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RESEARCH

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Thomas L. Sporleder and Juan Liu

Intangible assets are increasingly becoming an important driver in the sustainability and competitive advantage of food firms within the global food supply chain. Brands are an important component of the food supply chain. In addition, brand names and building brand equity over time are recognized as an important strategy that enhances the firm's intangible assets over time. This article investigates the long-run potential of brand equity among food firms to actually create real options for a firm's management.

The value of a real option is embedded in strategic flexibility when irreversible investments are made under uncertainty. The value of decision flexibility in some future time period may be important. This analysis quantifies the 'value' that may be associated with this enhanced flexibility. Building brand equity also builds brand extension potentials for the future. Hence brand marketing investment is conceptually analogous to buying a call option. Subsequent exploitation of these potential brand extensions is a right but not an obligation for firm managers.

The empirical analysis views brand equity among food firms as a real option of growth and empirically tests selected drivers that are conceptually associated with firm growth. Results indicate that brand equity has a positive effect on the growth option value of the firm, after accounting for other major drivers of firm growth. Brand equity elasticity is estimated with respect to a firm's growth value for both the industry- and firm-level. One major implication of the analysis is that managers of food firms should evaluate the efficacy of brand equity building strategies in terms of the contribution brand equity makes to the firm's growth option value. The evidence suggests that categorizing and managing advertising expenditures solely as an expense item may be too narrow from a strategic viewpoint.

Consumer Reaction to Beef Safety Scares

Sayed H. Saghaian and Michael R. Reed

A key question regarding consumer behavior is how consumers react when faced with unexpected food safety concerns and whether consumer responses to sudden, unanticipated beef safety scares are consistent with rational well-informed consumer behavior. Better understanding of consumer reactions to beef safety scares helps the beef industry construct strategies that restore consumer confidence after food safety crises.

Beef safety scares have short-run and long-run impacts on consumer preferences. The overall objective of this research is to investigate the impact of the foot and mouth disease (FMD) and Bovine Spongiform Encephalopathy (BSE) events on Japanese retail meat quantities and prices, as evidenced by dynamic retail-level changes in the neighborhood of each event. We use a co-integrated vector auto-regression model, directed acyclic graphs, and historical decomposition to investigate Japanese consumer responses to the news of beef safety events.

The results of this research help beef producers and retailers better understand consumer reactions to beef safety scares. The historical decompositions of the per capita consumption and price series indicate that quantity and price responses in the neighborhood of FMD and BSE events were dissimilar and consistent with well-informed, rational consumer behavior. For example, quantity demanded of Australian beef, which is primarily grass-fed, fish, and poultry rose upon the discovery of BSE, while quantities of primarily grain-fed beef fell precipitously.

Consumers respond to information regarding the origin and type of contaminated beef products, and account for the nature of the contamination in their purchasing decisions. Beef exporters and producer groups can use the study's findings as a rationale for credible quality assurance programs that emphasize effective and transparent communication with consumers. The findings also highlight the need for beef industry representatives to be immediately involved in providing the mass media with accurate information when a safety crisis arises. Consumers consider food safety an entitlement, and most are unlikely to pay large premiums for safety assurance unless crises are frequent or locally prominent. However, credible efforts that raise consumer confidence in an entire nation's beef supply may be justified by their ability to reduce erosion of demand and market share when safety crises do occur.

An Evaluation of Customer Relationship Management (CRM) Practices among Agribusiness Firms

Antonio Torres, Jr., Jay T. Akridge, Allan Gray, Michael Boehlje and Richard Widdows

Customer Relationship Management (CRM) has received much attention in the business press as a management process to enhance a firm's performance. While discussed extensively in the popular press, there has been little research conducted

on CRM, its components, how CRM programs are implemented and managed, and what impact, if any, CRM has on firm performance. Additionally, there are virtually no studies on CRM in agribusiness firms.

Based on an extensive literature review, six activities/behaviors that ought to comprise a CRM program for agribusinesses were identified: CRM objectives, types of customer data available, uses of customer data for managerial decision-making, approach to market, tactics used to develop and maintain relationships with customers, and the assessment of technology infrastructure currently in use. The relationship of these six areas, as well as challenges encountered in using customer data, to perceived performance of the firm's CRM initiative is explored in this study.

Middle and upper level agribusiness managers were contacted to assess their CRM programs along the eight dimensions described above. Cluster analysis was used to develop a taxonomy of respondents based on their perceived CRM performance; the resulting cluster solution was then used to profile each cluster on both demographic variables as well as the core set of activities/behaviors/outcomes to better understand key differences in the CRM programs of agribusinesses.

Overall, three distinct segments were identified: Leaders, Emerging Leaders and Underachievers. The narrative profile developed for these segments found that those agribusiness firms that performed best had loftier goals, collected more sophisticated customer data, used an array of tactics to develop and maintain customer relationships and encountered fewer challenges to making the best use of customer data in an information system/database.

An Empirical Analysis of the Determinants of Success of Food and Agribusiness E-Commerce Firms *Fernando Montealegre , Sarahelen Thompson, and James S. Eales*

Agriculture and the food service markets have historically been quick adopters and assimilators of new technologies, especially cost reduction technologies. Agriculture was identified as one of the great promises of e-commerce; the high level of fragmentation present in the supply chain, large volumes traded, and homogeneous products only reinforced the expectations.

The objective of this study is to identify characteristics that are associated with successful e-commerce firms throughout the agricultural and food supply chain. This research will help food and agribusiness e-commerce firms in their struggle to remain in business, provide a method of estimating the probability of survival of e-commerce sites, and evaluate feasible changes to a website's functioning and the likelihood of survival based on these changes. Increasing the benefits of e-commerce available to firms throughout the agricultural and food supply chain is the ultimate purpose of this study.

Relevant e-commerce and agricultural e-commerce literature suggested a series of characteristics that will serve as determinants of success for agricultural and food chain e-commerce firms. The development of a model that relates these characteristics to the firms' probability of survival produces valuable insights for developing e-commerce ventures and could be used to estimate the effect on the probability of survival of feasible changes in existing e-commerce firms.

Factors which increase the probability of survival of agricultural e-commerce sites: providing a community feature displaying valuable market information and customizable settings for users, catering to buyers or sellers, but not both, avoiding deep markets with intense competition, using auctions, and providing one-stop shopping. E-Commerce survival of food service sites is enhanced when they provide market information in a customizable format, using auctions and avoiding exchanges or private negotiations.

The Canadian Dairy Commission: an empirical survey on its relevance in today's civil society *Sylvain Charlebois , Wolfgang Langenbacher, and Robert D. Tamilia*

Little academic research has investigated marketing boards and the CDC, especially from a managerial and marketing perspective. To address this shortcoming, the current study provides critical insight into consumers' perception and knowledge of the CDC and its role within the Canadian dairy industry.

The methodological orientation of the study combines both secondary research and quantitative measurement to offer a unique perspective in the way the marketing of dairy products to consumers in Canada is done. The study also has public policy implications about the democratic process as it applies to the CDC, a government institution. Notwithstanding that the CDC is a federally funded agency that operates under the Canadian supply management scheme; the current study provides a template for consultative research specifically targeting consumers of dairy product.

The majority of consumers surveyed were unable to state the exact purpose of the CDC. Given that the CDC's mandate is to serve the interests of consumers, this is evidence of consumer ignorance about how dairy products are priced in Canada.

Canadian dairy farmers need to recognize very quickly that the insulated market position and price fixing powers they now enjoy divorce them from domestic consumers needs.

CASE STUDIES

Strategic Marketing Decisions for Organic Agricultural Producers

Jon C. Phillips and H. Christopher Peterson

A group of organic agricultural producers facing a strategic decision is featured. The group is planning to form an organization to market their produce jointly. If they decide to proceed with this undertaking, they will have to select a distribution channel. The case begins with a discussion of the physical capital and human resources under the control of the growers involved. It includes an overview of the demand for organic produce at the local and national levels. The case also presents the demand conditions, requirements, advantages, and disadvantages of different distribution channels for organic vegetables, both on a general level and as they relate to this particular group. The following channels are addressed: roadside stands, farmers' markets, distributors, retailers, restaurants, institutions, and processors. Pros and cons are listed for each channel, as they relate to the particular situation under consideration. Study questions for use in an academic course or workshop are included.

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Growth-related Measures of Brand Equity Elasticity for Food Firms

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Abstract

Brand names and brand equity are recognized as important intangible assets among firm managers in the global food supply chain. This analysis investigates the long-run potential of brand equity among food processors to actually create real options for a firm's management. The empirical analysis views brand equity among food processors as a real option of growth and empirically tests selected drivers that are conceptually associated with firm growth. Results indicate that brand equity has a positive effect on the growth option value of the firm, after accounting for other major drivers of firm growth. Brand equity elasticity is estimated with respect to a firm's growth value for both the industry- and firm-level. One major implication of the analysis is that managers of food firms should evaluate the efficacy of brand equity building strategies in terms of the contribution brand equity makes to the firm's growth option value. The evidence suggests that categorizing and managing advertising expenditures solely as an expense item may be too narrow from a strategic viewpoint.

Keywords: brand equity; brand valuation; real options; food firms; growth option value

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Introduction

Real options logic provides a novel approach for examining firms' long-term specific investment which may have option-like properties (McGrath et al., 2004). This investigation posits that brand equity captures real options components in the sense of brand extension potential and therefore future firm growth in the long-run. The relationship between brand equity and a firm's growth is examined empirically by estimating an elasticity of brand value with respect to food and beverage firms' growth option value. This elasticity estimate provides an empirical means of tying a change in brand equity to a change in the growth value of the food firm.

The Importance of Brand Equity

Brand equity is an important element of the total intangible asset base of firms, especially in the global food system. Firm assets often are categorized as tangibles composed of the 'hard' assets such as land, buildings, machinery, and equipment along with the intangibles, representing the so-called 'soft' assets of the firm. Brand equity is one of several different types of intangibles that a firm may own. Other intangibles assets may include copyrights, trademarks, patents, firm specific knowledge, and the social capital of its employees. Intangibles may be an important part of competitive strategy for a firm by providing the basis for an advantage over rival firms and becoming the foundation for inimitable value that is sustainable over time (Porter, 1985).

Creation and maintenance of intangible assets such as brand equity is becoming more important in today's intensely competitive environment. Traditional accounting methods of valuing intangibles are increasingly inadequate: the balance sheet records historical costs and expenses investments in intangibles. According to the balance sheet, "the more a company invests in its future, the less its book value is" (Rodov and Leliaert, 2002). The gap between the values recorded in the corporate balance sheet and the capital markets' valuation of the business enterprise is widening (Lev, 2001). Some recent attempts have been made to quantify and explain this difference and its components.

Brand equity is a major value driver of intangible assets, especially in consumer-based industries such as food processing (Sporleder and Louiso, 2004). As a firm asset, brand equity requires development and maintenance expenditures, but management often questions how much investment a brand needs. This question often is complicated by the ambiguity of brand value.

Brand Valuation

Several different definitions of brand equity have been offered over the years. Many of them are consistent with Farquhar's (1989) definition of brand equity as the

value added by the brand to the product.[1] In financial reporting, accounting for brand valuation is relatively new (since the mid-1980s). The wave of brand acquisitions in the late 1980s highlighted the need for accurate brand equity valuation (Motameni and Shahrokhi, 1998; Seetharaman et. al, 2001).

Generally there are two perspectives for brand equity valuation, i.e. consumer-based and financial-based (Lassar and Sharma, 1995). The consumer-based valuation focuses on brand strength among consumers and the efficiency of market process. The financial-based valuation involves various measures of a price premium that may be attributable to quality perception on the part of the customers of the product or service. Several means are available for calculation of price premiums on branded products including the cost method, market method, income method, and the formulary method (Cravens and Guilding, 1999; cited by Seetharaman et. al, 2001). The cost method is regarded as conservative while the remaining methods recognize some element of 'future potential' in the metric. Motameni and Shahrokhi (1998) introduced the formulary valuation method by Interbrand Group in conjunction with Financial World as one of the most comprehensive approaches for brand valuation.

Each year Interbrand publishes its "Top 100 Brands" in *Business Week* magazine. The Interbrand approach may be the most popular and well-recognized method of brand valuation in the world. The Interbrand Group is a British brand-management consulting firm with offices in 35 countries. In contrast to other methods, Interbrand actually calculates dollar values for specific brand names. This dollar value is essentially the discounted cash flow attributable to the brand after stripping out operating costs, tax and other intangible earnings, i.e. a five-year weighted average of net present values obtained as the products of brand earnings and the discount rate. To merit consideration in the annual survey firms must meet three specific criteria. The brands valued must:

- derive at least one third of sales from outside their home countries,
- have brand valuation greater than $1 billion, and
- have publicly available financial and marketing data.

Interbrand first determines the brand's overall sales and then deducts a charge for owning and maintaining the tangible assets. The income generated beyond the cost of tangible assets is due to intangible factors. Interbrand then separates earnings generated by the brand from the earnings generated by other intangibles. This is done through market research and interviews with industry executives. The final phase is to establish the risk of the brand in order to estimate an appropriate discount rate. To calculate brand strength Interbrand uses seven factors including market leadership across geographic and cultural boundaries. The risk analysis

[1] See Keller (1998, P43) for a summary of alternative definitions of brand equity.

procedures produce a discount rate that is applied to brand earnings to calculate NPV of the brand. The concern of product life cycle is included in such evaluation by using a terminal value to account for the life of the brand and in determining the discount rate of the future cash flows.

Although the Interbrand approach is a method developed by consultants, their estimates of brand equity have been studied in academic literature. Barth et al. (1998) examined the reliability of these estimates and the market's reaction to brand valuation. The authors' findings suggest that Interbrand value estimates are relevant and sufficiently robust to be reflected in market value of equity..

Real Options, Brand Equity, and Firm Growth

Real Options Value in Brand Equity

Real options logic provides a novel means of assessing brand value in terms of future potentials. The value of a real option is embedded in strategic flexibility when irreversible investments are made under uncertainty (Dixit and Pindyck, 1994). Such value can be simply shown in the "expanded NPV" framework as (Trigeorgis and Mason, 1987):

$$\textit{Expanded NPV} = \textit{Static (passive) NPV} + \textit{Option Premium}$$

Traditional DCF approaches focus on static NPV while ignore the managerial flexibility of adapting future operating strategy which may bring opportunities for larger benefits and future growth. With such managerial flexibility managers can exercise the option in future desired state and not exercise otherwise. Such flexibility expands the opportunity's true value relative to passive NPV by improving its potential profit while limiting losses. Trigeorgis and Mason (1987) described this as "asymmetry" or "skewness" in the distribution of the value of the project.

Essentially the notion is that the value of decision flexibility in some future time period may be important in some situations. The idea then is to quantify the 'value' that may be associated with the flexibility. Real options logic invites the analyst to use a conceptual foundation based on the value of managerial flexibility (McGrath et al., 2004).

Dias and Ryals (2002) used a real options framework to analyze returns on brand investment. The real options method attempts to capture the value of brand extensions when estimating brand equity. They argued that traditional methods of brand valuation underestimate returns on brand investment because the focus is placed on generating incremental sales and ignores future brand extension potentials. Traditional methods of valuing brand extension possibilities rely on

discounted cash flow (DCF) analysis, such as net present value (NPV). In contrast, real options logic emphasizes the potential managerial flexibility under uncertainty in the future. Dias and Ryals (2002) view the link between brand marketing and real options as conceptually straightforward. If brand marketing is the means by which the brand is maintained, then by continuing the brand and building brand equity, a real option is created for management through the possibility of future exploitation of brand extensions.

The analysis presented herein aims at providing empirical analysis of financial and strategic factors that may influence the growth option value of firms, especially brand equity. Brand marketing is a vehicle for building brand equity. Building brand equity also builds brand extension potentials for the future. Hence brand marketing investment is conceptually analogous to buying a call option. Subsequent exploitation of these potential brand extensions is a right but not an obligation for firm managers (Sporleder and Louiso, 2004). Moreover, the cost of building and maintaining brand equity using real options logic may substantially influence the conclusions regarding the strategic value of brand equity and the entire firm.

Product life cycle is an important issue for manufacturers and food processors. Bollen (1999) argued that standard techniques for valuing real options typically ignore product life cycle models and specifies instead a constant expected growth rate for demand or price. Myopic investment decisions may result by undervaluing the option to contract capacity and overvaluing the option to expand capacity. This consideration encourages introducing factors such as brand age and firm age into the empirical investigation to proxy product life cycle. The distinction between brand age and firm age allows the analysis to reflect the difference between brands purchased and firm acquisitions of entire businesses.

Growth Option Value of Firms

The contemporary characterization of total firm business value includes assets-in-place and growth potential. The DCF of future income streams from assets-in-place accounts for a portion of current business value of a firm. An additional portion of the total business value of a firm can be characterized as the present value of firm's growth options (PVGO), Figure 1. Firms with market capitalization in excess of a reasonable estimate of the DCF of assets-in-place exhibit a positive PVGO value. Throughout this research, PVGO of a firm is defined as the difference between market value and book value of common equity divided by its market value of common equity.

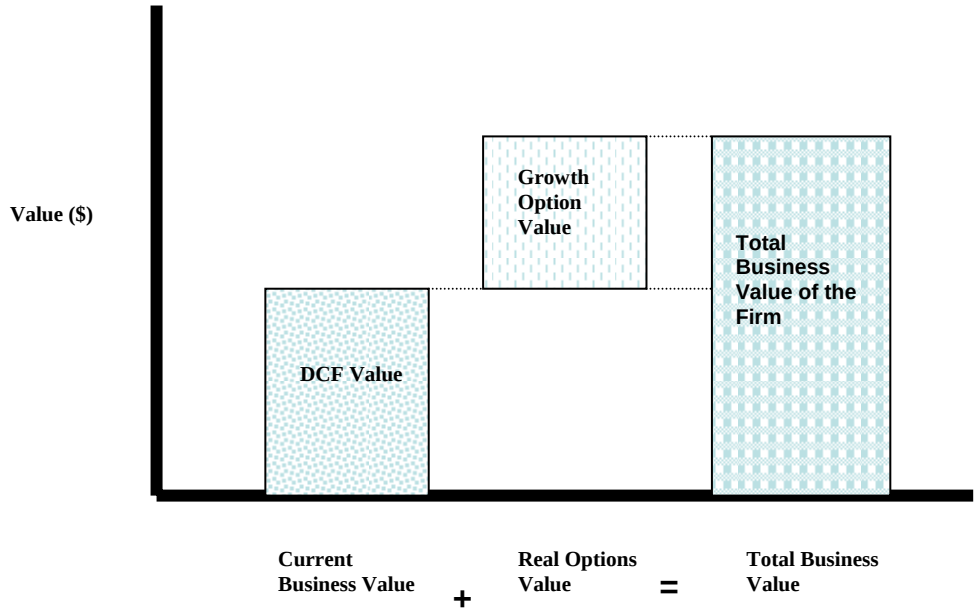

Figure 1. Graphical Representation of the Business Value of a Firm Determined from Both Assets-in-Place and the Present Value of Growth Option (PVGO)
Source: Liu and Sporleder

Studies have shown that the value of growth options can account for a substantial portion of the firm's total value (Myers, 1977; Kester, 1984; Pindyck, 1988). PVGO becomes the metric of interest in empirically measuring the extent to which brand equity provides a real option for managers and thereby enhances firm growth in the long run. A common estimate of growth option value (GOV) of a firm is the difference between the total market value of the company's equity and the capitalized value of its current earning stream. Kester (1984) applied the following formula to GOV calculation:

$$(1) \qquad GOV = VGO / V = [V - Current\ Earnings / Discount\ Rate] / V$$

Brealey and Myers (2000) defined PVGO as the option value of equity and set PVGO equal to the firm's market value of equity minus the value of the assets-in-place from divided by the firm's market value of equity to obtain the portion of equity value due to growth options.

Using a similar concept, Long et al. (2002) estimated the present value of growth options (PVGO) for a sample of manufacturing firms. As support for such measurement, Myers (1977) argued that a high market-to-book ratio should indicate a higher proportion of growth opportunities relative to assets-in-place. Folta and O'Brien (2003) also regarded market-to-book ratio as a broad proxy for growth options.

Empirical Model

This investigation is novel because it investigates the linkage between brand value and firm's growth options value, both theoretically and empirically. Brand equity is expected to exert a positive effect on firm's growth options value. The analytic focus is on the impact of firm's brand value (BRANDV) in terms of a firm's growth option value (PVGO). These two values of BRANDV and PVGO can be regarded as jointly dependent variables and a simultaneous equations model is appropriate:

$$(2a)\ BRANDV_{i,t} = F(Lgbrandage_{i,t}, Advertising_{i,t-1}, Advertising_{i,t}, Salesuncert_{i,t}, Industryuncert_{i,t}*Beta_{i,t}, Advertising_{i,t}*Salesuncert_{i,t}; PVGO_{i,t})$$

$$(2b)\ PVGO_{i,t} = F(Firmage\text{-}dummy_{i,t}, Sustgrowth_{i,t}, Sgnapersale_{i,t}, Leverage_{i,t}, Assets\text{-}in\text{-}place_{i,t-1}, Salesuncert_{i,t}, Industryuncert_{i,t}*Beta_{i,t}; BRANDV_{i,t})$$

where i is the ith firm and t is the year.

System estimation allows for possible cross-equation parameter restrictions (Greene, 2003). Accordingly 3SLS is used for estimation of the linear regression parameters.

Brand value (BRANDV) is regarded as a function of advertising expense, disaggregated uncertainty indicators and the endogenous variable of the firm's growth option value (PVGO). Besides BRANDV other explanatory variables regarded as strategic drives for PVGO include measures of the individual firm's strategic factors regarding operations, investment, financing and dividends. Sustainable growth rate (Sustgrowth) is selected as a proxy for both operation and dividend factors. The leverage ratio (Leverage) is selected as a measure of equity versus debt financing. As an indicator of relative cost structure within a firm, selling, general and administrative expenditures of per dollar of sales (Sgnapersale) is chosen.

Data Sources and Model Specification

In the empirical work reported here, the estimate of brand value is from Interbrand and is scaled by the firm's market value of common equity to account for size differences among firms across the sample. Thus, the primary data source for annual brand equity estimates by firm is obtained from the top 100 global brands calculated by Interbrand and published in *Business Week*. To be considered among this top 100 list, the brand must "have a value greater than $1 billion, derive about a third of its earnings outside its home country, and have publicly available marketing and financial data." Thus all the sample observations are large global corporations with publicly-traded stocks.

The focus is on the food and beverage sector. A firm with more than one top global brand in the same year is associated with the highest ranked brand. Some brands

are excluded from the sample because of incomplete firm financial information. The empirical estimation reported here is based on 50 usable observations during the period of 1999 and 2003. These observations are from 12 firms in the food, beverage or tobacco sector, Table 1.

The relevant firm-specific financial data are from COMPUSTAT, Hoover's Online and Corporate Affiliations'2004 (LexisNexis). Industry-level uncertainty is proxied by the Dow Jones Sector Titans Indexes. Definitions and corresponding proxies for all variables are in Table 2.

