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Measuring Strategic Intent in the South Texas Food Marketing Industry

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Binomial and multinomial logit analysis is applied to data collected from questionnaires to measure strategic intent in the food marketing industry. Questions were framed based on data from the U.S. Department of Commerce's "County Business Patterns" reports and from best-practice studies. Question topics were placed into a competitive strategy framework following the 1998 work of Porter. Results indicate a strategic focus on outbound logistics and market pricing at the direct value level. Indirect activities focus on human capacity and firm infrastructure, particularly expanding internationally. Firms are adopting information technologies as a competitive strategy, and are doing so as part of a combined strategy to develop human assets.

Key Words: food marketing, industrial organization, information technology, strategy

Business leaders, while steering their firms toward profitable economic currents, make several classes of decisions. Static neoclassical economic theory focuses on decisions that adjust marginal input or output levels given an existing production technology. Extending our view into the future, the dynamic theory forms a bridge to evaluate investments whose lives span multiple time periods (Mas-Colell, Whinston, and Green, 1995). Typically, business managers make decisions on the adoption of mutually exclusive potential long-term technologies based on the outcome of net present value analysis. Statistical decision theory provides a mechanism to incorporate uncertainty into both decision classes (Pratt, Raiffa, and Schlaifer, 1996).

An alternate, yet complementary method of gaining information regarding business practice adoption relies on benchmarking techniques (Bogan and English, 1994). Although benchmarking is not directly a method for evaluating the economic feasibility of a new technology, it does provide insight into the potential to enhance firm competitiveness. At the same time, benchmarking provides insight into another class of decisions that business executives ponder—i.e., from an extremely large set of activities in which little if any information exists, what practices should even be categorized in evaluations as practices which are being "implemented"? At this stage, the class of decisions can be characterized more as attempts at clarifying an ambiguous world than as resolving uncertainty about future events (March, 1994).

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The long-term success of many businesses relies on the seeming intuitive ability of its leaders to accurately anticipate distant events and then properly position the firm to take advantage of evolving trends (Porter, 1985). An empirical question growing out of this observation is: Can firm leader perceptions of future competitive advantage factors be statistically measured in a relevant industry? The current study examines this notion for the food marketing industry in the south Texas region.

To provide an initial context for the question of how business leaders are assessing future trends, preliminary data are first collected on the food marketing industry, derived from U.S. Department of Commerce county business pattern (CBP) reports over the period 1993–95. CBP reports are frequently aggregated at the county level across nonfood marketing and food marketing industries within a sector (such as transportation). In the background section below, the data disaggregation and descriptive context for the food marketing industry are presented, as well as a review of the business foundation used to develop a questionnaire completed by business leaders to measure strategic intent. This is followed by a description of the questionnaire data and a discussion of the statistical method of data analysis. Results are then presented. The study ends with a summary and conclusions section.

Background

Industry Trends

To provide the context for evaluating business leader perceptions about sources of future industry competitive advantage, a general characterization of industry trends was developed on a number of firms by employee size, total employees, and average wages between 1993 and 1995. The south Texas region defined in the study includes 30 counties, starting at the Mexico border and having a northern boundary including the cities of Laredo, San Antonio, and Corpus Christi. The general strategy in disaggregating data in a county with differing industry subsector data was to apply a proportion to the unaggregated county data within a Standard Industry Classification (SIC) code level. The proportion applied was calculated from counties within the defined area that did have disaggregated data at the SIC code level of interest.

In examining agribusiness sectors (other than the farm sector) during the period 1993 to 1995, retailing and wholesaling showed the largest increases, with both exceeding 300% (figure 1). Retailing and wholesaling also dominate in absolute numbers, with retail outlets approaching 7,000 and wholesale outlets numbering approximately 3,000 in 1995. Small firm sizes (less than 20 employees) dominate in absolute numbers across all sectors. For example, roughly 90% of the service sector, which numbered about 900 firms, consisted of firms with fewer than 20 employees.

Interestingly, even though growth in total firm numbers took place across all firm sizes, growth was concentrated in the larger sized enterprises. The data do not indicate whether existing firms are gaining employees and moving into the larger

