46 | 25.79 | 15.51 | 13.35 |
| Median | 10 | 9 | 5 | 20 | 10 | 10 |
| St. Dev. | 17.78 | 12.35 | 12.04 | 21.25 | 16.68 | 13.56 |
| Coefficient of Variation | 1.13 | 1.28 | 1.27 | 0.82 | 1.08 | 1.02 |

Table 2. Correlation Matrix of Importance of Factors in Making Capital Expenditures

| | Convenience | Customer Service | Personal Factors | Price | Product Performance | Support Service |
|---------------------|-------------|------------------|------------------|---------|---------------------|-----------------|
| Convenience | 1 | | | | | |
| Customer Service | 0.0163 | 1 | | | | |
| Personal Factors | -0.0183 | 0.1111 | 1 | | | |
| Price | -0.1802 | -0.1592 | -0.1619 | 1 | | |
| Product Performance | -0.2168 | -0.1018 | -0.0722 | -0.0385 | 1 | |
| Support Service | -0.0453 | -0.0263 | 0.0295 | -0.0921 | 0.0083 | 1 |

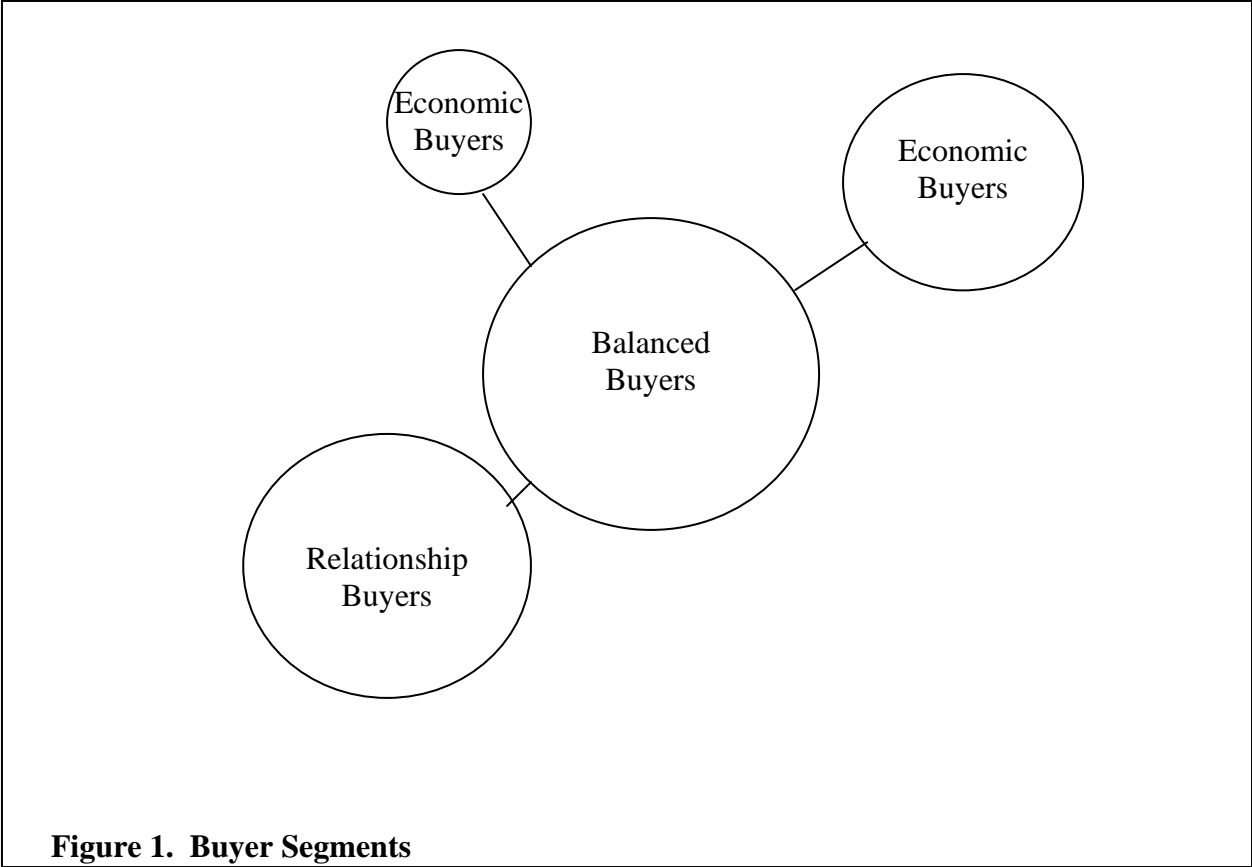


Figure 1. Buyer Segments

Table 3. Buying Behavior Clusters

| Buying Behavior | Frequency | Percent |
|---------------------|-----------|---------|
| Balanced | 724 | 36.77 |
| Relationship | 581 | 29.51 |
| Price | 462 | 23.46 |
| Product Performance | 202 | 10.26 |