The specified simultaneous equations system is adjusted from Liu and Sporleder (2005). The parameters are estimated by 3SLS regression using unbalanced panel data of 50 observations during the sample period of 1999-2003. Lag structures for advertising expense were investigated. However, since there is high positive correlation between the advertising expense of current and previous years for the same firm, only the current year is included in the finalized model. Brand age also is excluded from the finalized model because of high correlation with advertising expense.

Results

Among the 12 top global brands in food sector, most are related with either food or consumer product retailing, Table 1. All companies with top brands in the sample are headquartered in the United States except DANONE, a French company. These top brands all represent more than $1 billion in brand equity value. Over one-third have valuation in excess of $10 billion. Coca-Cola maintains the greatest brand equity valuation of any other brand globally. The brand equity in Coca-Cola is estimated at around $70 billion (during the sample period) which is more than three times the valuation of the second highest brand value, McDonald's.

Of course, brand equity can either increase or decrease over time. There are dynamic aspects to the relative rankings of these brand value as calculated by Interbrand. Pepsi has enjoyed a significant increase in brand equity, nearly doubling in 2003 compared to previous years. Of the 12 top food and beverage brands from 2002 to 2003, one-fourth decreased in value. This suggests that attaining a high level of brand valuation is no guarantee of continued brand value appreciation.

Table 2: Conceptual Variables and Proxies

Conceptual Variable	Calculation	Data Source	Variable Notation
Amount of Brand Equity for an individual brand per $ of the firm's capitalization	Brand value as measured by Interbrand divided by the entire firm's market capitalization	Interbrand, and CompuStat	*BRANDV*
Growth option value of the firm	(Market value of common equity – book value of common equity) / Market value of common equity	CompuStat	*PVGO*
Brand age	ln (Brand age)	Hoover's online[2]	*Lgbrandage*
Firm age dummy	=1 if firm founded earlier than 1940 (mean of the sample founded year); =0 otherwise	Corporate affiliations	*Firm age dummy*
Firm-level sales growth uncertainty	standard deviation of firm's net sales growth rate of past five years	CompuStat	*Salesuncert*
Industry level uncertainty	Standard deviation of industry returns of past five years	Dow Jones Indexes	*Industryuncert*
Sensitivity of firm's return to the market return	Linear regression of $r(firm)_{it}=\alpha_i+\beta_i\, r(industry)_{it}+e_{it}$, where r is monthly return.	CRSP and Dow Jones Sector Titans Indexes	*Beta*
Advertising expenditure per $ of sale	ln [(Advertisement expense)/ (Firm's total sales)]	CompuStat	*Advertising*
Firm's assets-in-place	ln (firm's total assets of the previous year)	Corporate affiliations	*Assets-in-place*
Leverage ratio	(Long term debt + Debt in current liabilities) / Firm's total assets	CompuStat	*Leverage*
Marketing and overhead expense per $ of sales	(Selling, general, and administrative expenses) / Firm's total sales	CompuStat	*Sgnapersale*
Sustainable growth rate	ROE × (reinvestment earnings/net income)	CompuStat	*Sustgrowth*

[2] Brand age is approximated through the firm-specific history information provided in Hoover's Online. Each brand age is calculated as the number of years since the brand was first introduced.

The relative importance of a brand's value is captured in the BRANDV variable calculated as the ratio of brand value over the firm's market capitalization (market value of total common stock). About one-third of the sample firms have BRANDV greater than 0.5. This means that for the largest brand valuations, the brand value alone accounts for over one-half of the firm's market capitalization. On average, about 38% of a food firm's market capitalization is accounted for by brand equity.

Brand Equity Elasticity Estimates

Table 3: 3SLS Parameter Estimates for Simultaneous Equation System Model (using sample among food, beverage and tobacco firms)

Variable	Estimates	
	BRANDV	PVGO
Constant	-0.51 (0.689)	0.75 (0.210)***
Firmage-dummy$_{i,t}$		0.13 (0.065)*
Advertising$_{i,t}$	-0.31 (0.142)**	
Assets-in-place$_{i,t-1}$		-0.05 (0.020)*
Sustgrowth$_{i,t}$		-0.47 (1.156)
Sgnapersale$_{i,t}$		-0.19 (0.194)
Leverage$_{i,t}$		0.40 (0.267)
Salesuncert$_{i,t}$	16.18 (7.542)**	1.46 (0.860)*
Industryuncert$_t$* Beta$_i$	-0.004 (0.002)**	0.003 (0.001)**
Advertising$_{i,t}$ * Salesuncert$_{i,t}$	6.24 (2.613)**	
BRANDV$_{i,t}$		0.57 (0.326)*
PVGO$_{i,t}$	0.41 (0.682)	
System weighted R^2	0.53	
System weighted MSE	1.07	
Number of observations	50	

* p<0.10, **p<0.03, ***p<0.01

Brand equity (BRANDV) is expected to have a positive effect on a firm's growth option value. As shown in the regression results (Table 3), the coefficient of BRANDV is positive and therefore consistent with a priori expectation. For the effect on PVGO, the other variables with significant and positive coefficients are the firm age dummy, sales uncertainty, and industry-level uncertainty. Assets-in-place is identified with a significant and negative coefficient. This indicator implies that

larger firms do not have proportionately the same growth option potential as relatively smaller firms[3].

A unique feature of this empirical research is the estimation of brand elasticities for individual firms as well as across all food and beverage firms taken as a group. Other elasticities for PVGO also are estimated which include assets-in-place and sales uncertainty with respect to PVGO of food and beverage firms, Table 4.

For all food and beverage firms, taken as an average, brand equity elasticity with respect to PVGO is 0.498. This elasticity estimate is comparable with the elasticity of assets-in-place and is larger than that of sales uncertainty elasticity. The brand equity elasticity indicates that for each 10% change in the brand equity (BRANDV), the firm's growth option value (PVGO) changes 4.98% in the same direction. This is an interesting estimate rich with implications. The implication of the elasticity is that brand equity is not only a saleable asset in a firm's arsenal of intangibles, but that this particular intangible actually adds significantly to firm value or market capitalization over time. The further implication is that brand equity building strategies should not be evaluated by managers as simply a 'controllable expense item' in the sense of expenditure items such as advertising and promotion. The PVGO and real options approach to brand equity truly implies that brand equity building strategies are long-term investments for the stakeholders of the firm, broader than mere expense items.

Relative brand equity elasticities for selected individual brands contain interesting implications as well, Figure 2. Among the 12 individual brand elasticities that are estimated, the estimates range from 0.067 (Pepsi) to 0.651 (McDonald's). As the value of firm's growth option value increases the brand elasticity also increases. The magnitude of the disparity between the lowest and highest brand equity elasticities is surprising. Note that the McDonald's brand elasticity is roughly 10 times larger than the Pepsi brand elasticity. This implies that substantial variation across firms would be expected in the elasticities, even across firms within the same economic sector.

[3] However, remember that the sample of firms used for the calculations presented in this research are all very large global firms, as required by Interbrand in order for that brand to be included in the brand equity calculation that Interbrand performs annually. So, 'relatively small' in this instance still means that the corporation that owns the brand is large by most standards.

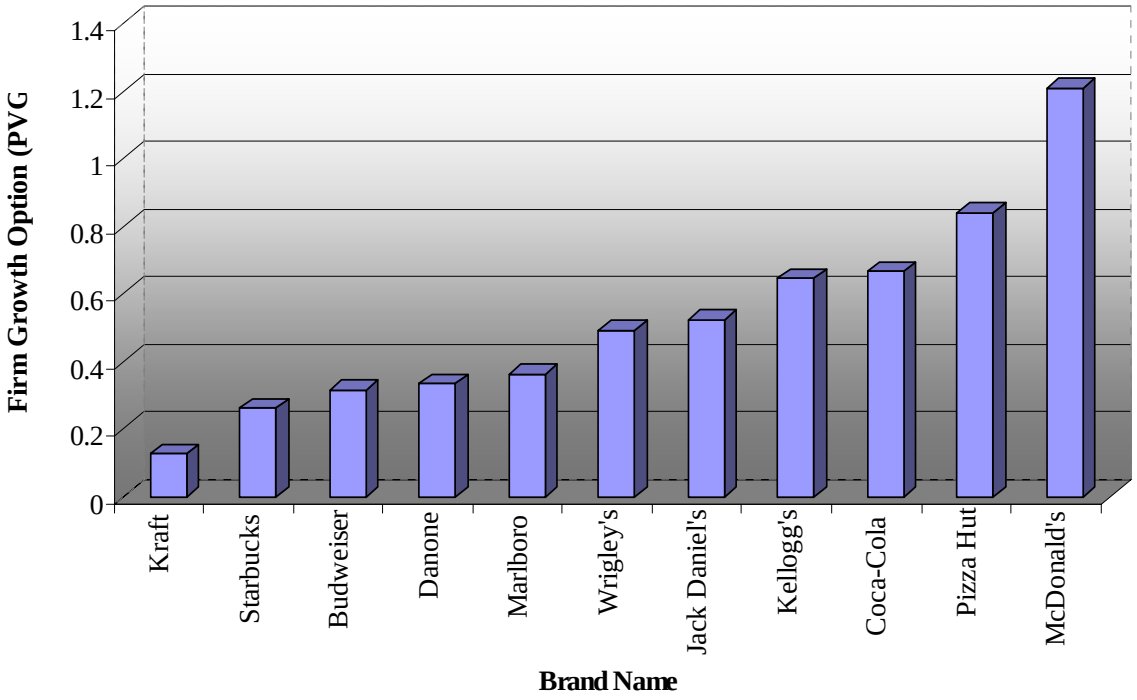

Figure2: Brand Equity Elasticity Estimates for Selected Food Firms

The average assets-in-place elasticity with respect to PVGO is -0.561, which suggests that for each 10% change in firm size, the firm's growth option value (PVGO) changes 5.61% in the opposite direction. The firm-specific estimates range from -0.423 (Wrigley) to -0.960 (Kraft), which present a less variety than brand equity elasticity. Another indication is that firm's growth strategies may vary according to the different impacts of key drivers. McDonald's sees significant firm growth from both brand building and the level of assets-in-place, while Pepsi may have focused more on the latter

Conclusions

Brand names and brand equity are recognized as important intangible assets among firm managers in the global food supply chain. This analysis investigates the long run potential of brand equity among food processors actually creating real options for a firm's management. The empirical analysis views brand equity among food processors as a drive for firm's growth option value and empirically tests other selected factors conceptually associated with firm growth. Results indicate that brand equity has a positive effect on the growth option value of the firm, after accounting for other major drivers of firm growth.

Brand equity elasticity is estimated with respect to firm's growth value for both the industry- and firm-level. For all food and beverage firms, the average brand equity

elasticity with respect to PVGO is 0.498. As the value of firm's growth option value goes up, the brand elasticity also increases. The implication of the elasticity is that brand equity is not only a saleable asset in a firm's arsenal of intangibles, but that this particular intangible actually adds significantly to firm value or market capitalization over time. The wide range of brand elasticity with respect to firm's growth option value indicates substantial variation across firms, even within the same business sector. This further reflects the different focus and/or impacts of firm's investment strategies on growth.

One major implication of the analysis is that managers of food firms should evaluate the efficacy of brand equity building strategies in terms of the contribution brand equity makes to the firm's growth option value. Clearly, strategies that build brand equity should be viewed and evaluated for their real options value to the firm. The evidence suggests that categorizing advertising expenditures solely as an expense item may be too narrow from a strategic viewpoint. The PVGO and real options approach to brand equity truly implies that brand equity building strategies are long-term investments for the stakeholders of the firm, broader than mere expense items.

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Appendix A:

Table 1: World's Most Valuable Brands in Food, Beverage & Tobacco Sector

		Brand Value (Million$)							
	Brand	**2003**	**2002**	**2001**	**2000**	**1999**	**Industry**	**Parent Company**	**Country of Origin**
1	COCA-COLA	70453	69640	68950	72537	83845	Food & Beverages	Coca-cola	USA
2	McDONALD'S	24699	26380	25290	27859	26231	Retail	McDonald's	USA
3	MARLBORO	22183	24150	22050	22111	21048	Tobacco	Altria Group	USA
4	BUDWEISER	11894	11350	10840	10685	8510	Alcohol	Anheuser-Busch	USA
5	PEPSI	11777	6390	6210	6637	5932	Food & Beverages	Pepsico	USA
6	KELLOGG'S	7438	7190	7010	7357	7052	Food & Beverages	Kellogg's	USA
7	PIZZA HUT	5312	6050	6000	N/A	N/A	Retail	YUM Brands Inc	USA
8	WRIGLEY'S	5057	4750	4530	4324	4404	Food & Beverages	Wrigley's	USA
9	DANONE	4237	4050	N/A	N/A	N/A	Food & Beverages	Group Danone SA	France
10	KRAFT	4171	4080	4030	N/A	N/A	Food	Kraft Foods Inc	USA
11	STARBUCKS	2136	1960	1760	1330	N/A	Food & Retail	Starbucks	USA
12	JACK DANIEL'S	N/A	1580	1580	1480	N/A	Alcohol	Brown Forman	USA

Appendix B:

Table 4: Average PVGO and BRANDV; Elasticity for Brand Equity, Firm Size and Sales Uncertainty (Large Food and Beverage Firms with Top Global Brands)

Brand	Firm	Average BRANDV (1999-2003)	Average PVGO (1999-2003)	Derived Elasticity Estimate with Respect to PVGO		
				Brand Equity	Assets-in-place	Sales Uncertainty
KRAFT	Kraft Foods Inc.	0.068	0.568	0.068	-0.960	0.494
PEPSI	Pepsico	0.103	0.877	0.067	-0.566	0.302
STARBUCKS	Starbucks	0.203	0.824	0.141	-0.451	0.101
DANONE	Group Danone SA	0.220	0.698	0.180	-0.517	0.202
MARLBORO	Altria Group	0.267	0.780	0.195	-0.718	0.121
BUDWEISER	Anheuser-Busch	0.270	0.908	0.169	-0.608	0.043
JACK DANIEL'S	Brown-Forman	0.365	0.740	0.281	-0.511	0.039
WRIGLEY'S	WRIGLEY JR	0.409	0.879	0.265	-0.423	0.061
KELLOGG'S	Kellogg	0.564	0.925	0.348	-0.476	0.143
COCA-COLA	Coca-Cola	0.572	0.911	0.358	-0.550	0.055
PIZZA HUT	YUM! Brands	0.738	0.930	0.452	-0.454	0.119
McDONALD'S	McDonald's	0.788	0.690	0.651	-0.724	0.053
Average Industry Level		0.381	0.811	0.498	-0.561	0.197

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Consumer Reaction to Beef Safety Scares[1]

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Abstract

This study examines the impact of two beef safety scares on retail-level meat per capita consumption and prices in Japan. The objective is to investigate the Japanese consumer reactions to the news of FMD and BSE discoveries, as reflected in the quantity and price changes in the immediate neighborhood of each event. Better understanding of consumer reactions to beef safety scares helps the beef industry restore consumer confidence after food safety crises and provides opportunities for national-level product differentiation based on beef quality and traceability.

Keywords: consumer behavior, food safety, beef, Japan.

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Introduction

Food safety scares have short-run and long-run impacts on consumer preferences because of their health and well-being implications. The effects of food safety concerns are part of a dynamic process where consumers often change consumption habits during the scare and later revert to previous buying patterns. Sociological researchers argue that, generally, as a food safety scare receives prominent media coverage, consumers initially over-react by avoiding the identified food item (Mazzocchi, 2005). However, concern gradually diminishes and a new equilibrium is established, though low level anxiety can continue for some time. Any new information that consumers gain during food safety scares can change their behavior when future shocks occur, and as they learn the negative consequences of different safety scares, their reaction to future outbreaks may be heightened. Producers and retailers need to be cognizant of the length and extent of consumer reactions to different food safety scares.

Public awareness of beef safety increased worldwide during the past two decades as a result of highly publicized cases of E. coli food poisoning, foot and mouth disease (FMD) outbreaks and *Bovine Spongiform Encephalopathy* (BSE) scares reported in the EU, US, Canada, Japan, and other regions. Consumer concerns and the public and private costs of beef safety incidents led to increased attention to strategic options for prevention and management of beef safety risks to reassure consumers and address their needs, restore lost markets, and comply with safety regulations.

The Japanese beef industry faced an outbreak of FMD in March of 2000, and a BSE crisis in September of 2001. FMD was reported in cattle in Miyazaki city during March 2000, the first outbreak in Japan since 1908. FMD is a highly contagious disease, so FMD-free countries usually ban imports in many animal and animal products from the infected country when it is detected. Importing countries often have a difficult time in keeping the disease outside their country and from spreading once it enters. Transmission of FMD most commonly occurs during physical or close contact between acutely infected and susceptible animals.

The first case of BSE in Japan was reported on September 10, 2001. BSE is a fatal neurological disease which typically occurs in adult animals aged five years or older. The exact cause of BSE is not known, but it is primary transmitted by feeding of diseased animal products. Consumption of contaminated beef by humans is suspected to cause Creutzfeldt-Jakob disease. BSE discovery in Japan resulted in considerable economic damage to Japanese beef producers as well as food service industries, in part due to the actions of Japanese beef industry and government officials that eroded consumer confidence (McCluskey, et al. 2004). In response to the crisis, the Japanese government launched an aggressive marketing campaign promoting the safety of Japanese beef (Fox and Peterson, 2002).

Heightened visibility appeared to create opportunities for branding, labelling, and product differentiation based on traceability and beef quality. Labelling of credence attributes reduces information costs to consumers and can result in increased demand for quality-assured products. Beef producers and retailers can differentiate their beef products to protect markets, or perhaps earn higher premiums, by using beef safety and quality assurance as a strategic response to consumers' risk perception of beef.

The objective of this study is to investigate the impact of the FMD and BSE events on Japanese retail meat quantities and prices, with emphasis on beef of varying quality and origin. We use a co-integrated vector error correction (VEC) model, directed acyclic graphs, and historical decomposition to investigate Japanese consumer responses to the sudden, unexpected beef safety scares. These dynamic techniques result in a more accurate estimation of the complex interrelated effects among the variables under study than the traditional static demand models. Directed graphs, in particular, allow the errors among the endogenous variables to be incorporated into the forecasted effects of these meat market shocks over time. We trace the dynamic effects of these meat market shocks on retail-level prices and quantities over time to see if these changes are consistent with well-informed rational consumer behaviour.

The Empirical Model and Data

The Data

Fish, poultry, and four beef types identified by type and origin, namely, U.S., Australian, Japanese wagyu, and Japanese dairy beef are evaluated. The sample data for fish and poultry were not distinguished by source of origin. The monthly time-series retail data used by Peterson and Chen (2005) are used in this study[2]. The sample contains 105 observations from April 1994 to December 2002. Retail prices and quantities for beef were obtained from Agriculture and Livestock Industries Corporations (ALIC) data. Beef prices were the weighted prices of four cuts (chuck, loin, round and flank) reported by ALIC based on Nikkei Point-of-Sales.

Retail prices and quantities for fish and poultry were both obtained from the Retail Price Survey by the Statistical Bureau Ministry of Public Management, Home Affairs, Post and Telecommunications. Fish prices used in the study were the weighted average of tuna, horse mackerel, flounder, yellow tail and cuttlefish. The fish types selected are composed of high, medium and low-end fish types. The choice of fish types to include in the study reflects the most representative fish series for which data were available and complete. Table 1 contains the descriptive statistics

[2] We thank Hikaru Peterson for providing the dataset.

of the price and quantity series in levels. These series were transformed into natural logarithmic form for the analysis.

Table 1: Descriptive Statistics of Meat Prices (Yen Per Gram) and Quantities (Per Capita Consumption in Grams) (N=105)

Variables	Mean	Max	Min	Std Dev
US Beef Price	2.56	2.83	2.22	0.15
Aus. Beef Price	1.90	2.11	1.67	0.11
Wagyu Price	5.59	6.00	4.99	0.23
Dairy Price	3.58	3.86	3.15	0.16
Fish Price	2.40	2.73	2.03	0.19
Poultry Price	0.93	1.01	0.68	0.04
US Quantity	50.95	80.12	7.39	13.08
Aus. Quantity	36.34	96.46	14.10	20.48
Wagyu Quantity	58.80	140.77	7.83	34.00
Dairy Quantity	113.97	170.99	26.43	28.22
Fish Quantity	349.60	572.33	278.65	40.60
Poultry Quantity	300.09	424.00	241.00	36.43

The Empirical Model

The impact of food safety scares has been extensively investigated in the literature. The results of these studies generally show that food safety scares affect prices and demand adversely, and that consumers may be willing to pay higher premiums for safety and quality assurance. (e.g., Marsh, Schroeder and Mintert, 2004; Piggott and Marsh, 2004; McCluskey, et al., 2004; Peterson and Chen, 2005; Livanis and Moss, 2005; and Chopra and Bessler, 2005).

Scientific methods applied to food safety events have a wide range from most commonly used models of Almost Ideal Demand System, the Rotterdam models and their different variations, to models of contingent valuation, experimental auction and conjoint analysis. These models, however, are not quite appropriate to investigate the short-run dynamic consumer reactions to sudden beef safety events in the neighborhood of each event as reflected in the actual retail-level changes, which is the main objective of this research. The methodological approach used in this study includes Johansen's co-integration tests along with a VEC model, directed acyclic graphs, and historical decomposition to investigate the dynamics of price and quantity changes. The multivariate VEC models used in this research treat the price and quantity series as two separate systems where each system has six endogenous variables for the fish, poultry, and beef types.

The VEC model will not only allow estimates of short-run relationships for the price and quantity series, but it also preserves the long-run relationships among the variables. VAR/VEC models have the advantage of describing the reaction to scares

dynamically. Co-integration binds the series into a long-run relationship; it is now commonplace to examine time-series variables by co-integration techniques. Historical decomposition aids in providing a visual explanation of the impact of the beef safety shock on the price and quantity series in the neighborhood of each event. Specifically, orthogonal innovations are constructed using graph theory to determine causal patterns behind the correlation in contemporaneous innovations of the VEC model.

The first step is to test if the series are stationary by using the Augmented Dickey-Fuller (ADF) test. The test involves running a regression of the first difference of the series against the series lagged one period, lag difference terms, and a constant as follows:

$$\Delta \boldsymbol{Z}_t = \alpha_0 + \alpha_1 \boldsymbol{Z}_{t-1} + \sum_{j=1}^{n} \beta_j \Delta \boldsymbol{Z}_{t-1} + \varepsilon_t$$

where ΔZ_t is the first difference of the time series. The stationarity test is the same as checking the series for unit roots to see if they are random walk, that is, their mean and variance are not constant over time. The null hypothesis is that the series are non-stationary. The non-stationary series are integrated of order one or I(1) with the first differences being stationary or I(0). ADF test can under-reject when sudden shocks are the cause of structure breaks in series with deterministic trends, and prior to ADF, test for structure breaks in the series are recommended (Sanjuan and Dawson, 2003).

Johansen's co-integration test is performed to determine whether the series are co-integrated and the co-integrating rank, r, using the likelihood ratio (Holden and Perman, 1994). If the series are integrated and co-integrated, then a VEC Model is appropriate to characterize the multivariate relationships among the variables in the series (Engle and Granger, 1987; Enders, 1995). The VEC model uses both short-term dynamics as well as long-term information; it has a co-integrating equation which captures the long-run relationship among the variables due to the presence of co-integration.