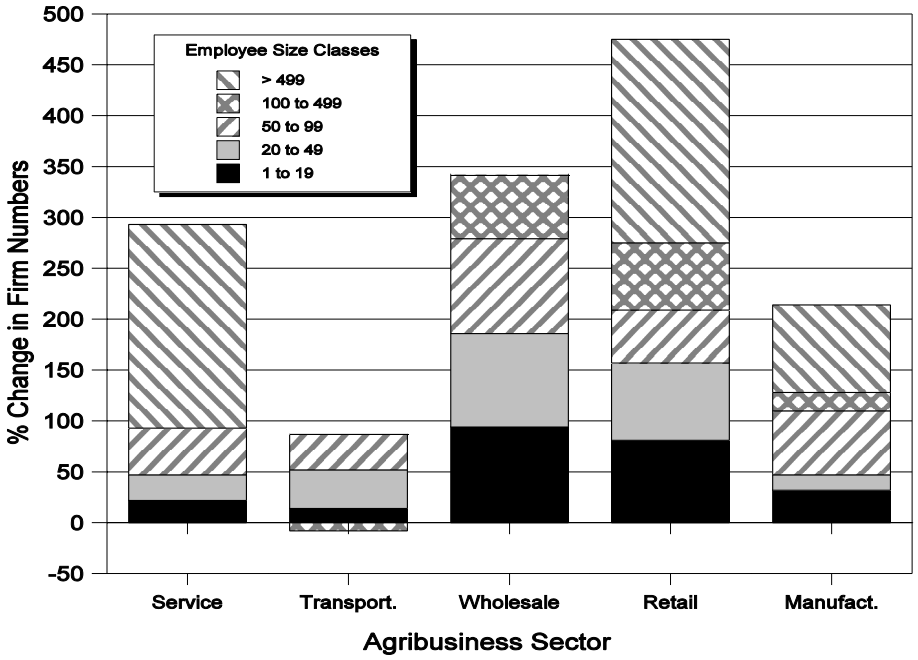

Figure 1. Percent change in firm numbers by employee size classes for agribusiness services, food transportation, food wholesalers, food retailers, and food manufacturers (1993–1995)

size categories or whether new firms are starting out with larger numbers of employees. Anecdotal evidence suggests this factor varies by sectors, with the entry of some franchises into the area accounting for added increases in the larger size classes. During the observation period, the food wholesaling sector showed its largest increase in firm numbers in 1994—the year NAFTA was implemented. Manufacturing, although relatively small in total firm numbers at approximately 300, has the highest percentage of large firms (30%). As shown by figure 1, the manufacturing and transportation sectors were the smallest gainers in total new firms between 1993 and 1995.

Every sector showed an increase in total employees in all size categories except transportation, which showed a decline in the 100–499 employee group. At nearly 120,000 employees in 1995, the retail sector is the largest employer. Food transportation, wholesaling, and manufacturing are almost even in numbers of employees, with each employing approximately 20,000 workers. The wage increase in transportation, coupled with the decline in employees, suggests technology is substituting out labor in that sector. Individual county records support this inference by reporting an increase in firms with fewer employees in nonborder counties where wages tended to be higher. Retailing has the lowest average wage at approximately $10,000 per worker, and manufacturing the highest at approximately $24,000. Strong

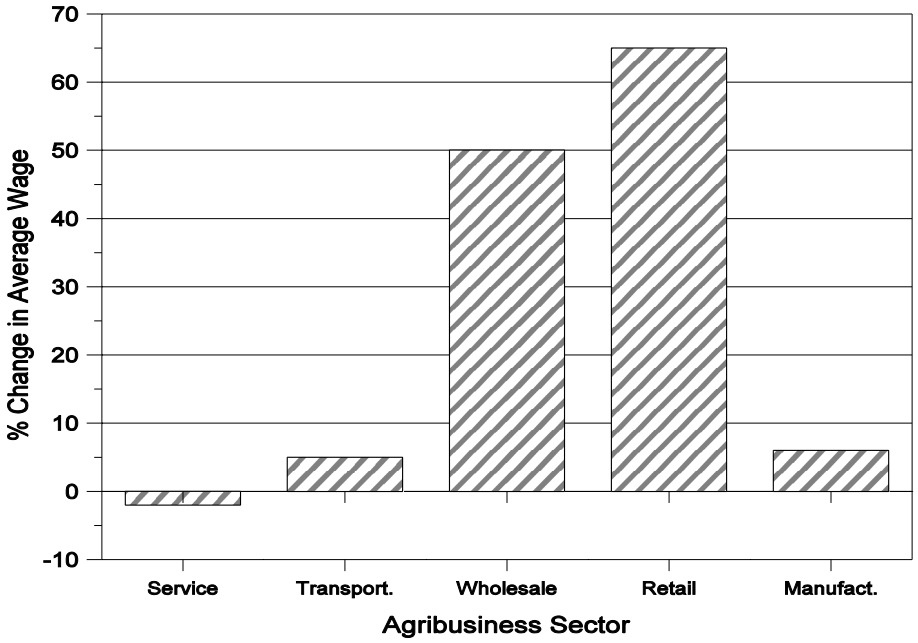

Figure 2. Percent change in average wages for agribusiness services, food transportation, food wholesalers, food retailers, and food manufacturers (1993–1995)

expansion in the retail and wholesale sectors appears to have been a factor in the strong growth in wages in those sectors (figure 2). The remaining sectors showed a much smaller percentage change in wage levels, with the service sector seeing some wage erosion.