Table 4. Mean Relative Importance of Each Factor for Five Buying Behavior Segments

| Factor | Segment | | | |
|----------------------|-----------|-----------|--------------|-----------|
| | Balanced | Economic | Relationship | Business |
| Relationship Factors | 55.13% | 31.38% | 80.44% | 17.75% |
| | min = 34% | min = 0% | min = 67% | min = 0% |
| Price | 23.18% | 57.59% | 13.23% | 27.86% |
| | min = 0% | min = 33% | min = 0% | min = 0% |
| Product Performance | 21.69% | 11.03% | 6.33% | 54.39% |
| | min = 0% | min = 0% | min = 0% | min = 40% |

Table 5. Factors used to Predict Segment Membership

| Question | Abbreviation | Description |
|---------------------------|--------------|--|
| Farm Size | SIZE | Farm Size measured upon hundreds of acres of corn, soybeans, wheat, and cotton |
| Operator Age | AGE | Age of the Primary Operator (5 categories) |
| Operator Education | EDU | Level of Education Completed (7 categories) |
| Internet Use | INTER | Dummy Variable (1=does not use) |
| Technology Adoption Rate | TECH | Lower values for adopting technology sooner (5 categories) |
| Loyalty to Local Supplier | SUPPLIER | How strongly the operator feels he is loyal to the local supplier (Likert scale 1 to 5) |
| Buys Low Price | PRICE | How strongly the operator feels he purchases the lowest priced capital items (Likert scale 1 to 5) |
| Loyalty to National Brand | BRAND | How strongly the operator feels he is loyal to the national brand (Likert scale 1 to 5) |
| Potential Growth | GROWTH | Projected 5 year growth percentage |

Table 6. MNL Estimation Results*

| | Factor | Coefficient | Std. Err. | Z Stat | p-value |
|-------------------------|----------|-------------|-----------|--------|---------|
| Business Segment | SIZE | -0.01284 | 0.00406 | -3.16 | 0.002 |
| | AGE | -0.02144 | 0.024874 | -0.86 | 0.389 |
| | EDU | 0.071268 | 0.031355 | 2.27 | 0.023 |
| | INTER | -0.20195 | 0.082223 | -2.46 | 0.014 |
| | TECH | -0.1235 | 0.04415 | -2.8 | 0.005 |
| | SUPPLIER | -0.31225 | 0.035548 | -8.78 | 0.000 |
| | PRICE | -0.02504 | 0.036343 | -0.69 | 0.491 |
| | BRAND | 0.012266 | 0.039879 | 0.31 | 0.758 |
| | GROWTH | -0.00145 | 0.000518 | -2.81 | 0.005 |
| | Constant | 0.084504 | 0.265536 | 0.32 | 0.75 |
| Economic Segment | SIZE | 0.006666 | 0.002269 | 2.94 | 0.003 |
| | AGE | 0.053157 | 0.017952 | 2.96 | 0.003 |
| | EDU | 0.028561 | 0.022676 | 1.26 | 0.208 |
| | INTER | -0.15222 | 0.058654 | -2.6 | 0.009 |
| | TECH | 0.05778 | 0.030889 | 1.87 | 0.061 |
| | SUPPLIER | -0.34587 | 0.026031 | -13.29 | 0.000 |
| | PRICE | 0.352196 | 0.02548 | 13.82 | 0.000 |
| | BRAND | 0.033996 | 0.029108 | 1.17 | 0.243 |
| | GROWTH | -0.00164 | 0.000382 | -4.28 | 0.000 |
| | Constant | -0.7408 | 0.192299 | -3.85 | 0.000 |
| Relationship Segment | SIZE | 0.006887 | 0.002135 | 3.23 | 0.001 |
| | AGE | -0.09162 | 0.016651 | -5.5 | 0.000 |
| | EDU | 0.189953 | 0.020786 | 9.14 | 0.000 |
| | INTER | -0.06269 | 0.052458 | -1.2 | 0.232 |
| | TECH | 0.177568 | 0.028771 | 6.17 | 0.000 |
| | SUPPLIER | 0.081863 | 0.02525 | 3.24 | 0.001 |
| | PRICE | 0.102316 | 0.023858 | 4.29 | 0.000 |
| | BRAND | 0.234266 | 0.028442 | 8.24 | 0.000 |
| | GROWTH | -0.00163 | 0.000374 | -4.36 | 0.000 |
| | Constant | -2.23374 | 0.18599 | -12.01 | 0.000 |

*Coefficients are relative to falling into the Balanced Segment

Table 7. Predicting Customer Segments Based on Buyer Characteristics

| Cluster | Factors Explaining Likelihood of Being in Segment | Directional Impact | Factor Identification |
|-----------------------------|--|---|---|
| Economic Segment | Price Buyer | More price sensitive more likely | Does the producer often inquire about price? |
| | Education | More education more likely | Do they have a college degree? |
| | Supplier Loyalty | Less loyal more likely | How long has the producer had an established relationship with the local supplier? |
| Balanced | | | |
| Business Segment | Farm Size | Larger farm is more likely | How many acres does the farmer operate? |
| | Product Adoption | Sooner adoption is more likely | How many new technologies are used on the farm currently? |
| | Age | Older producers more likely | How old is the producer? |
| Relationship Segment | Supplier Loyalty | More loyal more likely | How long has the producer had an established relationship with the local supplier? |
| | Education | Less education more likely | Do they have a college degree? |
| | Age | Older producers more likely | How old is the producer? |

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