The specification of the VEC model for each six equation system is:

$$\Delta X_t = \alpha_0 + \sum_{i=1}^{k-1} \Gamma_i \Delta X_{t-i} + \prod X_{t-k} + \varepsilon_t$$

where ΔX_t is a (6x1) matrix (ΔX_{1t}, ΔX_{2t} and ΔX_{6t} represent the six variables in the series); α_0 is a (6x1) vector of intercept terms; the $\Gamma_i \Delta X_{t-1}$ terms reflect the short-run relationships among elements of the X_t matrix, and the $\prod$ matrix captures the long-run relationship among the variables. The $\prod$ matrix can be decomposed into

two p x r matrices, α and β, where $\prod = \alpha\beta'$. The matrix β contains the co-integrating vectors that represent the underlying long-run relationship and the α matrix describes the speed of adjustment at which each variable moves back to its long run equilibrium (Johansen and Juselius, 1992; Schmidt, 2000).

The covariance matrix of the VEC model is used to investigate the causal relationship among the variables using directed acyclic graphs (Bessler and Akleman, 1998; Saghaian et al., 2002). With this method, an algorithm is utilized which begins with an undirected graph where all the variables are originally connected. The program removes adjacent edges when partial correlations are not statistically significant at an identified significant level, and assigns causal flow directions for the remaining edges based on the partial correlations of the residuals (Spirtes, Glymour, and Scheine, 2000). Non-zero, off-diagonal elements of the residual matrix allow for a shock in one variable to affect other variables in the model contemporaneously, which determines the causal structure behind the correlation in innovations (Swanson and Granger, 1997).

Finally, historical decompositions break down the price/quantity series into historical shocks in each series to determine their responses in a neighborhood (time interval) of the FMD and BSE events. Historical decomposition graphs are based upon partitioning of the moving average series into two parts:

$$Y_{t+j} = \sum_{s=0}^{j-1} \psi_s U_{t+j-s} + \left[W_{t+j}\beta + \sum_{s=j}^{\infty} \psi_s U_{t+j-s} \right]$$

where Y_{t+j} is the multivariate stochastic process, U is its multivariate noise process, and W is the deterministic part of Y_{t+j} (RATS, 2004). The first sum represents that part of Y_{t+j} due to innovations (shocks) that drive the joint behaviour of the series for periods $t+1$ to $t+j$, the horizon of interest, and the second is the series forecast based on information available at time t, the date of an event –that is, how endogenous variables would have evolved if there had been no shocks.

Chopra and Bessler (2005) who used a similar method to investigate the short-run and long-run impacts of FMD and BSE on meat prices in the United Kingdom showed that price responses in the neighborhood of FMD and BSE events were dissimilar, and consistent with well-informed, rational consumers. Finding comparable results in the Japanese market would suggest that economic theory allows generalizable predictions about price responses to future food safety scares, even across diverse cultures. This study further investigates the quantity responses and will determine whether and how the shocks also affect the amount of various meat consumed.

The Results

The results of the unit-root test are estimated by OLS and presented in Table 2. The second column of the table shows that the null hypothesis of zero first-order autocorrelation cannot be rejected at the 5% level of significance using the Durbin-Watson bounds test for each series except fish price, poultry price, US quantity, and dairy quantity, given the MacKinnon critical value. The right-most column of Table 2 gives the results of the ADF test for the first difference transformation of the series. The null hypothesis is rejected for all variables after first differencing.

Table 2: Augmented Dickey-Fuller (ADF)a Test Results.

Variable	Test Results for Variables in Levels	Test Results for Variables after First-Differencing
US Beef Price	2.64	9.47**
AUS Beef Price	2.39	11.60**
Wagyu Beef Price	2.13	11.11**
Dairy Beef Price	1.64	13.05**
Fish Price	3.02*	7.45**
Poultry Price	4.01**	9.40**
US Beef Quantity	3.40*	10.09**
AUS Beef Quantity	0.90	12.37**
Wagyu Beef Quantity	1.40	11.48**
Dairy Beef Quantity	2.76*	12.86**
Fish Quantity	2.30	4.44**
Poultry Quantity	1.98	4.14**

Note: ** 1% significance level, * 5% significance level.
[a] Test statistics are in absolute value and compared to MacKinnon (1996) one-sided p-value.

Table 3 presents the results of co-integration tests for the price and quantity series. As indicated by these results, the null hypothesis that $r = 0$, $r \leq 1$, and $r \leq 2$ is rejected at the 5% level for the price series, but the null hypothesis cannot be rejected at the 5% level that the co-integrating rank of the price system is at most 3. For quantity, the null hypothesis that $r = 0$ and $r \leq 1$ is rejected at the 5% level, but the null cannot be rejected that the co-integrating rank of the quantity system is

Table 3: Johansen Co-integration Test Results for Prices

Null Hypothesis[a]	Trace Statistics	5% Critical Value	Eignenvale
$r = 0$ *	185.46	95.75	0.53
$r \leq 1$ *	109.64	69.82	0.41
$r \leq 2$ *	56.34	47.86	0.26
$r \leq 3$	25.44	29.80	0.15
Johansen Co-integration Test Results for Quantities			
$r = 0$ *	170.37	95.75	0.61
$r \leq 1$ *	75.10	69.82	0.27
$r \leq 2$	43.86	47.86	0.19

[a] r is the co-integrating rank, MacKinnon-Haug-Michelis (1999) p-value. * 5% significance level.

less than 2. Thus there are long-term relationships among the variables and the VEC model is appropriate in order to determine the directed graphs and causal patterns for prices and quantities.

The residual correlation matrix of the estimated VEC models provides the contemporaneous innovations (errors) that show how errors among the endogenous variables are related. Considering the correlations among these errors allows better estimation of the pattern for the endogenous variables. The results (not shown, available from the authors upon request) show that the strongest correlation exists between the Japanese wagyu and dairy prices (0.68). This makes sense as pricing policies for Japan's beef industry are mutually applied to wagyu and dairy beef. These results also show that residuals associated with the two import origins are slightly correlated with dairy, but U.S. residuals are more strongly correlated to residuals from Japanese wagyu beef than Australian. Finally, there is little correlation in residuals for U.S. and Australian beef prices or among fish, chicken, and beef prices. There is much more correlation among the residuals from the quantity model. Correlations between US and wagyu, US and dairy, and wagyu and dairy are all high among the beef quantities. Fish and poultry consumption residuals are also highly correlated. Most correlation coefficients among the quantity errors are 0.40 or above, much higher than for prices.

Any inference on responses of beef prices and quantities to safety scares requires a careful investigation of contemporaneous correlation among corresponding innovations. In a case where contemporaneous correlation among the errors is present, historical decomposition functions may be distorted because of the effects of innovations in another variable in the system at the same time. Incorporating the complex interplay among these prices and quantities is required for the best projections to be forthcoming. Piggott and Marsh (2004), using U.S. quarterly data, showed that the effects of food safety concerns were only contemporaneous. A formal test of contemporaneous causal structures is performed here, where innovations are orthogonalized to obtain the historical decomposition functions. The TETRAD IV software is applied to the correlation matrix to generate the causal patterns and structure of the price and quantity series on innovations from the endogenous variables in each system (Spirtes et al., 1999). [3]

The historical decomposition results for the endogenous variables from the FMD and BSE shocks are shown over a 12 month horizon. The dynamic impacts of the shocks can spread over many months or dissipate quickly. We don't look at endogenous variables very far into the future because we are interested in the shortrun; it is likely that other effects that normally occur after a few months would cloud their impacts[4] .

[3] The directed acyclic graphs of causal structures are not shown; they are available from the authors upon request.

[4] There are 24 separate historical decomposition graphs for the price and quantity series. Only the BSE graphs for the quantity series are presented here; the rest are available from the authors. For a more detailed price analysis see Saghaian, et al., 2007.

The FMD Impact

The FMD historical decomposition shows a negative price impact, especially on the two prices of domestically produced beef, wagyu and dairy, and on imported Australian beef. Since FMD was discovered in live domestic cattle and with 92% of the live cattle imports in 2000 coming from Australia, Japanese consumer reaction is reflected by a sudden fall in the prices of Australian and dairy beef prices. It seems the news of the FMD outbreak, though it may not affect consumers' well-being directly, it affects consumers' perception of quality. Piggott and Marsh (2004) and other researchers have also maintained in their works that the news of an outbreak has an inverse relationship with quality.

Australian beef prices took the largest hit with the FMD outbreak. Figure 1 shows pre-shock estimates for Australian beef prices (the dashed line) with projections associated with the FMD shock. It is estimated that they dropped 12% due to the outbreak by May and they were 13% lower by July. They were still 7% below in December. In contrast, the largest negative impact on wagyu prices was only 6% and that occurred in November, and Japanese dairy beef prices were generally 4% to 6% lower due to the outbreak until December when they rebounded sharply. U.S. beef prices were the only ones that increased for some months with the FMD outbreak. On average, the outbreak had little impact on U.S. beef prices. These results indicate some sophistication among Japanese beef consumers as they reacted less negatively against U.S. beef imports, which were mostly frozen, or against fish and poultry. The FMD results show that, except for the U.S. beef prices, it took several months after the incident for the actual beef prices to begin to recover, but they were still lower than before the outbreak after twelve months. The quantity changes from FMD were less dramatic than price changes and there was also less consistency in the direction of impacts among the meats.

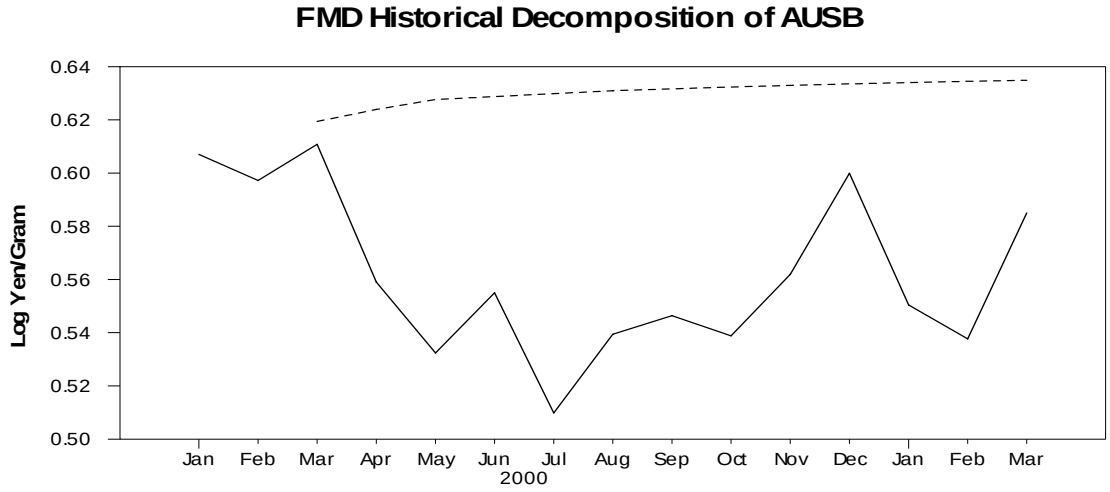

Figure 1: The FMD impact on the Australian beef prices (Yen/Gram in log-form). [5]

[5] The solid line is the actual price including the impact of food scare and the dashed line is its forecast without any shock.

The BSE Impact

The response of domestically produced beef prices in Japan after the BSE shock contrasts with the pattern for imported beef prices in the early months. Imported beef prices in Japan fell immediately in response to the BSE discovery, but domestic beef prices actually increased. Eventually, though, all beef prices were adversely impacted by the BSE discovery. Immediately after the BSE discovery, U.S. beef import prices fell the most dramatically and saw the widest difference between the actual and forecasted prices. U.S. beef prices rebounded after the first two months, but they took another quick dive after December, reaching their lowest point in May, approximately seven months after the outbreak.

Australian beef prices followed a similar pattern to U.S. prices except there was no dramatic drop during the first month. Japanese wagyu and dairy beef prices, on the other hand, rose after the BSE outbreak; certainly not what one would expect. For the most part, however, they remained rather close to what was projected before the outbreak. Yet by December, those prices began to fall absolutely and relative to what they would have been without an outbreak. The pattern for these beef prices may be explained by the way Japanese authorities handled the news of the BSE discovery. The immediate negative responses observed for the U.S beef prices may be attributed to the widely published remarks of a Japanese meat company which stated that imported beef was the most likely source of BSE in Japan, as explained by McCluskey, et al. (2004). After a two-week delay in publicly announcing the first confirmed case, the government's assurances of healthy domestic animals were contradicted by a second case a month later, prompting anxiety among consumers leading to further decline of beef prices.

The results show that the negative effects of the first BSE shock on beef prices were dissipating after a few months, but the second wave of the scare had a stronger impact on beef prices. Mazzocchi (2005) found similar results regarding two instances of BSE crises in Italy. Our results show that while there was concern about all beef in Japan, Japanese domestic beef prices fell less than imported prices, which suggests that Japanese consumers still had more confidence in domestic beef production, despite the BSE outbreaks. Yet after twelve months, consumption of all types of beef was markedly lower than the predictions without a BSE incident. Fish prices fell, surprisingly, right after the BSE outbreak, but were consistently above their original forecasts from December through April. Fish price increases indicate that Japanese consumers might have switched to their traditional diet, fish, because of the BSE scare. This result contrasts with those of Peterson and Chen (2005) who argued that with the BSE scare, demands for non-beef meats were little affected.
Consumption changes were drastic for all meats in the short-run. Purchases of US beef, wagyu beef, and dairy beef fell sharply in October and November, immediately after the BSE outbreak (figure 2).

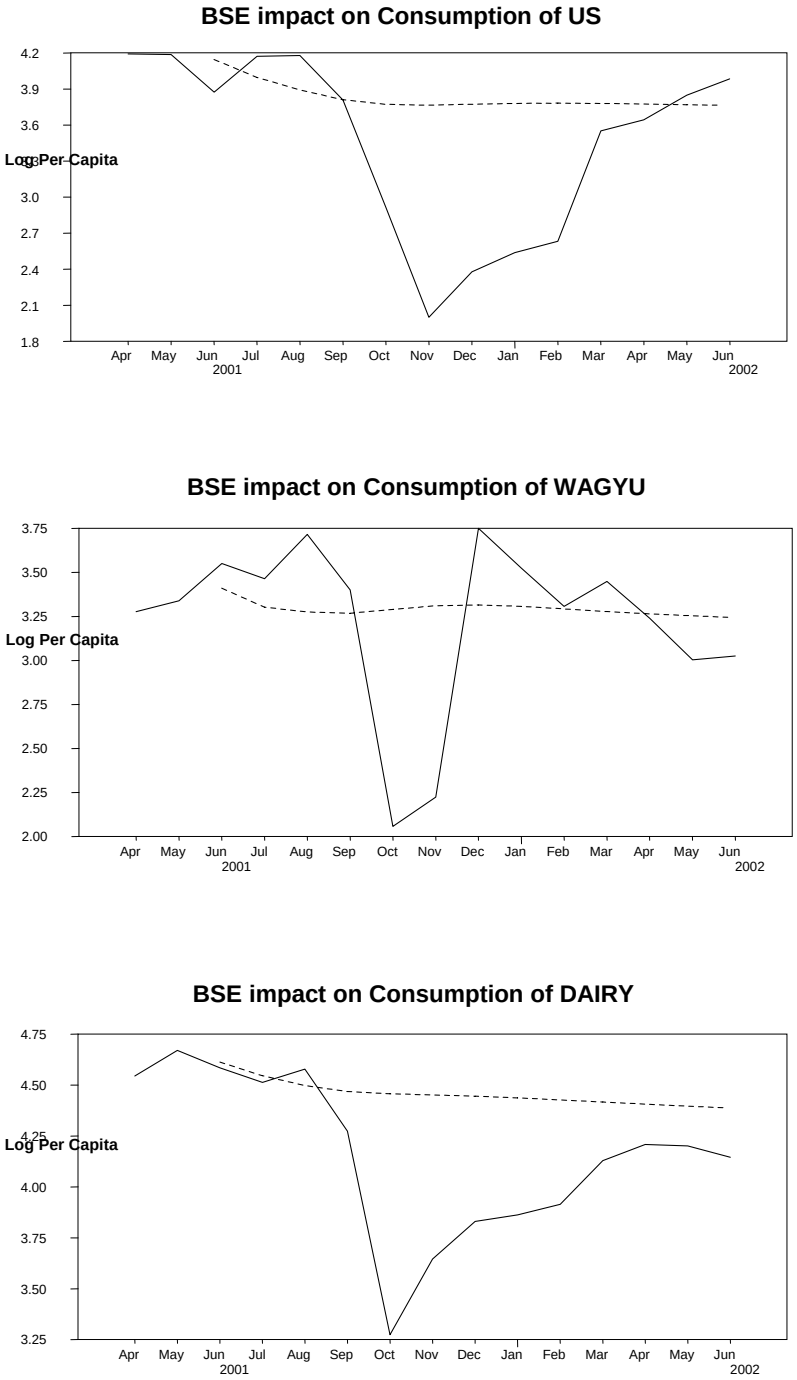

Figure 2: The BSE impact on per capita consumption of U.S., wagyu, and dairy beef (in log-form).

In contrast, consumption of grass fed Australian beef, fish, and poultry increased sharply during the same period (figure 3).

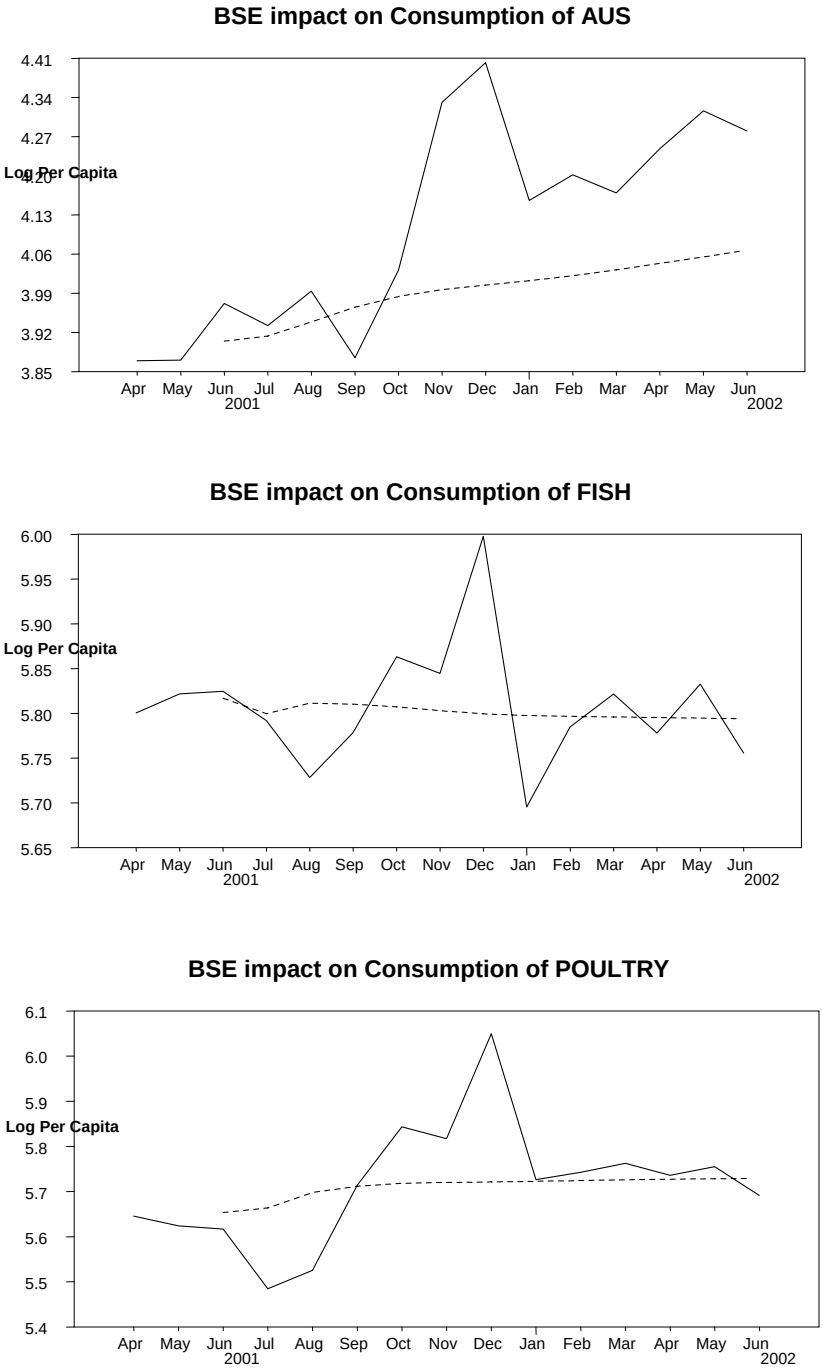

Figure 3: The BSE impact on per capita consumption of fish, poultry, and Australian beef (in log-form).

The impact clearly indicates that consumers were mostly suspicious of the US beef compared to the other beefs. The results show that, contrary to Peterson and Chen (2005) results, consumption of fish and poultry drastically increased. This shows

consumers switched to meats considered to be free of a BSE threat. These results indicate that Japanese consumer's purchasing decisions were rational given the kind of information to which they were exposed. While in the short-run consumption of beef decreased, in the longer run, all of the consumption levels were close to the predictions without a BSE incident; but prices, and consequently profit margins, were lower. Consistent with discussions made by Mazzocchi (2005), these results showed that Japanese consumers, as part of a dynamic process, first reacted negatively to the news of beef safety scares and changed their buying and consumption habits accordingly, and over time, as the concerns dissipated and beef safety worries diminished, they reverted back to their previous consumption pattern.

These insights into the habits of consumers and the changing purchasing patterns for consumers of meat products faced with food safety concerns have strategic implications and can help supply chain managers and practitioners in the food industry to understand and develop appropriate strategic responses. It is very important for food firms to be active in providing information to consumers because such information is used in purchasing decisions. Yet the information conveyed must be reliable if trust is to be retained between producers and consumers. Baker (1998) shows consumers prefer increased food safety; he lists several private industry, as well as government policy options, such as labeling and increased production standards and regulatory monitoring that can help address those concerns.

Summary and Concluding Remarks

The effects of food safety scares are part of a dynamic process, where consumers change consumption during the scare and often return to their past behavior afterward. The dynamics of consumers' perception of food safety scares are interesting and important to capture because of their strategic implications for the supply chain management. Food safety events are one of the few shocks that can abruptly eliminate an entire nation from export markets. Generally, the consumers over-react initially to the shock with decreased consumption of the suspect food item, but concern gradually dissipates, leading to the establishment of a new equilibrium. A targeted, accurate information campaign, though, might stave off some of the detrimental short-term consumer adjustments. Supply chain mangers should incorporate this information into their decisions and strategies to make the most of a bad situation.