In aggregate, the data indicate that competitive activity in the food marketing sector between 1993 and 1995 has been positive. That is, there has been growth across all sectors in firm numbers, their size, average wages, total employees, or combinations thereof. Rapid population growth, an overall expanding economy, and NAFTA all appear to be playing contributing roles in the positive growth of the food marketing sector in south Texas.

In addition to the health of the general economy—which certainly acts to shape the perceptions of firm managers regarding future sources of competitive advantage—there are changes in internal firm factors that managers control. Based on historical observations, Chandler (1991) noted that capturing economies of size and scope should be the strategy of business leaders seeking sustainable competitive advantage. How firms can actually achieve larger size or effective product or service diversity in a competitive fashion is not always transparent. To answer this question, firms frequently engage in benchmarking studies that compare activities in best-practice firms or parallel activities in nonallied industries.

At a national level, A.T. Kearney Consultants (1994) examined the state of information technology, with emphasis on level of electronic data interchange (EDI), utilization and implementation of point-of-sale (POS) data recording, and supporting inventory management automation. In another 1994 study, Cleveland Consulting Associates focused on logistics and, in particular, issues supporting the "Efficient Consumer Response" (ECR) industry initiative including warehouse practices, level and type of direct store deliveries, and vendor alliances for data sharing. A management practice review study conducted by Kinsey et al. (1996) found best-practice firms adopting automated logistics practices such as EDI, POS data recording, and partnership initiatives to foster ECR.

Park and McLaughlin (1998) surveyed U.S. food manufacturers and distributors on key aspects of the ECR initiative to determine those most likely to be adopted. The present study proceeds along similar lines as the Park and McLaughlin study, albeit regional, and with the intent to cast a broader net around possible future competitive factors. In particular, many of the firms in the region are small, and thus ECR type initiatives may be outside their near-term capability and strategic intent.

Economic Background for Questionnaire

Concisely stated, the general economic conditions shaping the south Texas food marketing industry are regional population growth, expanding trade opportunities, and information technology allowing reengineered logistics operations. The primary question remaining is: What factors are perceived by regional food marketers (who are constrained by existing levels of resource endowments) as those most like to contribute to their future competitive advantage?

To address this question, a broad but comprehensive survey instrument was designed, with questions conforming to the strategy framework developed by Porter (1998). Specifically, this framework is outlined as follows. Porter identifies five sources of competition: (*a*) characteristics related to possible new entrants into the industry, (*b*) sellers, (*c*) buyers, (*d*) product substitutability, and (*e*) the industry itself. These sources relate directly to the conventional characteristics that define perfect competition, and hence are founded on industrial organization theory. Additionally, Porter identifies the product value chain internal to the company as the source firm leaders have for creating sustained competitive advantage through strategic intent. This value chain has five direct activities: (*a*) inbound logistics, (*b*) operations, (*c*) outbound logistics, (*d*) marketing and promotion, and (*e*) service. Further, the firm supports the value chain indirectly through four mechanisms: (*a*) infrastructure, (*b*) human resource development, (*c*) technology development, and (*d*) procurement.

The framework developed by Porter for analysis of strategy formulation has been challenged on what appears to be largely one front. The challenge itself is a consequence of industries experiencing rapid technological change; thus, examples are most common in the information-communication industry. Hax and Wilde (1999), in proposing an alternate model, discount the product value chain as the core area

a firm has for controlling strategy formulation. Instead, they shift the focus from product control into areas designed to foster acquisition of monopolistic power.

Chakravarthy (1997) argues along similar lines, and notes it is with first-mover ploys and rapid product innovation enabled by continuous technological change that firms can create an industry with increasing returns to size. In turn, firms can capitalize on the knowledge of the inherently unstable equilibrium posed by a decreasing cost industry to again increase market power. Others who extend and build on this theme include Hamel (1996) and Brown and Eisenhardt (1998).

In response, Porter (1998) notes that although such studies contribute both in detail and substance, they do not alter his underlying foundation. And certainly, as he indicated, firm infrastructure is one of the indirect means a firm can use to enhance the value-added component of its competitive posture. Additionally, Porter emphasizes that strategic intent must in the long term support the value of the item exchanged—be it product, service, or both—or it cannot be sustainable.

Regardless of the outcome of this debate, the issues relevant to measuring strategic intent (whether in a rapidly evolving industry or in a more stable industry) are nevertheless still able to be linked to Porter's foundation. Given these considerations, each of the nine areas of direct and indirect product or service value-adding activity for the firm form the areas for the topical questions developed in the study questionnaire (table 1).

Data and Methods

The primary source of data for the study was a 25-question survey distributed to south Texas food marketers during the summers of 1997 and 1998. A total of 626 questionnaires were mailed—332 in 1997 with 102 firms responding, and 294 in 1998 with 84 returned. The 186 returned surveys yielded an overall response rate of 29.7%. The questionnaires were mailed on a Tuesday in June. A reminder postcard followed automatically on Friday, and follow-up phone calls commenced two weeks from mailout.

The first question asked the respondent to identify the firm type as a food manufacturer, wholesaler, distributor, retail-convenience, retail-specialty, or retail-supermarket (table 1). All questions (with one exception) were used to form the independent **x** variables topically related to strategic intentions as categorized in the Porter framework. The response options created 74 independent variables. In order to screen viable strategies from those adopted by firms that may not be successful, a screening technique was adopted following an early study by Woodward (1965). The approach uses a profitability question as a dependent variable. The actual question required a yes/no response, and asked if profits were satisfactory over the last three years.

The statistical model utilized in the study includes binomial and multinomial logit regressions. Each model is a member of a broader class of regression models where the dependent variable represents a discrete choice, two choices in the binomial, and

Table 1. Questionnaire Topic Questions, Number of Topics Keyed to Potential Sources of Competition, Primary and Secondary Value Creation Firm Activities, and Question Responses Selected in Binomial and Multinomial Profit Regression Estimates

Questionnaire Topic	No. of Options	Competition Sources	Direct Value	Indirect Value	Binomial Estimation	Multinomial Estimation
Firm type	6	–	–	–	–	Y
Firm size by employee numbers	5	–	–	–	–	Y
How value is added to product	4	–	–	–	Y	–
Source of expansion capital	5	Y	–	–	Y	Y
Workshops per worker	6	–	–	Y	Y	Y
Gross payroll	5	–	–	–	–	Y
Employee workshops	2	–	–	Y	–	Y
Needed firm knowledge	6	–	Y	Y	Y	Y
Training costs	5	–	–	Y	–	Y
Logistics cost reduction	5	Y	Y	Y	Y	Y
International trade and profits now	2	Y	–	–	–	–
Mexican trade and profits now	2	Y	–	–	–	–
Enter international trade	6	Y	Y	Y	Y	Y
Competition awareness	2	Y	–	–	–	–
Internat. trade and future profits	2	Y	–	–	–	–
Type of product pricing	4	Y	Y	–	–	Y
How warehousing needs fulfilled	6	–	Y	–	–	–
Use of point-of-sale scanners	2	–	Y	–	–	–
How orders are sent and received	3	–	Y	–	Y	Y
How firm arranges shipping	4	Y	Y	Y	Y	–
Rating of profits over last 3 years	2	–	–	–	Y	Y
Geographic zone of customers	5	–	Y	–	Y	–
Employee training and profits	2	–	–	Y	–	–
Time-consuming activities	5	–	Y	Y	Y	Y
Who manages inventory	4	Y	Y	Y	Y	–

Notes: Option numbers indicate the number of possible topic response options in the questionnaire. For the "Competition Sources," "Direct Value," and "Indirect Value" columns, a "Y" notation indicates a related response option topic in the specific question; a "Y" notation in the "Binomial Estimation" or "Multinomial Estimation" columns indicates at least one of the specific question response topics appeared under the respective estimated models.

three or more choices in the multinomial case. The present discussion is adapted from Greene (1995a). An underlying motivation for the decision choices is based on a random utility model formalized for the *i*th business leader facing *J* choices, with the utility of choice *j* being specified as follows:

$$U_{ij} = \boldsymbol{\beta}' x_{ij} + \varepsilon_{ij}, \tag{1}$$

where $\boldsymbol{\beta}$ denotes the parameters to be estimated, $\mathbf{x}$ is a vector of attributes corresponding to the state of choice j, and ε is an error term. Suppose the leader selects choice j. Then we assume that U_{ij} is the maximum among the J utilities. The statistical model is then based on the probability that choice j is made, which is expressed as follows:

$$\text{Prob}(U_{ij} > U_{ik}) \text{ for all other } k \neq j. \tag{2}$$

Assume a distribution allows the model to be operationalized, and let Y_i be a random variable indicating the choice made if and only if the J disturbances are independent and identically distributed with Weibull distribution. Then

$$F(\varepsilon_{ij}) = \exp(e^{-\varepsilon_{ij}}) \tag{3}$$

and

$$\text{Prob}(Y_i = j) = \frac{e^{\boldsymbol{\beta}' x_{ij}}}{\sum_{j=0}^{J} e^{\boldsymbol{\beta}' x_{ij}}} \quad \text{for } j = 0, 1, \ldots, J. \tag{4}$$

The estimated equations provide a set of probabilities for the J choices. In order to remove an indeterminacy set $\{\boldsymbol{\beta}_0 = \mathbf{0}\}$, then for $Y = 0$ in equation (4) above, the numerator equals 1. Note when $J = 0$, the binomial model results. Equation estimation follows Greene (1995b). The estimated equation selected in the analysis was based on levels of significance of each β_i, and on the frequency ratio obtained from the actual dependent value to its predicted value using individual response data in alternate estimated equations.