In this study, we employed monthly retail-level per capita consumption and price series of fish, poultry, and four beef types from different origins in a VEC model along with directed acyclic graphs to estimate causal relationships among residuals. The objective was to explore the dynamic responses of consumers, measured by prices and quantities prevailing, to the impact of FMD and BSE beef safety scares

in Japan. Historical decomposition of the endogenous variables showed that Japanese consumers understood the differences and reacted differently to the news of the two beef safety scares. This evidence conflicts with the observation of Paarlberg, Lee, and Seitzinger (2003) that consumers may not understand the difference between the health risks associated with beef safety crises.
Prices of all beef products were lower twelve months after the BSE discovery, a clear indication that the news of the BSE discovery adversely affected consumers' perceptions of beef quality and lowered profit margins. Yet, the price decrease for the two imported beef types were more than the price decrease for the two domestically produced beef categories. This indicates that Japanese consumers have a more positive view of their own beef products and this keeps their domestic beef products from falling in price as much as imported products. These insights have implications for the advertising and promotion by beef exporting countries. Previous studies (e.g., Comeau, et al, 1997) have found that advertising and promotion for imported beef significantly affect Japanese demand for beef.

While for both shocks, supply adjustments seemed to affect prices, consumption changes due to the BSE shocks were drastic for all meats in the short-run. Japanese consumers moved away from beef that uses high levels of concentrated feeds (US beef, wagyu beef, and dairy beef) and flocked toward grass fed Australian beef and fish and poultry. The consumption changes from the FMD outbreak had less magnitude and were basically unaffected for the FMD outbreak.

Comparison between the BSE results and those of Peterson and Chen (2005) is useful because the same data, but completely different methods, were used. Peterson and Chen concluded that large government expenditures were at least modestly effective in minimizing damage to consumer confidence, but they recognized that long-term impacts were potentially substantial. The results are also consistent with Mazzocchi (2005) and provide evidence that depressed beef prices for all four beef types several months after the initial discovery were largely attributable to the second BSE scare. These appear to potentially be long-run type of effects on beef prices.

Judging by the distinctive price and quantity responses to each food safety scare, the results indicated that Japanese consumers paid attention to what was reported regarding the origin and type of contaminated beef products, as well as the source and type of contamination. This has important ramifications for meat companies and should be instrumental in providing reliable, accurate information on a timely basis. Information from producers and the government affect consumer reactions. In the Japanese case, the government and domestic companies gave out misleading information that affected consumption levels more adversely after the second BSE scare.

The results of this research help beef producers and exporters better understand consumer reactions to beef safety scares. These results provide incentives for beef producers and retailers to proactively inform consumers about ongoing beef safety measures, and can potentially provide policy makers a basis for countermeasures and compensations. Beef safety crises have increased overall awareness of potential future safety problems and the need for robust information technologies in the food marketing system. Time and experience provide a metric for consumers to recalibrate their risk perception and require beef producers and marketers to pay greater attention to beef safety issues and employ measures such as traceability and quality assurance schemes to address consumer concerns. Producers need to be prepared for low-probability events that can have large detrimental impacts. Investments that can be made to lower the large losses from an unlikely event seem to be justified. The BSE situation has certainly created opportunities for producers that have traceable production systems and have quality assurance programs that involve branding and labeling.

Proactive information provision in the food marketing systems reduces the impacts of the food scare. Safe food seems to be largely a public good, so industries have an interest to develop protocols together to provide greater safety assurances. A BSE case or salmonella outbreak impacts everyone; one incidence of "bad strawberries" hurts the whole strawberry industry and even related fruits. The U.S. government and the food industry must continue to invest heavily into procedures that will reduce food safety scares in these areas and into information systems that minimize the impacts of food safety shocks (Woods, 2006).

Beef producers and retailers can promote branded beef with emphasis on variety and quality to differentiate themselves from competitors and gain competitive advantage over rivals. Beef quality assurance schemes incorporate proactive measures such as information provision to minimize consumers' perception of risk associated with search, experience, and credence of beef attributes (Fearne, et al., 2001). McCluskey, et al. (2004) provide arguments of the need for monitoring and validation to build credibility among consumers for credence attributes such as labeled BSE testing and traceability throughout the production process. Quality labeling is now more widely applied in Japan to gain consumer confidence than ever before.

In the case of industry-wide beef promotion and quality assurance schemes, the focus is on managing and reducing consumers' perceived risk of the commodity beef. This is to enhance the image of beef and beef products in the eyes of the public and diminish cross-commodity substitution. Marketing beef safety and quality as an attribute and using quality assurance labels on meat products can effectively restore consumer confidence as well as potentially create niche markets to increase both producer and consumer surplus.

Food safety scares are likely to continue shocking commodity prices in the future. Yet it is hoped that more information and tracking systems are developed to reduce the shock effects. Further, the more food producers educate their consumers and differentiate their products, the less likely consumers' reactions will hurt the firms when the shocks occur.

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An Evaluation of Customer Relationship Management (CRM) Practices Among Agribusiness Firms

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Abstract

Customer Relationship Management (CRM) has received much attention in the business press as a management process to enhance firm performance. This research highlights differences between groups of respondents who believe their firm's CRM program is performing at a high level, as compared to those not satisfied with the performance of their CRM initiative. Cluster analysis was used to develop a taxonomy of respondents based on their perceived CRM performance. The resulting clusters are then profiled on both demographic variables as well as a core set of activities/behaviors to better understand key differences in the CRM programs of agribusinesses.

Keywords: customer relationship management (CRM), marketing, strategy, information technology, cluster analysis.

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Introduction

Customer Relationship Management (CRM) can be defined as the integrated use of people, process, and technology to build and maintain long-term, profitable relationships with target customers. CRM has garnered much attention as a tool to enhance a firm's competitive standing. However, recent research reveals that the performance of CRM programs is less than idyllic. Commonly cited reasons for the poor performance of CRM programs include the need for better customer data, the inability to match customer preferences with particular communications media, the inability to merge databases for separate business units, shifting customer demand patterns, and regulatory issues (Findlay and Stone, 2001). Clearly, this points to a need to improve the overall quality of CRM programs.

A review of the literature revealed a plethora of "To Do" or "How To" lists suggesting a myriad of business protocols to best implement CRM. However, few if any of these lists are based on empirical research and often merely reflect the author's opinion. Additionally, scant information is available on why businesses are motivated to adopt CRM, nor is there a detailed explanation of the problems that are encountered in implementing and managing the CRM process (i.e., specific activities that comprise a CRM program) from a manager's perspective. (See the October 2005 (Volume 69) issue of the *Journal of Marketing* for some recent empirical work on CRM and firm performance.)

Furthermore, little research exists on CRM in agriculture or agribusiness. Existing research focuses on the grocery industry (Ogbonna and Harris, page 291, 2001) and affinity or loyalty card programs (O'Brien and Jones, page 75, 1995), where the decision to adopt a CRM program has already been made. In summary, much popular press has touted the success of CRM, but there is far less work on how CRM is successfully implemented and managed.

CRM is often referred to as a strategy. Porter contends that, "the essence of strategy is in activities - choosing to perform activities differently or to perform different activities than rivals…" (Porter, 1996, page 64). Thus, if CRM is a strategy, then CRM must consist of a series of activities that provide a firm the opportunity to obtain or sustain a competitive advantage over their competitors. However, the specific activities which comprise a CRM program are not well defined.

The objectives of this research are to bridge the existing gap in the CRM literature with respect to agribusinesses by developing a taxonomy of agribusinesses, describing their CRM programs and highlighting key differences across a set of activities/behaviors. The aim is to better understand CRM performance differences in agribusiness organizations and then to begin to understand what drives these

performance differences. Ultimately, the resulting taxonomy and profiling will allow for the placement of agribusinesses on a continuum of "successful" to "unsuccessful" CRM program performance and allow for a deeper understanding as to why some agribusiness firms are relatively more "successful" with CRM while others struggle.

Literature Review

A successful CRM program provides a firm with a distinctive capability by collecting and analyzing data on their customers and prospects and transforming that data into information for use in managerial decision-making (Empson, 2000; Grant, 1996; Spender, 1996). With this knowledge of the customer, a firm can develop a customized marketing mix (price, product, place, promotion) for each customer and begin to engage in "cooperative and collaborative" relationships with their customers.

In a study assessing the impact of relational information and processes, Jayachandran, Sharma, Kaufman, and Raman (2005) found that firms that have higher CRM performance also had the ability to capture, access and use customer information. Another study of on-line retailers with a brick and mortar presence, Srinivasan and Moorman (2005), linked the impact of firm strategic commitment to the performance of CRM system investments. More specifically, they conclude that firm commitments to either an on-line or bricks and mortar presence affect the performance of the CRM initiative, emphasizing the importance of context when evaluating the impact of CRM on firm performance.

Winer (2001) provides a framework for one to begin conceptualizing a CRM program. This framework although useful, is quite general and is only a starting point in the quest to identify relevant activities/behaviors/outcomes for a CRM program. Taking Winer's framework into consideration, coupled with a review of the literature, six areas are identified which comprise a CRM program. These areas are: 1) objectives of the CRM program; 2) types of customer data collected/available; 3) uses of customer data for managerial decision-making; 4) the firm's approach to market; 5) tactics used to develop and maintain relationships with customers; and 6) the information technology infrastructure currently in use.

The previous six areas of interest identify specific activities/behaviors that comprise a CRM program; however, they do not provide any information regarding the overall performance of such programs nor do they give any indication as to the challenges faced by managers when implementing CRM. Thus, the final two areas explored in this study include CRM performance and CRM challenges.

Data and Methods

A four-page, 20-question self-administered questionnaire was mailed to 2,000 middle and upper level agribusiness managers. (See Appendix 2 for a copy of the questionnaire). The initial questionnaire was pre-tested with middle and upper level agribusiness managers in January 2004, and revised before being mailed in February 2004. A follow-up reminder questionnaire was mailed two weeks after the initial mailing. Names and addresses for these agribusiness managers were identified using the Center for Food and Agricultural Business database at Purdue University. This target population was selected because it is believed that these are the individuals in an agribusiness firm who were most likely to be responsible for, and have some working knowledge of, their firms' overall CRM program. The managers were asked to use their respective operating unit as the focal unit of analysis because it is believed that the operating unit, not the firm, is most responsible for implementing and monitoring a CRM program.

Specific questions solicited agribusiness manager opinions with respect to their operating units' CRM program performance; metrics that managers considered important; types of customer data collected/accessed; uses of customer data; approaches to the market; tactics used to develop and maintain customer relationships; information technology infrastructure assessment; and challenges to making the best use of customer data in information systems/databases.

Of the 2,000 questionnaires mailed, a total of 256 questionnaires were returned. This resulted in a response rate of 12.8 percent, which is acceptable considering that most response rates for research of this type are less than 10% (Alreck and Settle, 1995, page 34). After an initial screening, 23 questionnaires were removed because missing observations existed on one or more of the 22 performance metrics that are to be used as basis variables in a cluster analysis. The final (usable) response rate was 11.6%.

Detailed descriptive statistics for the respondents are presented in Torres (2004). Firms represented in this sample are about equally split between small (less than $49 million annual sales – 31.0%), medium ($50 million - $499 million – 34.5%), and large ($500 million or more – 34.5%) sized firms. About two-thirds of respondents indicated that their firm played only one role in the distribution channel, and they either were a manufacturer (37.9%), distributor/wholesaler (10.6%), or dealer/retailer (18.1%). Furthermore, respondents tended to be from firms that were privately-owned (43.7%), with 22.1% of the sample from cooperatives, and 30.3% of the respondents from publicly-owned firms.

With respect to the arenas where agribusiness operating units compete (primary business interests) the most often cited interests were seed (29.5%), crop protection chemicals (10.2%), and feed/animal nutrition (9.9%). The remaining respondents

were scattered across a wide range of agricultural input and first handler industries including crop capital equipment (6.0%), fertilizer (5.2%), and crop handling/processing (4.3%). Additionally, a distribution channel with one level between the end-user and the operating unit was the most often used channel (55.1%) by responding firms, with 34.3% of the respondents selling direct to end-users.

Cluster analysis was identified as the multivariate tool that could be used to develop a taxonomy of responses and assist in the development of a narrative profile to better understand key differences between the clusters across the core set of activities/behaviors/outcomes of a CRM program. The basis variables used to develop this taxonomy are the 22 CRM performance metrics. These 22 performance metrics serve as "characteristics that tell us why segments [groups] differ (e.g. needs, preferences, decision process, etc.)" (Moriarty, 2004, course notes).

One would expect that the CRM programs of agribusiness firms would differ in their effectiveness, and as such, can be classified into homogenous subsets based on their CRM performance. Furthermore, there is interest in identifying "best practices" associated with CRM programs. A profile of such performance-based clusters on each of the core sets of activities/behaviors/outcomes can be used to identify those "best practices" employed by successful agribusinesses, illuminating key differences in CRM programs between superior and inferior performers.

Cluster Analysis Results

The cluster analysis (using the Euclidean distance as a measure of dissimilarity and by employing Ward's method as the linking method) was performed on all 22 CRM performance metrics, where respondents were given 22 areas of CRM performance and asked to rate their operating unit's performance relative to its expectations over the past three years. The 1 to 5 scale offered the following responses: far worse than expected, slightly worse than expected, about the same as expected, slightly better than expected, and far better than expected.

Inspection of the resulting cluster analysis dendogram revealed a three-cluster solution. In the three-cluster solution, the first cluster contained 121 respondents, which accounted for about 52% of the sample. The second cluster contained 42 respondents and represented about 18% of the sample, while the third cluster contained 70 respondents and represented approximately 30% of the sample. For each cluster, the mean rating on each CRM performance variable was calculated as well as the overall mean rating. In Table 1, CRM performance variables are listed in descending order according to the overall mean. In addition, ANOVA statistics, F-tests and associated p-values are also displayed.

For Cluster 1, each of the CRM performance variables have a mean rating above 3.0, indicating that respondents in Cluster 1, as a group, perceive themselves as

Table 1: Cluster Mean Ratings for CRM Performance Metrics

	Overall Mean	Leaders	Emerging Leaders	Under achievers	F-test	p-value	
n (%)		121 (52%)	42 (18%)	70 (30%)			
Maintaining long-term customer relationships	3.64	3.97	3.62	3.09	44.40	0.000	***
Achieving a reputation for fairness with customers	3.62	3.88	3.67	3.16	28.85	0.000	***
Providing value for customers	3.61	3.93	3.71	3.00	54.81	0.000	***
Increasing profitability	3.50	3.98	2.76	3.10	39.43	0.000	***
Gaining an edge over competition in marketplace	3.49	3.96	3.26	2.81	59.43	0.000	***
Retaining current customers	3.46	3.83	3.40	2.87	41.23	0.000	***
Achieving mutual trust with customers	3.46	3.74	3.52	2.94	36.78	0.000	***
Increasing market share	3.45	3.95	2.95	2.87	54.45	0.000	***
Attracting new customers	3.39	3.75	3.07	2.97	28.37	0.000	***
Differentiating products/services from competitive products/services	3.39	3.74	3.31	2.84	28.94	0.000	***
Increasing sales with current customers	3.39	3.77	3.12	2.89	39.60	0.000	***
Increasing customer loyalty	3.38	3.66	3.10	3.06	19.03	0.000	***
Increasing customer satisfaction for products/services	3.38	3.66	3.33	2.90	25.57	0.000	***
Customizing products/services for customers	3.26	3.47	3.64	2.66	26.00	0.000	***
Providing up-selling opportunities (i.e., selling products with higher margins)	3.26	3.57	2.95	2.90	17.99	0.000	***
Developing new products/ services for customers	3.24	3.48	3.50	2.66	23.10	0.000	***
Reducing customer conflict (i.e., billing/invoice problems, product returns/exchanges)	3.18	3.31	3.38	2.84	9.36	0.000	***
Sharing information w/ customers	3.18	3.38	3.40	2.71	18.35	0.000	***
Reducing total cost of sales effort	3.09	3.31	2.76	2.93	7.83	0.001	***
Anticipating customers' emerging needs	3.03	3.22	3.36	2.50	23.87	0.000	***
Providing cross-selling opportunities (i.e., selling other products/brand lines)	2.99	3.16	2.81	2.81	4.29	0.015	**
Understanding customer purchasing behavior	2.88	3.01	3.40	2.33	30.75	0.000	***

Note A: A 1 to 5 rating scale was used, where 1 = far worse than expected, 2 = slightly worse than expected, 3 = about the same as expected, 4 = slightly better than expected and 5 = far better than expected.
Note B: *** 1% significance level, ** 5% significance level, and * 10% significance level
Note C: All mean values, except overall means, were calculated using the harmonic mean. See Appendix 1 for the formula used to calculate the harmonic mean.

exceeding their operating unit's expectations for performance over the past three years (Table 1). Additionally, Cluster 1 has the highest mean rating of the three clusters for 16 of the 22 performance metrics. Members of Cluster 1 are labeled Leaders.

Cluster 3, when compared to the other two clusters, does not have the highest rated mean for any CRM performance variable. However, they do have the lowest rated mean performance for 20 of the 22 performance variables, the exceptions being increasing profitability and reducing total cost of sales effort (Table 1). Moreover, Cluster 3 respondents have a mean rating below 3.0 for a majority of the CRM performance variables, which indicates that these respondents do not perceive themselves as meeting their operating unit's expectations with regard to performance. As a result, Cluster 3 respondents are labeled Underachievers.

Clusters 1 and 3 form the end-points of a continuum for CRM performance. Between Clusters 1 and 3 resides Cluster 2. Cluster 2, when compared to Clusters 1 and 3, has the highest rated mean scores for six of the 22 CRM performance variables (Table 1). Furthermore, Cluster 2 has a mean rating above 3.0 for 17 of the 22 CRM performance variables; thus, in general, they perceive themselves as meeting or exceeding their operating unit's expectations of performance. Overall, the mean performance ratings for Cluster 2 tend to be slightly lower than the mean ratings for Leaders (Cluster 1) and higher than Underachievers (Cluster 3). Thus, Cluster 2 respondents are termed Emerging Leaders.

To determine if group membership could be accurately predicted and to provide "meaningful practical differentiation" (Churchill, page 831, 1999), a reclassification procedure was employed (Torres, 2004). The three-cluster solution is a "good solution" because the resulting reclassification results (which are a part of a discriminant analysis) were able to predict a respondent's actual group membership 88.4% of the time.

Cluster Demographics

Cross tabulations were calculated to gain a better understanding of the firm demographics for each cluster. Only two cross tabulations showed a statistical dependence between a demographic variable and cluster membership: firm size and the operating unit that the respondent is responding for (Table 2).

Table 2: Summary Firm Demographic Characteristics by Cluster Membership

	Pearson's Chi-Square	df	p-value
Firm Role	16.52	14	0.283
Firm Size	9.66	4	0.047**
Firm Ownership Type	12.64	8	0.125
Operating Unit Represented	13.62	8	0.092*
Geographic Scope of Distribution for Products/Services	13.81	12	0.313
Operating Unit Size	6.33	4	0.176
Industry Segment	9.29	6	0.158
Primary Position in the Distribution Channel	0.14	4	0.998

Note: *** 1% significance level, ** 5% significance level, and * 10% significance level

The three size categories are: Small firms (sales less than $49 million), Medium firms (between $50 million and $499 million in sales), and Large firms ($500 million or more in sales). As described earlier, respondents were classified through the cluster analysis as Leaders, Emerging Leaders, or Underachievers. Almost two-thirds (63%) of the Medium firms were classified as Leaders, compared to 48% of the Large firms and 45% of the Small firms. Some 36% of the Large firms were classified as Underachievers, compared to 28% of the Small firms and 24% of the Medium firms. These findings suggest scale has positive and negative effects on CRM success. Size means resources, which provide opportunity for adequate investment to help insure CRM program success. At the same time, size means complexity and a successful CRM program involves orchestration of a myriad of components which is much more challenging in a large organization.

The types of operating units represented in this research include Total Firm/Parent Company, Agriculture Division, Geographic (Regional) Division, Product Division, and a category of "Other." Respondents reporting for Agriculture Divisions and Product Divisions were much more likely to be classified as Leaders with 69% of those reporting for Product Divisions classified as Leaders and 56% of those reporting for Agriculture Divisions. Only 43% of those respondents reporting for the Total Firm/Parent Company and those reporting for Geographic Divisions were classified as Leaders. Conversely, some 40% of those reporting for Geographic Divisions and 32% of those reporting for the Total Firm/Parent Company were classified as Underachievers. Organizational structure does seem related to CRM success. Product and Agriculture Divisions may have more focus with respect to target customer group compared to those reporting for the Total Firm/Parent Company or Geographic Division. And this focus may make the CRM strategy a bit more straightforward relative to other, more complex situations.

Cluster Profiles for CRM Objectives

Respondents were asked to rate 22 possible objectives for their CRM program on a scale of 1 (not important) to 5 (very important) to gather information on where respondents are targeting their efforts. Overall, each cluster rated every CRM objective important to their operating unit since no variable had a mean rating less than 3.0 (Table 3). Furthermore, the mean ratings across all three clusters are statistically equal for 9 of the 22 CRM objectives.

One can also see in Table 3 that Leaders have the highest rated mean of the three clusters for 6 of the 13 statistically significant differences. Some of their most important objectives where Leaders have the highest rated mean are:

Table 3: Cluster Means for CRM Objectives

	Overall Mean	Leaders	Emerging Leaders	Under achievers	F-test	p-value
n (%)		121(52%)	42 (18%)	70 (30%)		
Maintain long-term customer relationships	4.73	4.81	4.74	4.60	4.45	0.013**
Provide value for customers	4.67	4.78	4.81	4.39	13.86	0.000***
Retain current customers	4.66	4.74	4.69	4.50	4.92	0.008***
Increase profitability	4.56	4.53	4.58	4.60	0.36	0.699
Increase customer loyalty	4.44	4.45	4.58	4.33	1.81	0.166
Achieving a reputation for fairness with customers	4.42	4.59	4.52	4.07	12.17	0.000***
Achieve mutual trust with customers	4.41	4.53	4.57	4.10	9.72	0.000***
Increase sales with current customers	4.35	4.43	4.32	4.23	1.76	0.175
Gain an edge over competition in the marketplace	4.31	4.39	4.36	4.13	3.74	0.025**
Increase customer satisfaction for products-services	4.30	4.36	4.43	4.13	3.08	0.048**
Anticipate customers' emerging needs	4.25	4.34	4.29	4.09	2.29	0.103
Differentiate products- services from competitive products-services	4.21	4.32	4.31	3.96	5.79	0.004***
Attract new customers	4.19	4.24	4.43	3.96	4.41	0.013**
Increase market share	4.18	4.23	4.05	4.17	0.64	0.526
Share information with customers	4.05	4.11	4.17	3.87	2.23	0.110
Understand customer purchasing behavior	3.98	3.98	4.21	3.84	2.34	0.099*
Develop new products services for customers	3.92	4.06	3.76	3.76	2.99	0.052*
Provide up-selling opportunities (i.e., selling products with higher margins)	3.85	3.95	3.76	3.74	1.16	0.314
Reduce customer conflict (i.e. billing/invoice problems, product returns/exchanges)	3.67	3.73	3.93	3.41	3.39	0.035**
Customize products/services for customers	3.63	3.68	3.93	3.35	4.82	0.009***
Reduce total cost of sales effort	3.33	3.36	3.52	3.16	1.62	0.200
Provide cross-selling opportunities (i.e., selling other products/brand lines)	3.33	3.35	3.48	3.48	0.59	0.555

Note A: A 1 to 5 rating scale was used, where 1 = Not Important and 5 = Very Important. Note B: *** 1% significance level, ** 5% significance level, and * 10% significance level Note C: All mean values, except overall means, were calculated using the harmonic mean. See Appendix 1 for the formula used to calculate the harmonic mean.