The binomial analysis of the questionnaire data suggested there were two distinct groups who responded that profits had been unsatisfactory during the last three years. One group appeared to be seeking greater growth, referred to as the "type A" group (i.e., they are always trying harder, as opposed to their type B counterparts). The other group, denoted the "negative net revenue" group, was hypothesized to be earning insufficient revenue to cover all expenses. From a financial perspective, these two groups likely occupy opposite ends of the spectrum. Based on the anecdotal evidence obtained in phone conversations, attached as written comments to the returned questionnaires, and in the binomial model analysis, the respondents reporting unsatisfactory profits were divided into the two groups described above according to individual responses to specific questions in the questionnaire. This allowed for the dependent profitability question to have three response options: profits (*a*) have been satisfactory, (*b*) have been satisfactory but insufficient to meet expectations, and (*c*) have failed to cover all expenses. These three dependent variable response options also give rise to the multinomial model. Dividing the original 62 "profits unsatisfactory" responses into the two new response groups created 46 "negative net revenue" responses and 16 "type A" responses, along with the 124 "profits satisfactory" responses.

Table 2. Estimation Results for Binomial Logit Model with the Dependent Variable (*Y*) as Two Profit States (Satisfactory or Unsatisfactory), and Predictions of the Probability of Profit States Given Alternate Firm Characteristics

			Alternate **x** Values				
x Variables	**β**	β_i/σ_i	(I)	(II)	(III)	(IV)	(V)
Value added, inventory	2.59	3.80	1	0	0	0	0
Expansion capital source, venture	0.91	1.09	1	1	1	1	1
Expansion capital source, retained savings	1.63	3.90	0	0	0	0	0
Actual workshops per worker	0.29	1.61	1	1	1	1	1
Needed firm knowledge, ABC accounting	−2.25	−3.95	1	1	1	1	1
Needed firm knowledge, service	−1.97	−3.50	0	0	0	0	1
Logistics cost reduction, partnering	−1.45	−1.64	1	1	1	1	1
Logistics cost reduction, personnel	−1.06	−2.28	0	0	0	0	1
Logistics cost reduction, capital	−2.10	−3.88	0	0	0	0	1
Enter internat. trade, acquire internat. firm	2.02	1.29	1	1	1	1	1
Enter internat. trade, export	2.11	2.66	0	0	0	0	1
Enter internat. trade, joint venture	1.52	2.15	0	0	0	0	0
Send and receive orders, mail	−1.68	−2.49	1	1	1	1	1
Arrange shipping, contract fleet	1.66	1.49	1	1	1	1	1
Customer geographic zone, local	1.24	2.64	1	1	1	0	0
Time activities, personnel management	3.45	3.71	1	1	0	0	0
Inventory management, supply vendors	0.84	0.83	1	1	1	1	1
Prob(*Y* = Satisfactory) =			1.00	0.99	0.83	0.59	0.06

Notes: The first column represents the independent variables (**x**) in the estimated equations, which are options from the questionnaire. Numerical entries in the second column are the estimated coefficients, **β**. The third column contains the computed $Z_i = \beta_i/\sigma_i$ values for significance testing under the standard normal distribution. Generally, $|Z_i| < 1.64$ are weak, being above a 10% significance level. The columns labeled (I)–(V) indicate the presence (= 1) or the absence (= 0) of the x_i characteristic. The probability of the profit state (the last row of the table) is computed as Prob = $e^{\beta' \mathbf{x}}/(1 + e^{\beta' \mathbf{x}})$.

Results

Results are presented first for the binomial estimation. The estimated equation is then used to compute the probability of being in a satisfactory or unsatisfactory state given alternate **x** values. Next, results are presented for the multinomial estimation which represents the hypothesis that responses could be used to further decompose the negative response to the profitability question into two groups: the "type A" group and the "negative net revenue" group.

The best binomial estimation, balancing coefficient significance with predictive accuracy, contained 17 of the 74 possible response options from the questionnaire (table 2). The response variables in the estimated equation included: the best method of adding value being inventory; acquiring capital by venture investors and allied

Table 3. Frequencies of Actual and Predicted States Using Questionnaire Data for the Binomial Logit Model: Unsatisfactory Profits (= 0), or Satisfactory Profits (= 1)

	Predicted		
Actual	0	1	Total
0	40	22	62
1	10	114	124
Total	50	136	186

Note: Predicted accuracy is 154/186 = 0.83.

businesses; the workshop numbers per worker per year; needed firm knowledge in activity-based costing and in customer service; logistics cost reduction by partnering, by enhanced personnel capability, and by investment capital; entering international trade by international firm acquisition, exporting through an agent, and joint ventures with a partner; sending and receiving orders by mail; shipping arrangements through contract; geographic zone of customers being a local neighborhood; the most time-consuming activity being personnel management; and inventory management by supply vendors. Table 2, also reports the estimated coefficients on each response variable and the computed *Z*-values for significance testing.

Prior to predicting the probability that a firm would be perceived as profitable using alternate **x** responses, consider the prediction accuracy of the estimated equation. As stated earlier, the final equation selected in the analysis was obtained as a trade-off between individual coefficient significance and prediction accuracy. Overall, the prediction accuracy of the estimated equation was 154 correct out of 186 predictions based on the original questionnaire response data (table 3).

Finally, the estimated binomial model was used to predict alternate probabilities of the profit state using artificial questionnaire responses [table 2, column headings (I)–(V)]. For example, the probability of a 100% profitable state is found by substituting the **x** values indicated in table 2, column (I) into $\text{Prob} = e^{\beta'\mathbf{x}}/(1 + e^{\beta'\mathbf{x}})$. The alternative questionnaire responses that yielded this result include: the best method of adding value being inventory control; capital sources by venture investors; workshop numbers; needed firm knowledge in activity-based cost accounting; logistics cost reduction by partnering; entering international trade by international firm acquisition; sending and receiving orders by mail; shipping arrangements by contract; the geographic zone of customers being a local neighborhood; the most time-consuming activity being personnel management; and inventory management by supply vendors.

Alternate questionnaire responses [table 2, column (V)] that yield the other end of the financial scale—i.e., the **x** responses that predict an unsatisfactory view of profits—include: capital sources by venture investors; workshop numbers; needed firm knowledge in activity-based costing and customer service; logistics cost reduction by

partnering, enhanced personnel capability, and investment capital; entering international trade by international firm acquisition, and exporting through agents; sending and receiving orders by mail; shipping arrangements by contract; and inventory management through supply vendors.

An aspect of the binomial model in predicting probabilities of the profit states was its shift from predicting profitable to unprofitable with only a few changes in questionnaire response options. In particular, altering responses related to logistics and personnel management makes the outcome move from relatively high to low probabilities without many 50-50 type predictions. To explore this characteristic of the binomial model in greater depth, the multinomial model was developed.

Again, as was done in the binomial case, a balancing of coefficient significance and predictive accuracy was used in selecting the final multinomial equations (two equations for three profits states). First, examining the explanatory variables (table 4, column 1) selected under the multinomial estimation, there is one less dependent variable in the estimated equations than in the binomial, dropping from 17 to 16 out of 74 possible response variables. The variable options are: firm type being food manufacturing and retail supermarket; firm size by employee numbers; workshop numbers; capital source being friends/relatives, or the bank and the Small Business Administration (SBA); gross annual payroll; need more employee workshops; needed firm knowledge in activity-based costing and customer service; training costs; limits to reduce logistics costs being capital; steps to enter international markets being to acquire an international firm; product pricing to follow competition; sending and receiving orders by mail; and most time-consuming activity being personnel management.

The sign and magnitude of the coefficient values estimated for the two equations (table 4, columns 2 and 3) indicate generally the effect the associated variable will have on the probability of being in a given state. For example, consider the variable of capital source from friends/relatives. If a firm has this characteristic, it will increase the odds of being in the "negative net revenue" state, but will lower the odds of being in the "type A" state.

Examining the significance of the coefficients, compare the probability that the computed *Z*-statistic exceeds a critical value **z** (table 4, columns 4 and 5). Note that variables which tend to be significant in one equation tend to be insignificant in the other. This aspect of the multinomial model reinforces the need for dual measures (significance and predictive accuracy) in selecting the final variables to include in the estimated equation. Comparing the predictive accuracy of the binomial estimation to the multinomial estimation, note that as the number of states predicted increases (two versus three), the total absolute accuracy declines, from 83% (table 3) to 71% (table 5), yet relative accuracy improves. That is, when predicting two states, if predictions are random, prediction would be 50% in each state. The binomial model estimate yields a 33% improvement over a random assignment. Under the multinomial model, three states must be predicted, or any one state would earn 33% under random assignments, yielding a relative accuracy improvement of 38%.

Table 4. Estimation Results for Multinomial Logit Model with the Dependent Variable (*Y*) as Three Profit States: Satisfactory (= 0), Unsatisfactory as Negative Net Returns (= 1), and Unsatisfactory as Type A (= 2)