1) maintain long-term customer relationships; 2) retain current customers; and 3) achieve a reputation for fairness with customers.

Emerging Leaders, when compared to Leaders and Underachievers, have the highest rated mean for 11 variables, but only 7 of the differences in these mean ratings are statistically significant. Some of objectives where Emerging Leaders have the highest rated mean are: 1) provide value for customers; 2) increase customer loyalty; 3) achieve mutual trust with customers; and 4) increasing customer satisfaction for products/services.

Of the three clusters, Underachievers do not have the highest rated mean for any CRM objective. Moreover, while Underachievers consider each of the 22 CRM performance variables relatively important to their operating unit, they do not consider these as important as Leaders and Emerging Leaders do.
Comparing Table 1 with Table 3, one can reach some conclusions with regard to importance of CRM objectives and perceived CRM performance. The general trend in Table 1 is that, overall, only Leaders and Emerging Leaders perceive themselves as meeting their operating unit's expectations for CRM performance over the past three years. Coupling this information with the general trends shown in Table 3, it appears that operating units with loftier goals (i.e. higher mean ratings) also tend to have higher levels of perceived CRM performance.

Cluster Profiles for Approach to the Market

Respondents were asked to indicate their operating unit's focus to approaching the market for their products and services, measured on a 1 (not a focus) to 5 (major focus) scale. Possible response categories were superior quality, superior service, product differentiation, innovation, customized product/service offerings, and low price.

The mean rating for each cluster on using low price as an approach to market was below 3.0 (Table 4). This indicates that Leaders, Emerging Leaders, and Underachievers prefer any of the other five approaches to market relative to focusing on low price. Furthermore, respondents indicated that their principle means of attracting customers to their products and services center on superior service and superior quality.

Of the three variables where cluster means differ statistically, Leaders show a tendency to focus on innovation relative to Emerging Leaders and Underachievers (Table 4). A firm approaching the market with an innovation strategy is likely to have a culture which supports innovation. And, such an innovation culture would be open to a new strategy like CRM, making the required investments easier to support, and the required organizational adjustments more "business as usual" relative to those firms where innovation is not as important.

Table 4: Cluster Means for Approach to Market

	Overall Mean	Leaders	Emerging Leaders	Under achievers	F-test	p-value
n (%)		121(52%)	42 (18%)	70 (30%)		
Superior Quality	4.53	4.54	4.56	4.49	0.17	0.844
Superior Service	4.44	4.45	4.72	4.26	6.10	0.003***
Product Differentiation	4.13	4.22	4.17	3.96	1.92	0.149
Innovation	4.12	4.25	4.12	3.89	3.28	0.039**
Customized Product/Service Offerings	3.81	3.91	4.16	3.42	8.89	0.000***
Low Price	2.13	2.23	2.07	1.98	1.32	0.269

Note A: A 1 to 5 rating scales was used, where 1 = Not a Focus and 5 = A Major Focus
Note B: *** 1% significance level, ** 5% significance level, and * 10% significance level

Emerging Leaders show a strong preference for using superior service, followed by customizing products/service offerings when approaching the market with their products and services. Underachievers have the lowest mean ratings for all six approaches to the market. This indicates that Underachievers have a lower level of commitment to any of the approaches to market, when compared to Leaders and Emerging Leaders. This lack of commitment and clarity may also help explain their lack of CRM success.

Cluster Profiles for Customer Data Collected/Accessed

Respondents were asked to indicate the percentage of customer (end-user) information their operating units collected or had access to. For each of the ten areas, respondents could indicate that they don't collect the information, or indicate the percentage of their customer base such information was collected for (possible responses were don't collect, 50% or less, 51% or more). Summary cross tabulation results for each analysis between the percentage of an operating unit's customer (end-user) data collected or has access to by cluster membership are displayed in Table 5.

Table 5: Summary Results for Types of Data Collected by Cluster Membership Cross Tabulations

	Pearson's Chi-square	df	p-value
Name and Address	1.25	4	0.87
Phone Number	3.44	4	0.49
Email Address	2.98	4	0.56
Contact History (i.e., date, time, and method of contact)	7.63	4	0.11
Sales Data (i.e., number of items purchased, amount of purchases, etc.)	3.03	4	0.55
Location/source of purchase for each transaction (i.e., direct sales, retailer, on-line, etc.)	3.04	4	0.55
Product specification data for each item purchased (i.e., parts number, serial numbers, application rates, etc.)	1.57	4	0.81
Complaint Data	0.88	4	0.93
Cost of Service	10.36	4	0.04**
CLV	9.48	4	0.05**

Note: *** 1% significance level, ** 5% significance level, and * 10% significance level

Only two cross tabulations were statistically significant. This statistical significance indicates a dependence relationship between the cost of service by cluster membership and customer lifetime value (CLV) by cluster membership.

A majority of respondents indicated that their operating unit does not collect or have access to cost of service information. This result is not unexpected, for cost of service data is a more sophisticated type of data than a customer's name and address or email address. As such, it is likely that the collection of such data is resource (i.e., money, people, and technology) consuming. Leaders clearly distinguished themselves in collecting, or having access to, cost of service customer data, relative to either Emerging Leaders or Underachievers.

The implications from the failure of Emerging Leaders and Underachievers to not collect or have access to customer cost of service information are clear -- it denies these agribusinesses the opportunity to monitor the cost of servicing a customer and assess whether or not they are expending too much or too little resources on specific customers. Conversely, the collection of or access to such information places Leaders in a relatively better position to determine how resources are to be allocated to individual customers and could enhance their operating unit's profitability or ability to achieve CRM performance goals.

To calculate a customer lifetime value (CLV), firms need four pieces of information: potential revenue stream, cost stream, discount rate, and the number of years a customer is expected to continue to do business with an entity. Almost 60% of

respondents indicated that their operating units do not collect or have access to CLV information for their customer base. Given that most agribusiness operating units do not collect cost of service information, it is not surprising to see an even larger percentage of respondents indicate that their operating units do not collect or have access to CLV data.

Cluster Profiles for Uses of Customer Data

Respondents were asked to indicate the extent to which they agreed with how customer data was used by the operating unit. For this set of questions, a 1 to 5 scale offered the following responses: strongly disagree, disagree, neutral, agree, and strongly agree. Leaders have the highest mean ratings for evaluating marketing strategies for products/services and segmenting customers based on the value each customer has to the firm (Table 6).

Table 6: Cluster Mean Ratings for Uses of Customer Data

	Overall Mean	Leaders	Emerging Leaders	Under achievers	F-test	p-value
n (%)		121 (52%)	42 (18%)	70 (30%)		
Evaluate marketing strategies for products/services	3.69	3.83	3.69	3.44	3.33	0.038**
Customize products/services for customers	3.61	3.72	3.98	3.19	9.28	0.000***
Segment customers based on the value each customer has to our firm	3.52	3.62	3.50	3.36	1.08	0.340
Analyze emerging trends (i.e., product/services usage trends, technologies)	3.51	3.60	3.74	3.23	3.98	0.020**
Analyze competitor influence on our customers	3.3	3.41	3.57	2.94	6.75	0.001***
Analyze customer response to promotions	2.81	2.79	3.05	2.70	1.13	0.324

Note A: A 1 to 5 scale was used, where 1 = Strongly Disagree and 5 = Strongly Agree
Note B: *** 1% significance level, ** 5% significance level, and * 10% significance level
Note C: All mean values, except overall means, were calculated using the harmonic mean. See Appendix 1 for the formula used to calculate the harmonic mean.

For Leaders, five of the six uses of customer data had a mean above 3.0, indicating agreement for using customer data to analyze emerging trends, analyzing competitor influence on an operating unit's customer base, evaluating marketing strategies for products/services, customizing products/services for customers and finally, for segmenting customers based on the value each customer has to the firm.

Emerging Leaders have the highest mean ratings for analyzing customer response to promotions, analyzing emerging trends, analyzing competitor influence on an operating unit's customer base, and customizing products/services for customers. This result indicates that Emerging Leaders are quite aggressive in the use of customer data they obtain, giving additional credence to the notion that they are poised to join Leaders as superior performers. Their use of customer data is also likely to be a contributing factor in meeting and/or exceeding their operating units' performance expectations, since using/analyzing customer data potentially aids an operating unit in understanding their customer base and provides insights into which product/service offerings to make available to customers or which tactics to use to develop and maintain customer relationships.

Underachievers again remain true to form: their mean rating for each of the six uses for customer data was the lowest among the three clusters.

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Cluster Profiles for Tactics Used to Develop and Maintain Customer Relationships

Respondents were given 16 activities that could be used to develop or maintain customer relationships and asked to indicate their operating unit's usage or non-usage of these activities. Possible responses were use currently, planning to use in next 3 years, don't use nor plan to use/don't know. Table 7 displays summary cross tabulation results for each tactic by cluster membership. Of the 16 tactics used to develop and maintain customer relationships, only three tactics have a dependent relationship with cluster membership, or vice versa. These tactics are personalized emails, price discounts based on the amounts purchased, and trips, gifts, etc.

Currently, Leaders rank first overall in employing personalized emails to develop and maintain customer relationships. Underachievers and Emerging Leaders follow a distant second and third, respectively. However, with respect to their future intentions, Underachievers rank first overall in planning to use personalized emails within the next three years, followed by Leaders. Thus, one should see a majority (75% or more) of operating units using personalized emails in the very near future. This approach also provides some evidence that the customers of these operating units have email addresses and most likely are computer savvy.

Approximately 75% of respondents indicated that their operating unit currently uses price discounts on the amount purchased to develop and maintain customer relationships. Respondents currently using price discounts on the amount purchased are most likely to be of two types: Leaders or Underachievers. Emerging Leaders are the least likely to use this tactic currently, nor are they likely to use this tactic within the next three years.

The use of price discounts contrasts with an earlier conclusion about using low price to approach the market for an operating unit's products/services. This result appears to suggest that operating units are in fact competing on price. However, it

may also be the case that respondents may not view price discounts based on the amount purchased as competing on price, but instead "justify these discounts on the grounds that large orders reduce selling expenses and may shift some of the costs for storage, transportation, and financing to buyers. The law allows quantity discounts provided they apply on the same basis to all customers" (Boone and Kurtz, page 724, 1999). Furthermore, few respondents see this tactic as being a future growth area.

Overall, approximately 52% of respondents indicated that they don't use nor plan to use/don't know if they will use trips, gifts, etc. as a tactic to develop and maintain customer relationships with their operating units' customers. However, about 41% of respondents indicated that their operating units currently employ the use of trips, gifts, etc. for customers to develop and maintain customer relations. Respondents that currently use trips, gifts, etc. to

Table 7: Summary Cross Tabulation Results between Tactics Used to Develop and Maintain Customer Relationships and Cluster Membership

	Pearson's Chi-square	df	p-value
Reward/frequent buyer programs	2.36	4	0.669
Personal selling/sales force	0.64	4	0.959
Newsletter which contains suggestions tips or hints for product usage and/or testimonials	2.86	4	0.582
Pre-pay/early pay discounts on purchases	4.27	4	0.370
Websites	4.63	4	0.327
Special/restricted access to content on website	1.89	4	0.756
Rebates on purchases	4.24	4	0.373
Direct mail	5.61	4	0.230
Personalized emails	11.82	4	0.019**
Customer call center/telemarketing	3.19	4	0.527
Price discounts based on the amounts purchases	8.81	4	0.066*
Trips, gifts, etc.	9.30	4	0.054*
Informational meetings (i.e. customer breakfasts, lunches, or dinners, field days, guest speakers)	3.02	4	0.554
Complaint resolution policies/procedures	2.56	4	0.633
Inventory stock protection for unused 6 (i.e., your operating unit will buy back unused inventory/stock from customers)	0.94	4	0.919
Product bundling (i.e., products and/or services sold together rather than sold individually)	4.70	4	0.319

Note: *** 1% significance level, ** 5% significance level, and * 10% significance level

develop and maintain customer relationships are likely to be of two types: Leaders and Underachievers. Furthermore, respondents do not see this tactic to be a future growth area among respondents.

Cluster Profiles for Information Technology Infrastructure

Respondents were asked to indicate the extent to which they agreed with eight questions assessing their operating unit's information technology infrastructure. The scale 1 to 5 offered the following responses: strongly disagree, disagree, neutral, agree, and strongly agree. There was no statistical difference in 6 of the 8 variables

Table 8: Cluster Mean Ratings for Information Technology Infrastructure

	Overall Mean	Leaders	Emerging Leaders	Under achievers	F-test	pvalue
n (%)		121(52%)	42 (18%)	70 (30%)		
A good information infrastructure (i.e., e-mail, intranet, internet, etc.)	3.69	3.80	3.79	3.45	2.71	0.069*
A good telecommunications infrastructure (i.e., telephone and video conferencing)	3.48	3.50	3.63	3.35	1.02	0.363
Information technology that allows for one-to-one communications with current customers	3.41	3.36	3.64	3.34	1.27	0.283
An information system that is integrated across several functional areas (i.e. marketing, finance, customer service, manufacturing, research, etc.)	3.27	3.28	3.50	3.10	1.74	0.178
Information technology to acquire customer related data in a centralized database	3.25	3.13	3.60	3.19	2.38	0.095*
The ability to consolidate all acquired customer related data in a centralized database	3.23	3.22	3.38	3.21	0.34	0.715
Data sharing technologies that enable data access between information systems	3.04	3.02	3.24	2.96	0.79	0.454
The necessary infrastructure to capture customer data from al customer interaction points	2.92	2.83	3.24	2.88	2.116	0.123

Note A: A 1 to 5 rating scale was used, where 1 = Strongly Disagree and 5 = Strongly Agree.
Note B: *** 1% significance level, ** 5% significance level, and * 10% significance level.
Note C: All mean values, except overall means, were calculated using the harmonic mean.
See Appendix 1 for the formula used to calculate the harmonic mean.

used to assess information technology infrastructure (Table 8). This suggests that across the clusters, parity among operating units largely exists with respect to information technology infrastructure. Furthermore, it suggests that respondents feel that their information systems are adequate to "get the job done," but not superior, and do little to explain differences in CRM performance across the clusters.

Emerging Leaders have the highest rated means for all variables except information infrastructure (i.e., e-mail, intranet, internet, etc.), with each variable rated above 3.0. With respect to variables that have statistically significant differences between mean ratings, Emerging Leaders clearly distanced themselves from Leaders and Underachievers in having information technology to acquire customer related data in a centralized database. This may permit Emerging Leaders easier access to more data, which offers the potential to increase productivity.

Despite lower ratings, six of the eight mean ratings for Underachievers are statistically no different than the mean ratings given by Leaders and Emerging Leaders. This suggests that differences in information technology investment/capability do not explain the performance issues this group faces. In the 'people-process-technology' triad, it is people and process which should be the primary focus of Underachieving firms.

Cluster Profiles for Information System/Database Challenges

To assess obstacles to making the best use of customer information in information systems/databases, respondents were asked to rate fourteen areas that were (potential) current challenges facing their operating unit. A scale of 1 (no challenge) to 5 (a major challenge) was employed. Overall, respondents indicated that their most significant challenges to making the best use of customer data in information systems/databases was (overall mean ratings of 3.0 or above) how to effectively use and collect data, followed by software technology (Table 9). Interestingly, respondents indicated that top management was supportive of their efforts to making the best use of customer data in their information system/database.

Leaders and Emerging Leaders generally did not consider lack of strategic focus and incomplete customer data to be a challenge, or remained neutral on the matter (mean rating of 3.0). Underachievers, on the other hand, considered these issues challenges. Clearly, Underachievers considered lack of strategic focus a challenge; it was also one of the highest mean ratings overall for any cluster and is consistent with their struggle to clearly identify a clear approach to their market (Table 4).

Table 9: Cluster Mean Ratings for Making the Best Use of Customer Data in Information System/Database

	Overall Mean	Leaders	Emerging Leaders	Under achievers	F-test	p-value
n (%)		121 (52%)	42 (18%)	70 (30%)		
How to effectively use the data	3.44	3.47	3.29	3.46	0.47	0.624
How to effectively collect data	3.42	3.37	3.29	3.60	1.49	0.228
Software technology	3.23	3.25	3.08	3.27	0.45	0.639
Lack of strategic focus	3.17	3.00	2.95	3.60	7.50	0.001***
Incomplete customer data	3.08	3.00	2.83	3.37	3.43	0.034**
Cost of initial investment	2.92	2.88	3.24	2.79	1.88	0.155
Lack of internal ownership	2.90	2.67	2.90	3.30	5.72	0.004***
Maintenance cost	2.89	2.97	2.83	2.80	0.59	0.553
Lack of employee incentives to share customer data across the operating unit	2.81	2.81	2.69	2.87	0.27	0.765
Hardware technology	2.72	2.83	2.56	2.61	1.28	0.279
Inaccurate data (i.e., data entered incorrectly)	2.71	2.64	2.38	3.02	4.98	0.008***
Overwhelmed about where to start	2.00	2.59	2.73	2.84	1.14	0.322
Data is not current	2.60	2.55	2.57	2.71	0.50	0.609
Lack of top management support	2.58	2.41	2.36	2.99	5.48	0.005***

Note A: A 1 to 5 rating scale was used, where 1 = No Challenge and 5 = A Major Challenge.
Note B: *** 1% significance level, ** 5% significance level, and * 10% significance level
Note C: All mean values, except overall means, were calculated using the harmonic mean. See Appendix 1 for the formula used to calculate the harmonic mean.

Finally, firms that are performing well across the 22 CRM performance metrics (Leaders and Emerging Leaders) faced fewer challenges than firms that are not performing well (Underachievers). Underachievers indicated that one of their principle challenges was having incomplete customer data. This lack of complete customer data may explain their lower levels of customer data usage when compared to Leaders and Emerging Leaders, and is most likely a contributing factor in their lower levels of CRM performance.

Summary and Managerial Implications

This research highlighted key differences across three groups of agribusinesses (Leaders, Emerging Leaders, and Underachievers) across six activities/behaviors, CRM performance and CRM challenges, providing a "snapshot" of their respective CRM programs.

Leaders reported the highest level of CRM performance. These firms had the most ambitious CRM objectives. They also collected more sophisticated data on their customers and encountered fewer challenges to making the best use of customer data in information systems/databases when compared to Emerging Leaders or Underachievers. Leaders and Emerging Leaders were shown to be the most aggressive in their uses of customer data and more clear to their approaches to market than Underachievers. In general, parity in the use of information technology infrastructure best describes the operating units of all three groups.

Managers looking to launch a CRM program, or those working to enhance the performance of an existing program, are interested in key success factors of successful programs. Based on this research, the best practices associated with more successful agribusiness CRM programs include: 1) setting ambitious objectives; 2) collecting more sophisticated customer data; 3) aggressive use of customer data for making decisions and supporting marketing programs; 4) clarity of approach to the market; and 5) managing the inevitable challenges to making the best use of customer data in information systems/databases.

If agribusiness managers want to give their operating units the best chance for CRM initiatives to be successful, this research suggests they should set lofty objectives; capture customer data relevant to supporting their strategy; use the data they collect on their customers to better understand their purchasing behavior; and employ a wide array of targeted tactics to develop and maintain customer relationships. Finally, it is important to note that technology infrastructure did not distinguish high performance from low performance. Strategy, people, and process issues are more important to CRM program success than investments in computer systems (hardware and software).

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Appendix 1: Harmonic Mean

When calculating a mean score with unequal sample sizes, the harmonic mean is preferable to the arithmetic mean because the "variance of means is proportional not to n, but to 1/n. The measure that takes this into account is not the arithmetic mean, but the harmonic mean. The harmonic mean of k numbers $(X_1, X_2, ..., X_{k)}$ is defined as (Howell, page 233 and 234, 2002):

$$\overline{X}_h = \frac{k}{\Sigma \frac{1}{x_i}}$$

Appendix 2: CRM Questionnaire

Note: A percentage symbol was accidentally included for the response to question 15. As a result, this question was not used in any analysis.

(17) In your opinion, what are your **operating unit's** current challenges with regard to making the best use of customer data in your Information System/Database? *(Circle your answer as you rate the following on a scale of 1 to 5, where 1 = No Challenge and 5 = A Major Challenge)*

	No Challenge				A Major Challenge
Maintenance cost	1	2	3	4	5
Hardware technology	1	2	3	4	5
Software technology	1	2	3	4	5
Overwhelmed about where to start	1	2	3	4	5
Lack of internal ownership	1	2	3	4	5
Inaccurate data (i.e., data entered incorrectly)	1	2	3	4	5
Cost of initial investment	1	2	3	4	5
How to effectively use the data	1	2	3	4	5
How to effectively collect the data	1	2	3	4	5
Lack of strategic focus	1	2	3	4	5
Data is not current	1	2	3	4	5
Lack of employee incentives to share customer data across the operating unit	1	2	3	4	5
Lack of top management support	1	2	3	4	5
Incomplete customer data	1	2	3	4	5

(19) Relative to your **operating unit's** expectations, how has your **operating unit**, over the last 3 years, performed with respect to . . . *(Circle your answer as you rate the following on a scale of 1 to 5, where 1 = Far worse than expected and 5 = Far better than expected)*

	Far worse than expected	Slightly worse than expected	About the same as expected	Slightly better than expected	Far better than expected
Increasing profitability	1	2	3	4	5
Increasing market share	1	2	3	4	5
Gaining an edge over competition in the marketplace	1	2	3	4	5
Increasing customer loyalty	1	2	3	4	5
Differentiating products/services from competitive products/services	1	2	3	4	5
Attracting new customers	1	2	3	4	5
Retaining current customers	1	2	3	4	5
Increasing customer satisfaction for products/services	1	2	3	4	5
Customizing products/services for customers	1	2	3	4	5
Developing new products/services for customers	1	2	3	4	5
Reducing total cost of sales effort	1	2	3	4	5
Providing cross-selling opportunities (i.e., selling other products/brand lines)	1	2	3	4	5
Providing up-selling opportunities (i.e., selling products with higher margins)	1	2	3	4	5
Increasing sales with current customers	1	2	3	4	5
Reducing customer conflict (i.e., billing/invoice problems, product returns/exchanges)	1	2	3	4	5
Achieving mutual trust with customers	1	2	3	4	5
Achieving a reputation for fairness with customers	1	2	3	4	5
Providing value for customers	1	2	3	4	5
Maintaining long-term customer relationships	1	2	3	4	5
Sharing information with customers	1	2	3	4	5
Understanding customer purchasing behavior	1	2	3	4	5
Anticipating customers' emerging needs	1	2	3	4	5

(20) Have you attended the "Strategic Customer Relationship Management" program offered by the Center for Food and Agricultural Business at Purdue University? ……. ☐ Yes ☐ No

(21) What is your position within the company? *(Check one)*

- ☐ President/CEO/Owner
- ☐ Corporate Marketing (VP Marketing, Director of Marketing)
- ☐ Sales Management (VP Sales, Director of Sales, Regional Sales Manager, etc.)
- ☐ Database Manager/Administrator
- ☐ General Manager
- ☐ Marketing (Product Manager, Advertising Manager, Marketing Manager, etc.)
- ☐ Other _____

Thank you for completing this questionnaire. Your effort and assistance on this research project are greatly appreciated!