	Est'd Coefficients		β_{ij} Significance Levels		
x Variables	Neg. Net Returns ($\beta_{j=1}$)	Type A ($\beta_{j=2}$)	$P_{j=1}[\lvert\mathbf{Z}\rvert] > \mathbf{z}$	$P_{j=2}[\lvert\mathbf{Z}\rvert] > \mathbf{z}$	Means of **x**
Firm type, manufacturer	−0.517	−1.366	0.35	0.04	0.18
Firm type, retail supermarket	−0.645	−31.711	0.21	0.00	0.10
Firm size by employee numbers	0.003	0.002	0.23	0.59	61.13
Actual workshops per worker	−0.798	0.050	0.02	0.87	0.98
Capital source, friends/relatives	0.980	−31.089	0.22	0.00	0.06
Capital source, bank or SBA loan	0.131	−0.771	0.75	0.17	0.41
Gross payroll ($K)	0.002	0.000	0.04	0.98	346.15
Need more employee workshops	0.088	−1.317	0.81	0.04	0.63
Needed firm knowledge, ABC accounting	1.711	0.825	0.00	0.31	0.20
Needed firm knowledge, service	2.546	0.035	0.00	0.97	0.19
Training costs	0.002	0.005	0.11	0.17	538.35
Logistics cost reduction, capital	1.141	−30.924	0.02	0.00	0.24
Enter internat. trade, acquire internat. firm	−2.805	−0.462	0.08	0.67	0.03
Product pricing, price follower	−0.330	−30.888	0.64	0.00	0.13
Send and receive orders, mail	0.768	0.241	0.27	0.82	0.12
Time activities, personnel management	−0.398	−32.336	0.46	0.00	0.28

Notes: The first column represents the independent variables (**x**) in the estimated equations, which are options from the questionnaire. Numerical entries in the next two columns are the estimated coefficients, $\boldsymbol{\beta}_j$. The fourth and fifth columns contain significance levels for the respective β_{ij}. Entries in the final column are the means of the x_i values, where values less than 1 indicate yes/no options in the questionnaire.

Table 5. Frequencies of Actual and Predicted Outcomes Using Questionnaire Data for the Multinomial Logit Model with Three Profit States: Satisfactory (= 0), Unsatisfactory as Negative Net Returns (= 1), and Unsatisfactory as Type A (= 2)

	Predicted States			
Actual States	0	1	2	Total
0	98	14	12	124
1	17	29	0	46
2	9	2	5	16
Total	124	45	17	186

Note: Predicted accuracy is 132/186 = 0.71.

Table 6. Predicted Probabilities on Each of Three Possible Profit States Using Alternate x Values: Profits Satisfactory (= 0), Profits Unsatisfactory as Negative Net Returns (= 1), and Profits Unsatisfactory as Type A (= 2)

	Alternate **x** Values		
x Variables	(I)	(II)	(III)
Firm type, manufacturer	0	0	0
Firm type, retail supermarket	0	0	0
Firm size by employee numbers	61	61	61
Actual workshops per worker	0	1	2
Source of expansion capital, friends or relatives	1	0	0
Source of expansion capital, bank or SBA loan	0	1	0
Gross payroll ($K)	346	346	346
Need more employee workshops	1	1	0
Needed firm knowledge, activity-based cost (ABC) accounting	1	0	1
Needed firm knowledge, customer service	1	0	0
Training costs	538	538	538
Limits logistics cost reduction, capital	1	0	0
Steps to enter international trade, acquire international firm	0	0	1
Type of product pricing, price follower	1	1	0
Send and receive orders by mail	1	0	0
Time-consuming activity, personnel management	1	0	0
Profit State:	Probability of Profit State		
$j = 0$, Satisfactory	0.01	0.94*	0.35
$j = 1$, Unsatisfactory as Negative Net Returns	0.99*	0.06	0.00
$j = 2$, Unsatisfactory as Type A	0.00	0.00	0.65*

Notes: The columns labeled (I)–(III) indicate the presence (= 1) or the absence (= 0) of the x_i characteristic. Values greater than 1 indicate the mean value of the characteristic, except in the case of workshops (which are actual values). The profit state probabilities are computed from: $\text{Prob}(Y = j) = e^{\boldsymbol{\beta}_j'\mathbf{x}}/(1 + \sum_0^J e^{\boldsymbol{\beta}_j'\mathbf{x}})$.

Using the estimated multinomial equations to calculate how alternative questionnaire choices would affect the probability of being in each of the three profit states [table 6, columns (I)–(III)], initially all firm types, firm size by employee numbers, payroll, and expenditures per workshop were held constant. For example, a 99% probability of being in a negative net revenue state is found by substituting the **x** in table 6, column (I) into $\text{Prob}(Y = j) = e^{\boldsymbol{\beta}_j'\mathbf{x}}/(1 + \sum_0^J e^{\boldsymbol{\beta}_j'\mathbf{x}})$. Questionnaire choices that yielded this outcome included: no employee workshops, acquiring capital from friends and relatives, a perception that more workshops were needed, and a perception that additional information was needed on activity-based cost accounting and for customer service.

Also contributing to a high probability that profits would be viewed as net negative were choices in viewing capital as the limiting factor to reducing logistics costs,

not being in an international market, being a price follower, sending and receiving orders by mail, and having personnel consume the most management time. Holding these responses constant and switching to either a manufacturing or retail supermarket firm would alter probability distributions so that they were weighted greater on the satisfactory profit state. Increasing firm size by increasing average payroll and employees would lower the probability that profits were viewed as net negative, but never below a 50% likelihood.

Variable choice responses in the estimated model that predict a 94% chance that profits are viewed satisfactorily include one employee workshop per year, acquiring capital from banks or the SBA, no perception that activity-based accounting or customer service information would be useful information, and being a price follower. Key response variables that shift the probability from the first state of having a high likelihood that profits will be viewed as satisfactory to the net negative state are number of employee workshops, capital sources, capital no longer being seen as limiting reduced logistics costs, not using mail for orders, and management time being spent on issues other than personnel.

The third profit state predicted using the estimated multinomial equation was that profits are now unsatisfactory because, while being positive, it was assumed they could be larger. A 65% likelihood was simulated if the firm was involved in international trade through acquiring an international firm, and had an increased number of workshops for employees per year over the previous two states. Capital is not viewed as a barrier to reducing logistics costs, although a need for activity-based cost accounting information exists. Interestingly, this suggests these firms may see opportunities to increase profits through cost control as opposed to infrastructure development. The firms in this state do not see themselves as price followers, implying a relatively high level of marketing sophistication. Holding these responses constant and increasing firm size rapidly shifts the probability weight from this state to being largest on the satisfactory state, again emphasizing the importance of economies of size in perceptions.

Summary and Conclusions

Business leaders must choose courses of action over three general classes of decisions: static marginal adjustments in inputs and outputs, multi-period investment, and strategic courses. While there is a large body of literature examining static and dynamic decision concepts that surround implementation and execution, there is almost no literature related to empirically measuring strategic decisions in an industry. To examine the future strategic directions of the south Texas food marketing industry, data from three sources were compiled.

Initially for background context, county business pattern data from the U.S. Department of Commerce (1993–95) were disaggregated to provide a general trend of the food marketing industry in south Texas. Food marketing was defined to include service, transportation, manufacturing, wholesaling, and retailing sectors.

The data indicate that overall, the food marketing sector has grown in firm numbers, employees, and average wages between 1993 and 1995. Secondary information was collected from benchmarking studies on best management practice industry trends. These studies report the more competitive firms are implementing information technologies to reengineer logistics across all levels of the market channel. Additionally, this information was used to define questions for a firm business leaders' questionnaire. Its design included questions in the topical areas from the five direct and four indirect areas Porter (1998) identified as the firm's value chain.

The original questionnaire was designed so that the level of satisfaction regarding profits over the last three years formed the independent variable, answered as either a satisfactory (1) or unsatisfactory (0) response option. Other questions identified firm characteristics and strategic intentions, and served as dependent variables in the regression. The survey was distributed to 626 firm managers; 186 completed surveys were returned, yielding a response rate of 29.7%.

Data obtained from the questionnaire were analyzed using binomial and multinomial procedures. Analysis of data by binomial procedures, combined with written comments and phone conversations, suggested the group that responded to profits as unsatisfactory could be decomposed into two groups. A scoring process was used based on responses to other independent variable questions to partition the original group that responded profits were "unsatisfactory" into two new groups: a "negative net revenue" group, and a "type A" group that was hypothesized to be earning positive profits, but which nonetheless sought greater revenue.

Analysis using multinomial logit regression of the three responses—(*a*) profits are satisfactory, (*b*) profits are net negative, and (*c*) profits are adequate but need to be better—revealed the sharpest picture of industry strategic intent. Relating this back to the value chain activities described by Porter, firms that view themselves as having satisfactory profits, or are seeking to increase profits, display responses that appear to be focusing strategic intent in the direct value-added arena. They are accomplishing this through improvements in market pricing by rejecting price-following activity, and in logistics. Logistics strategies are interwoven with marketing in the area of international trade and the demand for activity-based cost accounting information. This is particularly evident with respondent simulations that suggested profit increases could come from logistics cost control, not additional infrastructure through capital acquisition.

At the indirect level, firms are focusing on human resources. This is seen as a direct correlation with workshop numbers and in firm investment in workshops, and the perception that profits are either satisfactory or can be improved. Additionally, smaller sized firms that have acquired an international market appear to be positioning by altering firm infrastructure to include an international component. Developing international trade was less important in the sample as firms increased in size, but this finding may be related more to the sample or regional firm characteristics, which appear sensitive to Mexican trade, rather than to a national trend.

Even for those respondents categorizing their firms as relatively small size (as measured by gross payroll or employee numbers), information technologies appear

to be a significant component in industry strategy. This result is not directly targeted by any one response, but the ensemble of combined responses related to increased numbers of workshops, more investment in training, less reliance on mail for ordering, and market pricing schemes.

Interestingly, firms appear not to be focusing simply on technology acquisition; rather, a more complex picture emerges. Firms are concerned indirectly with building human capacity to utilize information technology to add product value, and the direct mechanism is through application of the technology to establish more competitive pricing and logistics cost control, or through marketing and, in particular, international expansion.

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