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(1) Your **firm** is best described as a: (*Check all that apply*)

- ☐ Manufacturer (produces products for resale)
- ☐ Distributor/wholesaler (sells primarily to dealers)
- ☐ Dealer/retailer (sells primarily to end-users)
- ☐ Other (Please specify)_____

(2) In 2003, your **firm's** total annual gross sales (in U.S. dollars) were: *(Check one)*

- ☐ Less than 10 million
- ☐ 10 million – 49 million
- ☐ 50 million – 99 million
- ☐ 100 million – 499 million
- ☐ 500 million – 999 million
- ☐ 1 billion or more

(3) Your **firm** is: *(Check one)*

- ☐ A cooperative
- ☐ Privately-owned (non-cooperative/independent)
- ☐ Publicly-owned (non-cooperative)
- ☐ Joint venture of a private/public firm and cooperative

(4) Please check the box below that most accurately describes the **operating unit** you are responding for:

- ☐ Total Firm/Parent Company
- ☐ Agriculture Division/Operating Unit
- ☐ Geographic (Regional) Division/Operating Unit
- ☐ Product Division/Operating Unit
- ☐ Other (*Please specify*)_____

NOTE: ***For the remainder of this questionnaire, please answer all of the following questions with regard to the operating unit you selected in question 4.***

(5) The primary geographic scope of your **operating unit's** distribution of products/services is: *(Check one)*

- ☐ Local (not statewide)
- ☐ Statewide
- ☐ Regional (multiple states in the U.S.)
- ☐ National (U.S. only)
- ☐ North America (U.S. Canada, and Mexico)
- ☐ International (outside North America)

(6) In 2003, your **operating unit's** total annual gross sales (in U.S. dollars) were: *(Check one)*

- ☐ Less than 10 million
- ☐ 10 million – 49 million
- ☐ 50 million – 99 million
- ☐ 100 million – 499 million
- ☐ 500 million – 999 million
- ☐ 1 billion or more

(7) Your **operating unit's** primary business interest(s) are: *(Check all that apply* **AND** *circle your primary business interest)*

- ☐ Crop Protection Chemicals
- ☐ Seed
- ☐ Fertilizer
- ☐ Crop Capital Equipment
- ☐ Animal Health
- ☐ Feed/Animal Nutrition
- ☐ Livestock Capital Equipment
- ☐ Consulting
- ☐ Lending/Financing
- ☐ Trade Association/Trade Press
- ☐ Government Agency
- ☐ Crop Handling/Processing
- ☐ Livestock Marketing/Processing
- ☐ Other *(Please specify)*_____

(8) With respect to your **operating unit's** distribution channels, approximately what percentage of the sales for your operating unit move to market in the following ways? *(Total should add to 100%)*

Direct to end-users…….. ____ %

One level between end-users and my **operating unit**…… ____ %

Two levels or more between end-users and my **operating unit**……. ____ %

=100 %

(9) Please indicate the extent to which your **operating unit's** approach to the market is focused on …
(Circle your answer as you rate the following on a scale of 1 to 5, where 1 = Not a Focus and 5 = Major Focus)

	Not a Focus				Major Focus
Low price	1	2	3	4	5
Superior quality	1	2	3	4	5
Innovation	1	2	3	4	5
Superior service	1	2	3	4	5
Product differentiation	1	2	3	4	5
Customized product/service offerings	1	2	3	4	5

(10) For your **operating unit,** how important are each of the following items to you in your customer relationship management strategies? *(Circle your answer as you rate the following on a scale of 1 to 5, where 1 = Not Important and 5 = Very Important)*

	Not Important				Very Important
Increase profitability	1	2	3	4	5
Increase market share	1	2	3	4	5
Gain an edge over competition in the marketplace	1	2	3	4	5
Increase customer loyalty	1	2	3	4	5
Differentiate products/services from competitive products/services	1	2	3	4	5
Attract new customers	1	2	3	4	5
Retain current customers	1	2	3	4	5
Increase customer satisfaction for products/services	1	2	3	4	5
Customize products/services for customers	1	2	3	4	5
Develop new products/services for customers	1	2	3	4	5
Reduce total cost of sales effort	1	2	3	4	5
Provide cross-selling opportunities (i.e., selling other products/brand lines)	1	2	3	4	5
Provide up-selling opportunities (i.e., selling products with higher margins)	1	2	3	4	5
Increase sales with current customers	1	2	3	4	5
Reduce customer conflict (i.e., billing/invoice problems, product returns/exchanges)	1	2	3	4	5
Achieve mutual trust with customers	1	2	3	4	5
Achieve a reputation for fairness with customers	1	2	3	4	5
Provide value for customers	1	2	3	4	5
Maintain long-term customer relationships	1	2	3	4	5
Share information with customers	1	2	3	4	5
Understand customer purchasing behavior	1	2	3	4	5
Anticipate customers' emerging needs	1	2	3	4	5

(11) Which of the following activities does your **operating unit** use to develop and maintain relationships with customers?

	Use Currently	Planning to use in next 3 years	Don't use nor plan to use	Don't Know
Reward/frequent buyer programs	☐	☐	☐	☐
Personal selling/sales force	☐	☐	☐	☐
Newsletter which contains suggestions, tips or hints for product usage and/or testimonials	☐	☐	☐	☐
Pre-pay/early pay discounts on purchases	☐	☐	☐	☐
Websites	☐	☐	☐	☐
Special/restricted access to content on website	☐	☐	☐	☐
Rebates on purchases	☐	☐	☐	☐
Direct mail	☐	☐	☐	☐
Personalized emails	☐	☐	☐	☐
Customer call center/telemarketing	☐	☐	☐	☐
Price discounts based on amount purchased	☐	☐	☐	☐
Trips, gifts, etc.	☐	☐	☐	☐
Informational meetings (i.e. customer breakfasts, lunches, or dinners, field days, guest speakers)	☐	☐	☐	☐
Complaint resolution policies/procedures	☐	☐	☐	☐
Inventory/stock protection for unused products (i.e., your operating unit will buy back unused inventory/stock from customers)	☐	☐	☐	☐
Product bundling (i.e., products and/or services sold together, rather than sold individually)	☐	☐	☐	☐
Other *(Please specify)* _____	☐	☐	☐	☐

(12) At the present time, what percentage of your **operating unit's** customers (end-users) does your **operating unit** collect and/or has access to each customer's . . .

	Don't Collect	25% or Less	26%-50%	51%-75%	More than 75%
Name and address	☐	☐	☐	☐	☐
Phone number	☐	☐	☐	☐	☐
Email address	☐	☐	☐	☐	☐
Contact history (i.e., date, time and method of contact)	☐	☐	☐	☐	☐
Sales data (i.e. number of items purchased, amount of purchases, etc.)	☐	☐	☐	☐	☐
Location/source of purchase for each transaction (i.e., direct sales, retailer, on-line, etc.)	☐	☐	☐	☐	☐
Product specification data for each item purchased (i.e., parts number, serial numbers, application rates, etc.)	☐	☐	☐	☐	☐
Complaint data	☐	☐	☐	☐	☐
Cost of service	☐	☐	☐	☐	☐
Lifetime value of customer	☐	☐	☐	☐	☐

(13) Indicate the extent to which you agree with the following statements. At the present time my **operating unit** effectively uses customer data to . . . *(Circle your answer as you rate the following on a scale of 1 to 5, where 1 = Strongly Disagree and 5 = Strongly Agree)*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Analyze customer response to promotions	1	2	3	4	5
Analyze emerging trends (i.e., product/service usage trends, technologies)	1	2	3	4	5
Analyze competitor influence on our customers	1	2	3	4	5
Evaluate marketing strategies for products/services	1	2	3	4	5
Customize products/services for customers	1	2	3	4	5
Segment customers based on the value each customer has to our firm	1	2	3	4	5

(14) With respect to the information your **operating unit** maintains on your customers, indicate the extent to which you agree with each of the following statements. At the present time, my operating unit possesses . . . *(Circle your answer as you rate the following on a scale of 1 to 5, where 1 = Strongly Disagree and 5 = Strongly Agree)*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
A good information system infrastructure (i.e., e-mail, intranet, internet, etc.)	1	2	3	4	5
A good telecommunications infrastructure (i.e., telephone and video conferencing)	1	2	3	4	5
An information system that is integrated across several functional areas (i.e., marketing, finance, customer service, manufacturing, research, etc.)	1	2	3	4	5
The necessary infrastructure to capture customer data from all customer interaction points	1	2	3	4	5
The ability to consolidate all acquired customer related data in a centralized database	1	2	3	4	5
Data sharing technologies that enable data access between information systems	1	2	3	4	5
Information technology to acquire customer related data in a centralized database	1	2	3	4	5
Information technology that allows for one-to-one communications with current customers	1	2	3	4	5

(15) Approximately how many total customers does your **operating unit** have? ____ %

(16) What percentage of your **operating unit's** customers represent 80% of your total operating unit sales volume? ____ %

(17) In your opinion, what are your **operating unit's** current challenges with regard to making the best use of customer data in your Information System/Database? *(Circle your answer as you rate the following on a scale of 1 to 5, where 1 = No Challenge and 5 = A Major Challenge)*

	No Challenge				A Major Challenge
Maintenance cost	1	2	3	4	5
Hardware technology	1	2	3	4	5
Software technology	1	2	3	4	5
Overwhelmed about where to start	1	2	3	4	5
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Personal selling/sales force	☐	☐	☐	☐
Newsletter which contains suggestions, tips or hints for product usage and/or testimonials	☐	☐	☐	☐
Pre-pay/early pay discounts on purchases	☐	☐	☐	☐
Websites	☐	☐	☐	☐
Special/restricted access to content on website	☐	☐	☐	☐
Rebates on purchases	☐	☐	☐	☐
Direct mail	☐	☐	☐	☐
Personalized emails	☐	☐	☐	☐
Customer call center/telemarketing	☐	☐	☐	☐
Price discounts based on amount purchased	☐	☐	☐	☐
Trips, gifts, etc.	☐	☐	☐	☐
Informational meetings (i.e. customer breakfasts, lunches, or dinners, field days, guest speakers)	☐	☐	☐	☐
Complaint resolution policies/procedures	☐	☐	☐	☐
Inventory/stock protection for unused products (i.e., your operating unit will buy back unused inventory/stock from customers)	☐	☐	☐	☐
Product bundling (i.e., products and/or services sold together, rather than sold individually)	☐	☐	☐	☐
Other *(Please specify)* _____	☐	☐	☐	☐

(12) At the present time, what percentage of your **operating unit's** customers (end-users) does your **operating unit** collect and/or has access to each customer's . . .

	Don't Collect	25% or Less	26%-50%	51%-75%	More than 75%
Name and address					
Phone number					
Email address					
Contact history (i.e., date, time and method of contact)					
Sales data (i.e. number of items purchased, amount of purchases, etc.)					
Location/source of purchase for each transaction (i.e., direct sales, retailer, on-line, etc.)					
Product specification data for each item purchased (i.e., parts number, serial numbers, application rates, etc.)					
Complaint data					
Cost of service					
Lifetime value of customer					

(13) Indicate the extent to which you agree with the following statements. At the present time my **operating unit** effectively uses customer data to . . . *(Circle your answer as you rate the following on a scale of 1 to 5, where 1 = Strongly Disagree and 5 = Strongly Agree)*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Analyze customer response to promotions	1	2	3	4	5
Analyze emerging trends (i.e., product/service usage trends, technologies)	1	2	3	4	5
Analyze competitor influence on our customers	1	2	3	4	5
Evaluate marketing strategies for products/services	1	2	3	4	5
Customize products/services for customers	1	2	3	4	5
Segment customers based on the value each customer has to our firm	1	2	3	4	5

(14) With respect to the information your **operating unit** maintains on your customers, indicate the extent to which you agree with each of the following statements. At the present time, my operating unit possesses . . . *(Circle your answer as you rate the following on a scale of 1 to 5, where 1 = Strongly Disagree and 5 = Strongly Agree)*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
A good information system infrastructure (i.e., e-mail, intranet, internet, etc.)	1	2	3	4	5
A good telecommunications infrastructure (i.e., telephone and video conferencing)	1	2	3	4	5
An information system that is integrated across several functional areas (i.e., marketing, finance, customer service, manufacturing, research, etc.)	1	2	3	4	5
The necessary infrastructure to capture customer data from all customer interaction points	1	2	3	4	5
The ability to consolidate all acquired customer related data in a centralized database	1	2	3	4	5
Data sharing technologies that enable data access between information systems	1	2	3	4	5
Information technology to acquire customer related data in a centralized database	1	2	3	4	5
Information technology that allows for one-to-one communications with current customers	1	2	3	4	5

(15) Approximately how many total customers does your **operating unit** have? ____ %

(16) What percentage of your **operating unit's** customers represent 80% of your total operating unit sales volume? ____ %

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An Empirical Analysis of the Determinants of Success of Food and Agribusiness E-Commerce Firms

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Abstract

E-commerce's value creation in agricultural and food markets will only occur to the extent that e-commerce firms exist throughout the supply chain. The problem is that e-commerce firms throughout the agricultural and food supply chain have faced a serious challenge in staying in business. Many have been forced to exit the market, and only a few have survived to develop into functional web-based businesses. The objective of this research study is to identify characteristics that are associated with successful e-commerce firms throughout the agricultural and food supply chain. Relevant e-commerce and agricultural e-commerce literature suggests several characteristics that influence the success for agricultural and food e-commerce firms. A limited-dependent variable technique, logistic regression, is used to relate websites' characteristics to their probability of survival.

Keywords: e-commerce, food chains, survival probability, logistical regression

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Introduction

Agriculture and the food supply chain in general possesses a history of quick adoption and assimilation of new technologies, especially cost reduction technologies. Agriculture was identified as one of the great promises of e-commerce; the high level of fragmentation present in the supply chain, large volumes traded, and homogeneous products only reinforced the expectations.

Internet technology has provided the possibility for cost reduction and demand enhancement along the food supply chain through the use of e-commerce. Automation has the capacity to substantially reduce transaction and procurement costs. E-commerce can improve firm efficiency by reducing inventory levels, transportation costs, and order and delivery time. E-commerce markets are expected to be more transparent and more perfectly competitive than physical markets, conditions which should attract more consumers and thus increase demand. The contribution of internet technology to food chains has the potential to release value that was previously locked by higher costs along the food chain.

Electronic markets for agricultural products have been around since long before the internet came into existence. Since the mid 1970s certain agricultural industries supported electronic trading mechanisms. Two especially successful pioneers in electronic trading in agriculture are the Egg Clearing House, a computerized egg exchange, and TELCOT, an electronic cotton trading mechanism established in 1975 to promote transparent cotton pricing (Wheatley, Buhr, and DiPietre, 2001).

Twenty years later, Farms.com was established as the first agricultural e-commerce website on the internet. The internet reduced the costs of running an electronic trading platform. The industry was optimistic that this new technology would reinforce perfect competition, decrease transaction costs, and bring opportunities to the marketplace by increasing market size and reach. Low entry cost and high expected returns resulted in the agricultural dot.com boom in the period from 1999 to 2001.

The quick and continuous sprouting of firms during this period resulted in a densely populated market. While the market population continued to increase, volumes traded remained low. The consequence was the saturation of the agricultural and food supply chain electronic markets. Forester Research diagnosed e-commerce market saturation in 2002, and predicted that of 1400 electronic marketplaces present at the time, only about 200 would remain in business through 2004.

E-commerce's value creation in agricultural and food markets will only occur to the extent that e-commerce firms exist throughout the supply chain. The problem is that e-commerce firms throughout the agricultural and food supply chain have faced a serious challenge in staying in business. Many have been forced to exit the

market, and only a few have survived to develop into functional web-based businesses, and even for these the future is uncertain.

Objectives

The objective of this study is to relate characteristics of e-commerce sites to their operational status at the time of the study. We have data on 128 e-commerce sites of which 71 were still operating at the time of our study and 57 no longer were. Using logistic regression, we will relate this condition to firm characteristics to be defined, below. The hope is that characteristics that differ between surviving and defunct firms will be revealed. Such differences should be of interest to firms in both agricultural and food supply chains.

Literature Review

E-commerce Definition & Classification

E-commerce can be defined as the conduct of business activities electronically via digital media (Vulkan, 2003). It encompasses electronic trading of goods and services, online delivery of digital content, electronic fund transfers, electronic share trading, commercial auctions, collaborative design and engineering, online sourcing, public procurement, direct consumer marketing and after sales service. E-commerce can further be divided into two categories: business to business and business to consumer. While the latter has had most of the media attention with the revolutionary idea of shopping directly from your computer, business to business e-commerce has already been identified as a market more than 10 times the size of business to consumer e-commerce (Timmers, 1999).

The idea of business-to-business e-commerce is by no means a revolution. Dating back to the 1980s there were companies exploring the use of information systems to allow suppliers, distribution channels and customers to interchange data and timely information, which in turn would result in better forecasts of demand and supply (Cash and Konsynski, 1985). Before the internet was commercialized the rise of electronic data interchange (EDI) systems allowed for electronic documents to be transferred in a standard machine-process format (Dai and Kauffman, 2001). With the introduction of the internet, these electronic processes that were once only practiced by large companies are now commonly available throughout the market. This facilitation has provided the growth of internet business-to-business e-commerce where large numbers of buyers and sellers are willing and able to adopt these new technologies given their low cost and advantages.

Agricultural e-commerce presents a difficulty when trying to categorize it according to the specified taxonomy, since a farm or any type of agricultural production is indeed a business, but simultaneously presents market power characteristics such

as price taking behavior most commonly attached to consumers. As a result of this difficulty, agricultural initiatives were classified into four categories: content providers, agribusinesss-to-grower, agribusiness-to-agribusiness, and commodity futures and derivatives markets (Wheatley, Buhr, and DiPietre).

Lucking-Reiley and Spulber (2001) evaluated productivity gains from business to business e-commerce in four different categories: automation of transactions, the potential economic advantages of intermediation, the organization of centralized exchanges, and the reorganization of firms. The automation of transactions will make it unnecessary to translate computer files into paper documents, thus reducing the cost of personnel and eliminating a source of human error. Cost of procurement will be reduced before, during, and after the transaction. Previous to the transaction taking place, the costs of search for suppliers and buyers, and price and product comparisons are considerably lowered through the use of e-commerce. During the transaction, communication costs will be drastically reduced by excluding cost and time of travel, physical space for meetings, and the processing of documents. After the transaction has taken place, communication costs to assure contractual performance or confirm delivery will also be diminished. Software that enables the transaction itself to trigger necessary updates of inventory and accounting records will not only yield cheaper information but also speed up the process. As evidence of the later point, MasterCard estimates the cost of processing purchase orders to have decreased from $125 to $40. In 2000 the Economist published the findings on the cost of financial transactions; according to Lehman Brothers: a teller costs $1.27, an ATM costs $0.27, and an online transaction $0.01.

E-commerce intermediaries can reduce search cost while consolidating markets, providing market information, and offering a variety of goods and services. In that manner a consumer could trade with an intermediary and thus get everything needed in a one-stop-shop, as opposed to the extended version without the intermediary where the consumer would have had to contact several different suppliers. Intermediaries can reduce search costs, certify product quality, reduce barriers to communications and provide guarantees for buyer and seller commitment (Spulber, 1999). Certifying product quality as well as providing guarantees of delivery and payment are especially important in e-commerce.

As information costs diminish, as is the case with e-commerce, several things will occur. Consumers will be allowed to make direct purchases from manufacturers. There is less need for firms to be vertically integrated, resulting in more firms with greater specialization and outsourcing. Business-to-business e-commerce improves the performance of the supply chain by reducing inventory levels, transportation costs, and order and delivery lead times. E-commerce will restructure the market place not only by reducing transaction costs but also by reducing market thinness and increasing liquidity (Thompson and Sonka, 1997). These changes will promote firms' reorganization and thus further productivity gains.

Business models determine the way business is carried out by firms. More formally a business model is architecture for product, service and information flows, including a description of the various business actors and their roles, a description of the potential benefits for the various actors, and a description of the source of revenue (Timmers, 1999). E-commerce has revolutionized and significantly increased business model possibilities for firms.

Auctions have long been used as an exchange mechanism to determine a market clearing price and let the consumer with the highest willingness to pay make the purchase, thus maximizing price. However, traditional auctions present a significant cost in the transportation of the physical goods to the auction, as well as the time spent by the bidders at the auction. Internet technology facilitates auctions by decreasing their cost since the product does not have to be transported other than to its final location. The asynchronous characteristic of e-auctions increases convenience as well as the size of the market. The internet has also extended the duration of an auction from a few hours in a traditional setting to a few days or weeks in a virtual setting. Extended duration leads to a greater number of bidders and thus another increase in the size of the market. Further convenience can be sought by search engines and hierarchies of categories that allow customers to find what they need (Lucking-Reiley, 2000).

E-auctions also present several disadvantages relative to a traditional auction mainly in the difficulty of bidders to inspect the product before purchase. Large textual descriptions, images, videos and email question and answer mechanisms have all been used to diminish this effect. The risk of fraud, while evident, has not stopped internet auctions from leading the e-commerce revolution.

There are other possibilities for foul in internet auctions besides fraud. Two that are extremely hard to enforce in e-auctions are shilling and bid shielding. Shilling occurs when the seller bids on his or her own good in an attempt to raise the price for the item. There is a chance that the seller will end up not selling the product. Through the internet it is especially hard to enforce a non-shilling policy since it would be very easily done and hardly traceable for the seller to get a new free email and come in under a fake name as a bidder. Bid shielding is when a bidder places a low bid and then gets someone else to post an outrageous bid that will discourage anyone else from bidding until the auction closes, then the highest bid is retired and the item goes to the low single previous bid (Lucking-Reiley, 2000). Given the technological innovation of the internet, market makers and e-commerce designers as well as scammers will have a chance to test their creativity and exploit the possible variations of e-commerce exchange mechanisms.

Exchanges are the other most popular exchange mechanism on the internet. This economic mechanism aggregates many buyers and sellers through centralized

clearing, another recognized productivity gain from e-commerce. At these exchanges buyers place bids and sellers place offers. The main benefits of online exchanges seem to come from the provision of liquidity to the market from large numbers of participants. Electronic exchanges tend to focus on a specific industry, and are seldom owned, controlled, or backed up by a large company or an industry consortium. In some instances one can find "third party" marketplaces that have partnerships or special contracts with large companies.

Internet based market mechanisms such as auctions and exchanges with automated protocols present the potential for a bias. The protocol can be such that its design will benefit sellers or buyers. For example, an English auction is by design meant to be biased toward the seller since the bidders must compete by raising each others' price to their maximum willingness to pay. Throughout the literature, neutrality is cited as an important feature for the long run survival of an exchange (Vulkan, 2003). If a certain market mechanism is oriented towards one side of the transactions, say the seller, it will become increasingly hard for the exchange to attract buyers. Buyers could possibly reach a better deal through private negotiations. It is crucial that a market mechanism provides value for both buyers and sellers to attract enough participants to provide liquidity (Kaplan and Showney, 2000).

In business-to-business e-commerce the choice for a firm between using auctions or exchanges will depend on the liquidity of each. If an exchange has enough participants buyers and sellers can expect competitive prices. A seller may prefer an auction since by design it is seller oriented. However, if liquidity is lacking, no sale may occur, or the price may be depressed relative to competitive levels, and a seller would prefer a more liquid exchange. Characteristics of the good and industry could also tip the balance toward either mechanism. For example second-hand goods or items where the price is uncertain are more endemic to auction mechanisms. Some industries have traditionally implemented auctions, for example the cattle industry. If an auction displays a high degree of competition then the seller bias is reinforced and bidders will drift into exchanges. As more and more business moves toward e-commerce transactions, increased competition at auctions is a possible progression. Due to this effect, exchanges may become the dominant trading mechanism for business-to-business transactions in the long run (Vulkan, 2003).

Goldman Sachs Investment Research described ten success factors for an e-commerce firm: business model, market size, industry expertise, structural inertia, first mover advantage, branding and distribution, community features, technology, blending revenue streams, and management execution hustle (Carrere, 2001). As the first success factor business model is of primary importance. However there is no clear or definite answer for firms as to what business model will allow them to survive. Different business models may be suitable as time progresses.

Agriculture was identified by Goldman Sachs' research as one of the seven most business to business inclined industries (Carrere, 2001). The high level of fragmentation in the supply chain, large volumes traded and homogeneous products all incline agriculture towards e-commerce. The agricultural supply chain was described as full of imperfections that restrict efficiency. In this area e-commerce had great possibilities for improvements (Forbes.com).

Data & Methodology

Relevant e-commerce and agricultural e-commerce literature suggested a series of characteristics that will serve as determinants of success for agricultural and food chain e-commerce firms. The development of a model that relates these characteristics to the firms' probability of survival could yield valuable insight for developing e-commerce ventures and could be used to estimate the effect on the probability of survival of feasible changes in existing e-commerce firms.

Data

The variable of interest is the survival state of the e-commerce firms which takes a value of 1 if the business is still operating, and a zero if not.

The independent variables included in the model are: whether the site offers complementary e-commerce goods functioning as a one-stop-shop or specializes in a niche, is buyer/seller oriented or neutral, is sponsored by an industry consortium, market information provided by the site, degree of site automation, business model employed by the site, and e-market concentration. All variables except for market depth are dummy variables where a 1 indicates that the website displays the characteristic and a zero if it does not. Market depth as the only continuous variable takes the number of e-commerce ventures operating within the same market. In order to better accommodate the different business models and sites with multiple business models, three dummy variables will be included representing exchanges, auctions, and private negotiations respectively.

The values the specified variables will take are found or derived from two data sets in addition to the actual e-commerce websites used in the analysis, provided that the site is still in business. If not, data may be obtained from "The Museum of E-Failure" at www.disobey.com/ghostsites. The website was created to preserve the last image of e-commerce ventures gone sour before the record is lost.

The first data set is a listing of agricultural and food industry e-commerce sites compiled originally by Thompson and Nageotte (2001). The table consists of a time series data at four points in time: 1999, 2000, 2001, and 2003. Data are provided for over a hundred e-commerce websites and include information on their respective

business model, ease of registration, market power, and range of offerings for each of the four different points in time.

A secondary data set is obtained through searches of the Agri-marketing magazine's website, where news articles of specific websites provide substantial information, such as when the site started doing business or discontinued operations, its vision or business model, and volumes traded.

A limited-dependent variable technique, logistic regression, will be used to relate websites' characteristics to their probability of survival. The independent variables employed in the analysis are: Market Information, Degree of Automation, Neutrality, Industry Consortium, Private Negotiations, Auction, Exchange, One-stop-shop, and Market Depth. Each is discussed in turn. [1]

Providing valuable Market Information (MI) and customizable settings are widely used strategies to attract and more importantly retain e-commerce customers. A website that provides timely market information and customizable settings is usually preferred. Some business models include a "community" feature, which is defined as having emphasis on content and interaction with limited commerce options. Many web sites combine their community feature with facilitators, auctions, negotiated listings and or e-trade show features, all of which provide e-commerce options. Any website which is designated by Thompson and Nageotte to have a community feature receives a 1 for their MI and a zero otherwise.

Goldman and Sachs Investment Research also included technology as one of its ten success factors for an e-commerce firm. Assuming that the same technology is available to all firms, the extent to which firms accommodate in order to exploit the benefits of available technology will influence their probability of survival. Lucking-Reiley and Spulber identified automation as the first source of possible gains from e-commerce. Benefits will accrue in relation to the degree of automation within an e-commerce firm and its compatibility with other firms. Each of the websites was examined. Its Degree of Automation (DA) is set to one if it is judged to be more automated than an online catalogue shop and zero otherwise.

Goldman and Sachs Investment Research included business model as another of its ten success factors for an e-commerce firm. The choice of business model by the firm will surely influence its probability of survival. However, the optimal business model for an agricultural e-commerce firm ultimately depends on the characteristics of the product and the market in which the firm operates. There is no clear way to generalize a formula for whether a firm would be better off by utilizing auctions,

[1] A reviewer quite correctly pointed out that our list of firm characteristics is not exhaustive and could include things like firm logistics and the payment system employed. We acknowledge our data's short comings and note such for future research.

exchange mechanisms, or private negotiation (Carrere, 2001). Nevertheless, the development of e-commerce has allowed for the creation of many variations of more traditional business models, which suggests that business models can be molded to better exploit the benefits of e-commerce as a means to trade. According to Vulkan's predictions, as e-commerce markets develop, exchange mechanisms will be preferred to auctions, which will in turn be preferred to private negotiations. Many firms operate in more than one of these business models simultaneously, or have switched business models over time. The business model variables, Private Negotiations, Auction, Exchange, are set to 1 as appropriate according to the Thompson and Nageotte data (They are called Negotiated Listing, Auction, and Mall/"eTradeshow" in their data).

Market orientation or bias, is an important decision for a firm, physical or electronic. A firm can be buyer oriented, seller oriented, or neutral. E-commerce intermediaries exist in all ranges of market orientation, yet neutrality is accentuated for online business models. In the literature, Vulkan and Carrere both independently discuss that in the long run only sites that can attract both buyers and sellers will manage to survive. Since a seller oriented e-commerce firm is expected to have a harder time attracting buyers than a buyer oriented firm, and vice versa, neutral firms are expected to have an advantage and a better chance of survival. Neutrality is 1 if the site is so designated by Thompson and Nageotte and zero if it is deemed to be seller or buyer oriented.

The increased ease of communication diffusion through the use of the Internet has allowed for the establishment of industry consortiums throughout e-commerce markets. These consortiums directly support e-commerce ventures; Covisint in the automobile industry and Rooster in the agricultural industry are examples of such ventures. Although the demise of Rooster.com is contradictory, the support of an industry consortium is expected to have a significantly beneficial effect for the supported website's probability of survival. Industry Consortium is assigned a 1 if a search using search engines at *Agri-marketing* magazine's website revealed such support or if the firm was a business venture of an existing physical firm that held substantial market share.

Goldman and Sachs Investment Research included market size as one of its ten success factors for an e-commerce firm. Market size and market depth can ultimately determine if a website is to remain in business. The ease of entry to e-commerce markets has resulted in the crowding of firms that attempt to perform the same or very similar functions. Through the movement of business practices online, the capabilities of these firms are greatly enhanced. The results are markets that can be satisfied by only a few firms, further complicating the situation. Forester Research forecasted a market shakeout of 86% of all e-commerce marketplaces by 2004. The crowding effect displays progressive nature, meaning that at very low e-market concentrations, market size might simply be insufficient

to support operating firms. Furthermore every additional firm entering the market has a greater marginal contribution to the crowding effect than the previous and thus further decreases the probability of the website's survival. Market Depth is computed by totalling the Range of Offerings for a firm and then dividing this by the total number of firms which also participated in the products offered by the firm.

Throughout the literature of e-commerce design, the idea of a one-stop-shop is discussed as an important characteristic of successful e-commerce websites. Lucking-Reiley and Spulber (2001) discuss the potential economic advantages of intermediation as a source of productivity gains from e-commerce. They focus the initial discussion on the benefits to consumers, who can enjoy the conveniences of one-stop-shops with the asynchronous characteristics of e-business. Offering complementary e-commerce goods will increase the amount and regularity of consumers, both desirable outcomes for e-commerce firms. Survival probability will be expected to increase if the website becomes a one-stop-shop by adding complementary goods. For example, a livestock and meat e-commerce firm would benefit from also offering embryos, livestock medications or feed. So that a website that offers seed and fertilizer will have a better probability of survival than a website offering only seed. One-stop-shop is assigned a 1 for sites that are judged to offer a large number of complementary products and a zero otherwise.

Table 1 lists the descriptive statistics for each explanatory variable. The mean and standard deviation of each variable are presented first. With the exception of market depth, a breakdown of the variables is provided at three different levels: first, how many of the total observations displayed the characteristic (e.g., market information), followed by how many observations are associated with successful e-commerce ventures, and how many are associated with e-commerce ventures that have exited the market. Market depth as the only continuous variable gives means for those who survived and exited.

Table 1. Descriptive Statistics of the Data Set

Explanatory Variable	Mean	Std. Dev.	Total (N)	Survived	Exited
			128	71	57
Market Information	0.672	0.471	85	53	32
Degree of Automation	0.398	0.491	51	26	25
Neutrality	0.648	0.479	82	40	42
Industry Consortium	0.169	0.377	21	13	8
Private Negotiations	0.594	0.493	76	44	32
Auction	0.180	0.385	22	14	8
Exchange	0.484	0.502	61	29	32
One-stop-shop	0.5	0.502	64	39	25
Market Depth	22.14	6.04	22.14	21.63	22.75

The Model

Initial efforts to develop an empirical model suggested statistical survival analysis. However, "Survival analysis is used to analyze data in which the time until the event is of interest … If one wished to study the occurrence of some event in a population of subjects where the time until the occurrence of the event was unimportant, the event could be analyzed as a binary outcome using the logistic regression model."(Harrell, 2001). Since we are interested in survival probability of agricultural e-commerce firms, logistic regression will be used.

To achieve further insight and test statistical significance, several variations of the original model were executed. This results in a total of four models. Model one is the original empirical model consisting of 128 observations. Model two is the same model but the data for e-commerce providers is excluded, with a total of 115 observations remaining. Model three will use data only for agricultural e-commerce ventures and model four will be based on food service e-commerce ventures. Each model is estimated using SAS.

The Results

Table 2 lists the coefficient estimates, their standard errors, and the Wald statistics testing the hypothesis that each coefficient equals 0 for Model 1. Market information, auction, and exchanges are the significant variables, while neutrality and market depth approach significance.

Table 2: Parameter Estimates and Statistics for the Explanatory Variables

Explanatory Variable	Parameter Estimate	Standard Error	Wald	Variance Inflation	Odds Ratio
Intercept	1.27	1.1	1.34	-	-
Market Information	1.02	0.42	5.90*	1.05	2.78
Degree of Automation	-0.09	0.42	0.05	1.14	0.91
Neutrality	-0.52	0.43	1.53	1.09	0.59
Industry Consortium	0.34	0.54	0.41	1.05	1.41
Market Depth	-0.05	0.04	1.89	1.05	0.95
Private Negotiations	-0.21	0.57	0.13	2.01	0.81
Auction	1.18	0.61	3.78*	1.36	3.25
Exchange	-1.14	0.57	3.99*	2.02	0.32
One-stop-shop	0.38	0.42	0.81	1.18	1.46
R^2 = 0.19					
Chi-Square Statistic for the overall significance of the regression =19.60 (0.02)					
*Statistically significant at $\alpha = 0.1$					

The R^2 reported is due to Allison (1999). The Chi-square statistic for the overall significance of the regression tests the hypothesis that all variable coefficients are simultaneously zero. The value in parentheses is the P-value for the relevant Chi-square statistic.

Market information behaves as expected, exhibiting a positive contribution to the overall probability of survival. The model indicates that the provision of information via the Internet is valuable.

The impact of Neutrality is negative. This contradicts our expectations that in the long run only those e-commerce sites that manage to attract both buyers and sellers will manage to remain in business. Perhaps because our data can be qualified as "short term" the model is unable to capture long-term results. Or, perhaps the neutrality hypothesis is erroneous.

Market depth, the only continuous variable in the model, has a negative effect. The more firms operating within each e-commerce market, the lower the probability of survival for the e-commerce venture. The ongoing e-commerce market shakeout continues to reduce e-commerce offerings to sustainable levels.

The next three explanatory variables represent a site's business model. There is no clearly optimal business model for e-commerce firms. The results suggest that while private negotiation has a negative effect, the effect is insignificant. A site with an auction model increases its chances of survival significantly, while those with an exchange model decrease the probability of survival significantly. Vulkan predicted that once e-commerce markets fully develop exchange mechanisms would be preferred to auctions, which will in turn be preferred to private negotiations. Model results show that auctions are preferred to private negotiations, but both are preferred over exchanges. One interpretation of these results is that at present, exchange mechanisms still have a long way to go; this in turn suggests that the e-commerce markets are far from being fully developed.

Interpreting the Coefficients

Variable effects are discussed in the previous section. The variable coefficients themselves are difficult to interpret. In an ordinary least squares regression, coefficients are marginal effects. Logistic regression coefficients however, tell us the change in the log-odds associated with a 1-unit increase in the explanatory variable. Results are easier to interpret if they are converted to odds ratios. This is done by taking the antilogs of the coefficient estimates.

Market information has an odds ratio of 2.78, which means that the predicted odds of survival for e-commerce ventures providing substantial market information is 2.78 times the odds for those that do not.

Neutrality has an odds ratio of 0.59, which means that the predicted odds of survival for neutral e-commerce ventures (no bias) is 0.59 times the odds for those that are biased (buyer or seller). In other words, neutrality reduces the odds of success. The rest of the coefficients can be interpreted in the same manner.

Market depth, the only continuous variable, has an odds ratio of 0.95. Which means that the predicted odds of survival for e-commerce ventures that operate in markets one firm deeper is 0.95 times the odds for those that operate in one firm thinner markets. Firms have a greater chance of success in thinner markets.

Model Interpretations

From the model as a whole we obtain several insights. First, evidently e-commerce markets in general, but especially those associated with agriculture, are at an early stage of development. This results in a model that fits reasonably well given historical data, but produces several unintuitive relationships. Of the significant or near-significant variables in the model three, Market Information, Market Depth, and Auction, have the anticipated signs, while two, Neutrality and Exchange, do not. Whether this is due to lack of maturity in e-commerce in agriculture and food businesses or because of different workings of the markets, themselves, remains to be seen.

Secondly, it became apparent during this project that, against predictions, agriculture might not be well suited for e-commerce. The level of automation possible is relatively limited. Classified ads, or catalog shopping was already available and making them electronic contributes little value added. Inventory and record keeping in agricultural settings differs greatly from those in, say, the retail industry, limiting the degree of automation and reinforcing that agricultural e-commerce differs substantially from B2B e-commerce.

Agricultural margins have been historically thin, which raises an interesting concern: is e-commerce increasing the size of the pie or increasing the number of slices in the pie? Truth seems to be that it does both; thus, we have contradicting effects. On one side, cost reducing automation, increased transparency, and market reach are expected to increase market size. However, e-commerce firms compete directly with established firms, splitting the pie into a greater number of slices. This phenomenon is enhanced by the low entry costs associated with e-commerce startups, which has resulted in a large number of e-commerce ventures. On the other side, geographical considerations, given the bulk and relatively low value of most agricultural inputs and products, limits the size of e-commerce markets. Logistical costs prevent a farmer in Indiana from buying fertilizer from Arkansas.

The thin margins experienced in agriculture have constrained the degree to which e-commerce can increase market size. Price transparency seems to be unaffordable, or at the least undesired, by already established firms. Market reach is limited by bulkiness and geographical distance. Thus, the increase in pie size, if occurring, is certainly not of large proportions. The predatory effects of e-commerce firms on established firms may then be considered as having a greater effect. Thus, the positive effect on market size is surpassed by the predatory effects of the large number of new e-commerce ventures. At least for agricultural markets, these contradicting effects result in an overall negative effect on the market, possibly explaining why agricultural e-commerce ventures are having such a hard time staying afloat.

Modifications of the Empirical Model and Data Set

The original data set is comprised of 128 observations which can be grouped into three groups: agricultural, food service, and e-commerce provider ventures. The e-commerce provider ventures (such as Transora.com, now known as 1snync.org) differ greatly in the function that they provide to clients. Furthermore, the "dot.com rush" provided large amounts of business for these innovative companies. For these reasons, it was determined that observations in the data associated with e-commerce providers could be omitted from the empirical model.

A second model was developed with 115 observations. Table 3 shows the result of omitting e-commerce provider observations from the data set as an increase in the explanatory power and significance of the model. Models 3 and 4 isolate sites that are agriculture or food oriented, respectively.

Table 3. Comparison of Models 1-4

	Model 1	Model 2 Without E-commerce Providers	Model 3 Agriculture	Model 4 Food Service
Observations	128	115	50	72
R^2	0.1900	0.2381	0.3438	0.4733
Signif. Variables*	MI, n, md, A, E	MI, A, e	MI, N, MD, a, oss	MI, PN, a, E
Chi-Square	19.5965	22.6136	14.9029	31.5612
P-Value	0.0206	0.0071	0.0936	0.0002

*Variable acronyms displayed in uppercase are significant at $\alpha = 0.1$, those in lower case signify that the variable is approaching levels of significance at $\alpha = 0.1$.

Agricultural and food service e-commerce ventures can be empirically differentiated. This suggests that these two groups of observations could be treated separately. Two additional regression models were developed by separating the data of model 2 into two different data sets: one containing observations associated with agricultural ventures and another for those associated with food service ventures.

The two data sets are comprised of 50 agricultural observations and 72 food service observations. Note that the number of total observations from both categories (122) exceeds the number of observation in model 2 (115); this is the result of several ventures operating in both categories simultaneously. The results from these regressions are also presented in Table 4. Clearly both represent a substantially better explanatory power than model 2 as judged by R^2. One might argue that since the food service regression holds far more explanatory power than the agricultural regression, food service e-commerce markets are far more developed than agricultural e-commerce markets.

Table 4. Comparison of the Odds Ratios of Models 2, 3, and 4.

	Model 2 Without E-Commerce Providers	Model 3 Agriculture	Model 4 Food Service
Market Information	**4.42**	**7.01**	**12.90**
Degree of Automation	0.89	0.59	0.59
Neutrality	0.57	**0.22**	1.05
Industry Consortium	1.84	1.64	0.98
Market Depth	0.96	**0.85**	0.97
Private Negotiation	0.71	1.65	**0.05**
Auctions	**3.03**	5.09	4.50
Exchanges	0.38	1.48	**0.02**
One-Stop-Shop	1.77	3.26	1.55

Bolded entries are associated with significant coefficients ($\alpha = 0.1$). Underlined entries are associated with coefficients which approach significance.

As presented in Table 4, the odds ratio for market information is higher for food service firms than agricultural firms, and both are higher than in the combined Model 2. These results suggest that market information has the most powerful effect on the probabilities of survivals of e-commerce ventures. The variable's odds ratio is considerably higher for the food service sector than for agriculture. This in turn implies that food service e-commerce ventures should exhibit a greater degree of market information than agricultural ventures, since they have more to gain. Degree of automation is never significant in any of the models, but always decreases the odds of survival. Neutrality decreases survival odds in the combined and agriculture models, but increases them slightly for food service sites. Market depth was significant in several of the models but has only a minor negative effect on survival odds. Private negotiation's impact on the survival odds is quite different for

the two types of sites. It increases survival odds by more than 50% for agricultural ventures. At the same time the odds of survival of firms displaying private negotiation is one twentieth the odds of exiting the market in the food service ventures. Exchange's odds ratio exhibit extremely low values for the food service industry, while in agriculture the odds of survival surpass the odds of exiting the market by roughly 50%. Auctions have a positive effect across both industries, but with a stronger effect in agricultural e-commerce markets. One-stop-shop has a much better odds ratio in agriculture than in food service. This could be related with the relative ease and speed of internet in urban areas where the food service industry operates. Making it a lot faster to go from one site to the next and thus decreasing the positive effects of having a one-stop-shop offering complementary products.

Conclusions and Implications for Food and Agriculture e-Commerce Ventures

Based on the results of the empirical models presented in this study, the factors that significantly influence the viability or success of e-commerce ventures are shown in Table 5.

Table 5. Variables Displaying Significant Influence on survival Probabilities of E-commerce Ventures

Variables	In Agricultural Markets	In Food Service Markets
Market Information	A community feature displaying valuable market information and customizable settings for users.**	A community feature displaying valuable market information and customizable settings for users.**
Neutrality	Avoid neutrality.**	
Market Depth	Avoid deep markets where competition is intense.**	
Auctions	Use of auctions as a price discovery mechanism.*	Use of auctions as a price discovery mechanism.*
Exchanges		Avoid exchanges.**
Private Negotiation		Avoid private negotiation.**
One-Stop-Shop	Operate a one-stop-shop.*	

**Variables significant $\alpha = 0.1$
* Variables significant $\alpha = 0.15$

Successful e-commerce ventures had a customizable community feature to their e-commerce website where important market information is displayed. The importance of the market information is evident in information portals, such as *directag.com* and *agweb.com*, which survived exclusively as information providers. These two sites are agricultural sites. Market information is at least as important in the food chain industry. Here the same kinds of information portals existed such as *meatandpoultry.com* and *foodweb.com*. Schiefer has investigated information portals and their structures in his work, detailing the importance of this variable in e-commerce success.

Neutrality is seldom displayed in successful agricultural e-commerce ventures. Those that do display neutrality and are still in business such as *dairy.com* are also involved in the food chain sector and thus can afford to remain neutral. In agricultural e-commerce few neutral firms remain viable. For example, *Efruitinternational.com*, *cybercrop.com*, and *agex.com* are some of the neutral e-commerce websites that have exited the market. In the food chain and food service sector the probability of survival is nearly unaffected by a change in market orientation, thus an e-commerce venture operating in this sector is indifferent between neutrality or buyer/seller orientation. This suggests that agricultural e-commerce ventures are better off avoiding neutrality. Unfortunately for farmers, market bias is always against their best interest. As a business firm selling to farmers, or buying from farmers, the e-commerce venture must exploit their biased position in order to remain in business.

Market depth was insignificant for food chain ventures, but significant and detrimental to e-commerce survival in agriculture. In the cattle and livestock industry for example, all of the following sites exited the market before the end of the study period: *cattleinfonet.com*, *cattleoffering.com*, *cyberstockyard.com, meatexchange.com*, and *sellmeat.com.* There were also numerous e-commerce firms operating in the livestock sector at the end of the study period, which should raise a flag to any entrepreneur with intentions to enter that market.

The model implies that food service ventures should avoid private negotiation. Agricultural e-commerce ventures may improve the probability of survival through private negotiation, but this result is not significant. *Fielderschoicedirect.com* is an example of a successful e-commerce venture featuring private negotiation. This reinforces the idea that farmers exhibit a preference for personal business relationships, while the food service industry is far more efficiency oriented.

E-commerce ventures that ran auctions such as *farms.com*, *cattlesale.com, emergeinteractive.com*, and *winterlivestock.com* were able to sustain their e-commerce operations. Auctions also proved significant in the food chain sector. *Dairy.com*, *dairynetwork.com*, *bakeryonline.com*, and *beverageonline.com* are all examples of currently successful e-commerce ventures.

The exchange variable was not significant for agricultural ventures, yet it is very significant for food service ventures, which, according to the model, should avoid exchange mechanisms. This implies that food service ventures should in general always operate auctions, which may be complemented by any other business model. Finally one-stop-shop is significant in improving probabilities of survival. *Emergeinteractive.com*, *farms.com*, and *dairy.com* are examples of firms offering complementary products.

This study evaluated agricultural and food service e-commerce markets and designated characteristics as determinants of success. Of the variables in our models, market information, auctions and exchanges are the most important determinants of success. When only agricultural e-commerce ventures are evaluated, market information, neutrality and market depth are significant, while auctions and one-stop-shop are approaching levels of significance. For food service e-commerce ventures, market information, private negotiation and exchanges are clearly important and auctions may be important.

While not a direct implication of our analysis, it seems clear that firms entering the e-commerce markets need to remember that even though e-commerce is online, it is business. Having a strong business plan and a sound business structure are critical. The way in which e-commerce facilitates business misled many into believing that it would be simple to make money in electronic markets. The truth is that e-commerce has the capacity to make running a business easier, or help the business run more smoothly by enhanced efficiency and productivity gains. But e-commerce by itself is not going to magically fix business problems. For example, the almonds exchange site of *agex.com* failed when it was expected to create a market solution. The market for almonds is fragmented, fickle, and inefficient; the product passes through many different hands before reaching its final destination. Seasonal changes and large harvest variability plague the market. Since the market for almonds does not work optimally, there is a need for a new market for almonds. Introducing an e-commerce market made a lot of sense and created quite a stir in the almond industry. While many people joined the exchange, it experienced low levels of trading and exited the market. The problem is that those marketing problems that had plagued the physical market for almonds were not directly addressed. So in a nutshell, a non-operational physical market was moved online to become a non-operational e-commerce market. The website collapsed as have so many others in the e-commerce market shakeout.

There are e-commerce ventures that, at the time of this study, appeared to be successful, both in the agricultural as well as in the food chain sectors. Among the strongest e-commerce ventures at the time of the study were *theseam.com* and *eggclearinghouse.com* (now *eggs.org*); both benefit from industries familiar with electronic trading. The cotton industry has been practicing electronic marketing for

over 25 years. The true revolutionary was Plains Cotton Cooperative, which introduced TELCOT, an electronic trading system for cotton. The system required terminals at selling points, usually the gins, and also on the buyer site. TELCOT now operates under the name The Seam. Louis Baioni, The Seam's former chief executive officer, credits guaranteed trading as the key characteristic that has allowed the company to reach its current success. The seller receives payment for his cotton directly from The Seam and the buyer is guaranteed the quality and grade of cotton when cotton is sold through The Seam's exchange. The Seam collects payments from the buyers. Uvine.com is another site where guaranteed trade settlement has positively influenced survival as an e-commerce venture. "In any situation where a party trading in wine fails to meet their sales obligations, Uvine will act to preserve the integrity of the exchange and, as such, guarantees settlement to all of our customers" (*Uvine.com*, 2003).

The results of this study have led to the conclusion that e-commerce markets are not fully developed. Internet technology is itself in a developmental stage and technological growth is occurring at high rates. Regulatory institutions, whether governmental or private, needed to support business practices online are yet to become established. Furthermore, food service e-commerce markets are more developed than agricultural e-commerce markets. Differences in the amount of information and processes that can be automated between the food service and agricultural environments have resulted in a more established food service e-commerce sector. High speed internet is far more accessible in urban areas such as those in which the food service industry operates, while farmers and those involved in agriculture find themselves in rural areas where the internet is available, but is much slower. The agricultural industry also has a preference for familiarity and personal business relationships.

The models presented in this study should be revisited in the future when online markets are better developed and market information is more readily available, perhaps through regulatory institutions. Further research is also needed on the possible benefits of establishing an e-commerce regulatory institution, and the form that this institution should take to maximize the aggregate benefits for all involved in the market. Additional studies should be aimed at determining the outcome of the clash or complementarity between e-commerce and physical markets. The effect of e-commerce on market structure also deserves consideration for research to determine if markets will tend to become more vertically integrated, or if more intermediaries will appear to promote further specialization. The effects of e-commerce on market dynamic efficiency are also important.

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The Canadian Dairy Commission: an empirical survey on its relevance in today's civil society

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Abstract

The current function of the Canadian Dairy Commission (CDC) raises important public policy issues that have implications for wealth redistribution, administrative law, and civil liberty. The CDC's purported economic relevance in Canadian society serves as a facade for a short-sighted management approach that is devoid of the rudiments of a market mechanism. In order to suggest future public policy developments, an exploratory field survey was conducted and results are presented in this paper. Although the results do not infer that Canadian consumers are discontented with dairy prices in Canada, our evidence shows that consumers know very little about the processes behind marketing milk in Canada, especially with the price setting powers of the CDC. This study indicates that future policies should address this lack of consumer awareness. As global dairy markets evolve, policies designed to protect against domestic and foreign competition will most likely become less effective. Protectionist policies can be detrimental to a country's long-term prosperity as opportunities for new products, adoption of new technologies and faster responses to consumer demands are squandered. The study's limitations and implications for practice and future research are described.

Keywords: Canadian Dairy Commission, marketing boards, Dairy industry, milk products.

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Introduction

For decades, Canada has employed supply management boards to control the prices, production levels and imports of several agricultural commodities, two of which are fluid and industrial milks. The results have been controversial. Over the past decades, numerous economy studies have shown that the present system has serious flaws that will only exacerbate over time (Gorecki, 1982; Stanbury, 2002). The recent World Trade Organization talks afforded Canada's dairy supply management system a respite from scrutiny. Many argue that the Canadian government should follow other nations, such as England, Australia, Korea and New Zealand, by eliminating milk support prices and production quotas (Carman and Sexton, 2005; Gifford, 2005a; Hart, 2005). These countries' dairy industries now operate under a deregulated and open industry, exporting on average over 55% of their production overseas (Dairy Australia, 2004). According to Hart (2005, p. 3), the current level of dairy exports in Canada is less than 3 percent of its production level.

When the Canadian Dairy Commission Act was created in 1966, the quota system was designed to benefit milk producers. It assured them a stable income and protected them from the vagaries of the marketplace The Canadian dairy industry is the fourth largest of the agrifood sector of the economy, and employs about 38,000 people (Gifford, 2005a). However, the modus operandi of the Canadian Dairy Commission (CDC) has remained static throughout its 40 years of existence. CDC does not sufficiently inform Canadian consumers about dairy prices as well as the entire food industry about its intentions and obligations. The CDC reports only to Parliament through the Minister of Agriculture and Agri-Food Canada. Funded by the federal government, the CDC's current mandate is to strike a balance and serve the interests of all dairy producers, food processors, exporters, consumers and other government agencies. Yet, considering its cost-of-production approach to price fixing, many argue that the Canadian Dairy Commission erects an obstacle to competition throughout the Canadian dairy industry by penalizing the most dynamic and efficient producers via expensive quotas (Baylis, 2006). After all, average cost of production approach, ensures that the least productive milk supplier will remain in business. Moreover, the per capita milk consumption has dropped by 15% since 1983, and productivity has gone up with half as many cows now producing "the same volume of milk as 30 years ago; the average farmer milks three times as many cows, and produces five times as much milk" (Hart, 2005, p. 4). With rising productivity combined with a fall in demand one would expect milk prices to be lower. Yet the price of milk at farmgate rose by 49% from 1994 through 2005 (Canadian Dairy Commission, 2006a), while inflation during the same period was below 25% (Doll, 2006). The existence of the CDC has distorted the usual relationship between supply and demand (Carman and Sexton, 2005).

Little academic research has investigated marketing boards and the CDC, especially from a managerial and marketing perspective. To address this shortcoming, the current study provides critical insight into consumers' perception and knowledge of the CDC and its role within the Canadian dairy industry. The methodological orientation of the study combines both secondary research and quantitative measurement to offer a unique perspective in the way the marketing of dairy products to consumers in Canada is done. The study also has public policy implications about the democratic process as it applies to the CDC, a government institution. Notwithstanding that the CDC is a federally funded agency that operates under the Canadian supply management scheme, the current study provides a template for consultative research specifically targeting consumers of dairy product.

This paper is presented in three parts. The first part discusses a brief historical overview of the CDC and related current issues. In the second, we present results from a survey that measures consumer perceptions about dairy product pricing policies and the purpose of the CDC. In the third, the data are extrapolated to posit implications for future public policy and reform readiness.

Overview of the CDC

Created through the Canadian Dairy Commission Act of 1966, the CDC was intended to confirm to the federal government's commitment of maintaining a strong and prosperous dairy industry in Canada (Furtan, 1987). The CDC reports to Parliament through the Minister of Agriculture and Agri-Food Canada (Crown and Heady, 1972). It is funded by the federal government, producers and the marketplace, and strives to balance and serve the interests of all dairy stakeholders-producers, food processors, exporters, consumers and various levels of government. This regulatory agency has a yearly budget of about 6 million $CAN and governs the dairy supply management schemes that are in place across the country. Specific milk quotas, valued at 20 billion $CAN in 2005, are managed at the provincial level by milk marketing boards and agencies (Doll, 2006).

The CDC is composed of policy analysts, agricultural economists, financial, marketing, communications specialists, and support personnel. The functions of this staff include assisting the dairy industry in developing dairy policies, assessing the changing demand and production of milk and dairy products, and overseeing the pooling of milk revenues and market sharing systems. The Chairman, Vice-Chairman and Commissioner (all are called Commissioners) lead the CDC, all of whom are appointed by the Minister of Agriculture. Once appointed, the staff leaders have the authority to set dairy prices. The Commissioners are chosen based on their experience within the dairy industry and, as a result, are commonly former dairy farmers or individuals closely related to dairy farming.

At first, the CDC continued the government's price support programs for certain dairy products, such as butter, skim milk powder, and cheese. The federal government provided the CDC with a subsidy payment that was, in turn, disbursed to industrial milk and cream producers. Provincial milk marketing organizations worked with the CDC to manage the production of industrial milk, and to generate the funds needed to cover the cost of exporting surplus dairy products.

Subsidy Eligibility Quotas (SEQs) were the predecessors to the current Market Sharing Quota. These SEQs were intended to limit the amount of milk products that dairy producers could ship. However, the establishment of the SEQs did not effectively control dairy production and shipment amounts. Dairy producers were allowed to ship amounts of milk in excess of their SEQ limit. Furthermore, some producers did not have a quota, and these producers were allowed to enter the market at any time.

Levies were then used to support the export of dairy products. These levies were deducted from the federal subsidy that was paid on production, up to each producer's SEQ level. Since these producers were permitted to ship amounts greater than their respective SEQ limits, these surplus amounts could not be deducted from the subsidy that the government was required to give industrial dairy producers. This meant that the federal government was burdened by higher subsidy payments.

The failure of the SEQs led to the establishment of the Canadian Milk Supply Management Committee (CMSMC). On August 1, 2001, all ten provinces entered the National Milk Marketing Plan and the Comprehensive Agreement on Pooling of Milk Revenues. The provinces agreed to collect the funds needed to offset the costs of disposing surplus dairy products from their producers. These funds would then be given to the CDC. The National Milk Marketing Plan's most important function is to maintain the Market Sharing Quota, which is the national production target for industrial milk in Canada. In addition, the CDC works with the CMSMC in developing and refining the current milk supply management system in Canada (Barichello, 1981).

Much of the CDC's past efforts have been directed towards refining the price support program to ensure a fair return for efficient dairy producers in Canada. Support prices are defined as:

> *The prices at which the CDC buys and sells butter and skim milk powder in order to balance seasonal supply and demand changes in the domestic market (CDC, 2006).*

In 1975, a Returns Adjustment Formula was devised to better estimate producer costs. This estimation was used to determine the necessary support prices for dairy products. However, the formula was deemed ineffective.

In 1991, the CDC announced that product support prices and producer target prices would be based on the advice of a Consultative Committee and of other dairy stakeholders. The CDC worked with these stakeholders to help the dairy industry meet the changing needs of the marketplace. The initiatives of this collaboration were:

a) The provision of producer-financed assistance payments for exports of dairy products, and;
b) Rebates, which encouraged the increased use of Canadian dairy ingredients in products, sold both domestically and abroad.

Both of these initiatives were effective for a short period of time, but both were eliminated on July 31, 1995 (Canadian Dairy Commission, 2006a).

After these eliminations, the dairy industry adopted a new system of pricing and pooling market returns. Under this system, industrial milk was classified at prices according to the end use of the product. This meant that prices would be more indicative of what the final product's costs were, rather than of the costs to produce them. This new pricing and pooling system would ensure that revenues from dairy products would be shared both nationally and regionally.

After the passage of the CDC Act in 1966, the CDC came into existence a year later to regulate industrial milk prices, effectively creating a self-regulated monopoly, a supply marketing management scheme that has been the key to the dairy industry's financial success. The collaboration of the CDC with the dairy industry's stakeholders has thus far been critical in ensuring the continued strength and prosperity of dairy farmers in Canada.

Source of Conflict

For some time, the CDC has been a source of conflicting interests amongst certain stakeholders of the dairy industry in Canada. Some argue that the current regulatory system prevents retail prices of dairy products from rapidly fluctuating. According to some studies, retail dairy prices are increasing, but not anywhere near price increases observed in countries where there are no regulatory systems (Gouin, 2004). According to Stanbury (2002), farm gate milk prices in Canada are 41% higher than in the US and 135% above the world reference price set by New Zealand.

Regardless, internal market forces and globalization are compelling the industry to reform. The Uruguay Round at the World Trade Organization led to significant changes in supply management. The federal government ended its direct subsidies, and switched to higher ratification, in excess of 299 percent on certain dairy products (Lippert, 2001). Following the Uruguay Rounds, the mandate for the Doha Round of global trade negotiations, which started in 2002 and may last until 2012, is to eliminate farm export subsidies in an effort to reduce trade-distorting domestic support and improve access to global markets. At this juncture, it is possible to anticipate results with a fair degree of precision. However, dairy farmers, with the support of the Federal government, have exhibited much resistance to any change and are adamantly against any suggested reform put forth by WTO members.

Some interest groups support current policies while others do not. The Dairy Farmers of Canada, for example, lobbies the CDC to maintain current marketing policies, in order to protect farmers' earnings and promote dairy products. For example, the CDC supply management system was established to countervail power domination throughout the supply chain, and protect farmers against the hefty cost of over-production. To this end, forecasts are used to control milk production (Canadian Dairy Commission, 2006b). Hence groups such as The Dairy Farmers of Canada advocate the policies of the current system to Parliament (Baylis, 2006). Yet, dairy product prices have steadily increased over the last 10 years, while the cost of milk production continues to decrease (Consumers' Association of Canada, 2006).

When analysing the CDC and its industrial milk-pricing scheme, conflicting political positions become evident. The Dairy Processors Association of Canada is one such notable interest group. It is comprised of the top dairy processors in Canada: such as Kraft, Agropur, Ultima Foods, and Danone. Contrary to dairy farmers, dairy processors are not a homogeneous, single interest group. They are fierce competitors in the market place and often support opposing policy alternatives. The dairy processing industry is responsible in generating revenues up to 10B. $CAN annually. However, these food processors, which represent dairy farmers' principal clientele, have historically been largely excluded from dairy policy development. In recent years, however, steps have been taken to permit their input into redesign efforts, but they have never been granted a policy-making role. Decisions related to dairy price fixing remain the purview of farmers and the CDC.

Several other groups play significant roles within the dairy industry. The Canadian Council of Grocery Distributors (CCGD), the Canadian Independent Grocers (CIG), the Consumers' Association of Canada (CAC), and the Food and Consumer Products Manufacturers of Canada (FCPMC) are worth discussing.

The CCGD and the CIG represent the function of the supply chain closest to consumers. The goals of the CCGD and the CIG are to advance and promote the

grocery and foodservice distribution and retailing industry in Canada. In addition, they advance industry best practices for the benefit of its members and Canadian consumers. A similar group is the FCPMC, which enhances growth and competitiveness in the food and consumer products manufacturing industry. We can also include in this category the Confectionery Manufacturers' Association of Canada, which endorses the interests of Canadian confectionery manufacturing by furthering the business interests of its members and increasing confectionary consumption in Canada. These four groups have similar goals and are habitually against any industrial milk price hikes. They are all chiefly focused on the sustainability of their own industries and members as well as promoting their products to end consumers.

The CAC directly represents consumers by supporting the publics' right to food information, safety, quality, and choice. Also, the CAC provides consumers a voice at the government industry table. Because of the current legislative architecture, the CAC is required to go through the CDC if it wishes to intervene in the industrial milk marketing process (Veeman and Veeman, 1974). Since it is not as well structured and resource-plentiful as the Dairy Farmers of Canada, the CAC is often challenged by the complexity of milk marketing systems in Canada, a difficulty which hinders the CAC's efforts to muster consumers in support of key issues.

In recent years, the Canadian Restaurant and Foodservices Association (CFRA) has been overtly in opposition to recent industrial milk price increases. Since its founding in 1944, CRFA has grown to more than 31,000 members, and represents restaurants, bars, cafeterias and social and contract caterers, as well as accommodation, entertainment and institutional foodservice. They, too, support a fundamental reform of the CDC (Canadian Restaurant and Foodservices Association, 2006).

Many groups are not in favour of current marketing systems. Policy-makers can safely ignore dairy product consumers' interests because the consumer is known to be politically ineffective (Stanbury, 2002). Since almost every consumer in Canada consumes dairy products, we argue that their viewpoint is vital to future policy-making related to dairy product marketing systems. In the next section, we review the methodology and results of an exploratory survey that was conducted to measure consumers' current knowledge and understanding of how dairy products are marketed in Canada.

Method

Survey Procedure and Participants

A sample of consumers was randomly selected from the Canadian province of Saskatchewan. The questionnaires were given to trained investigators along with a

letter addressed to potential respondents to explain the purposes of the study. The Research Ethical Board of the University of Regina approved all research procedures and instrumentation. Consent was implied by return of the completed questionnaire. Names of respondents were kept in a locked file cabinet separate from the received questionnaires so that responses could remain anonymous. Returned questionnaires were kept locked in the offices of the principal investigator and were destroyed when the data analysis was completed. The data analysis was conducted using the Statistical Package for the Social Sciences version 11.5 for Windows.

The final sampling was comprised of 267 respondents. This is considered to be an acceptable sample size for this type of exploratory consumer survey on a food related topic (Stanton and Tucci, 1982).

Survey Instrument

The process of developing the survey instrument involved two distinct steps. The first step was desk research. This involved the analysis of existing published data on market trends across the whole range of processed dairy products. This analysis established the size and structure of the various market sectors and the shares of the major players. More than two dozen publications were reviewed to learn what previously had been done to survey consumer attitudes about food products. Particularly useful were research carried out by Kirkpatrick and Tarasuk (2003) and Fearne and Bates (2003).

The second step was questionnaire design. The questionnaire was designed so as to elicit ease of response from respondents. To this end, all the questions were closed and the length of the questionnaire was restricted in order to encourage 100 percent completion. The study consisted of nine items designed to take no more than five minutes to complete. Appropriate changes were made based on the comments of the pre-test group. The group was a random sample of the population, but we selected subjects so that gender and age group profiles would be similar to the overall population. Results from the pre-test were not used in the analysis. The survey was conducted all across the province of Saskatchewan from February 10 to March 15, 2006.

The inquiries of the survey were categorized into four parts. The first part of the questionnaire (questions 1-3) focused on purchasing and consumption behaviour of dairy products in general. The second section of the questionnaire (questions 4 and 5) focused on the willingness to pay for dairy products and pricing comparisons with U.S. dairy products. The third section dealt with attitudes towards and knowledge and perception of the CDC. Questions 6 and 7 considered consumer knowledge on the CDC, its role and function. A fourth and final section (questions 8 and 9) further addressed these specific issues.

In order to establish the extent to which attitudes, perceptions, preferences and willingness to pay might be affected by key demographic variables (e.g. age, gender, occupation, and geographic location) cross-tabulations were computed as appropriate.

Results

There were slightly more female (53.9%, n = 148) than male (43.4%, n = 119) respondents, and 111 respondents identified themselves to be in the 15-24 age group, which was the largest group in the survey. The 35-54 age group represented the second largest cluster with 67 respondents. The university environment in which this survey was conducted explains this result. We argue that, for this survey, all age groups were appropriately represented, though the median education level of respondents was likely above average of the general population.

The sample was dominated by representatives of households in which *"daily consumption of milk"* was reported (70.4%, n = 187). A small portion of respondents stated that they *"never consume milk"* (2.6%, n = 7). Other respondents reported that they either *"consume milk once per week"* (5.9%, n = 16) or *"two or three times a week"* (21.3%, n = 57). As for dairy products, the majority of respondents stated that they consumed dairy products *"two or three times a week"* (58.5%, n = 155). A significant portion of respondents reported that they *"consume dairy products once a week"* (37.8%, n = 99).

Based on our empirical results, price seems to be inconsequential to the decision-making process of consumers when buying dairy products. Although a significant portion of our sample specified that *"price does have an impact"* on buying decisions related to dairy products (29.9%, n = 80), a slightly higher number of respondents answered that *"price has no impact"* when purchasing dairy products for their households (37.8%, n = 101). More interestingly, a good number of respondents *"never or rarely check retail prices"* on dairy products (32.2%, n = 86). Nonetheless, results of our survey show that many respondents believe that *"dairy product prices should be decreased"* (34.8%, n = 93), while some felt that *"dairy product prices should remain the same"* (32.2%, n = 86). Furthermore, a significant portion of our sample *"do not know whether milk is more expensive in the U.S."* where no marketing board exists (71.9%, n = 192). Our findings suggest that consumers may be indifferent to retail prices of milk. Some consumers believe *"retail prices of milk in Canada to be more expensive"* (7.4%, n = 20), whereas a greater number of respondents consider *"retail prices of milk in the U.S. to be more expensive"* (19.1%, n = 51).

The third section, related to perceptions and knowledge of the CDC, also offered interesting results. The majority of respondents has *"never heard of the CDC"* (58.4%, n = 156), and a significant portion of survey participants were unable to

accurately describe the CDC's main purpose (80.6%, n = 215). Finally, our empirical results indicate that the correlation between question 6 (knowledge of the CDC) and question 7 (the purpose of the CDC) was particularly significant (0.801).

The standard statistical analysis of cross-table by Chi-square test was also performed. The following table shows the Chi-square test p-values for corresponding questions (since Table 1 is symmetric, we provide only the upper triangular part of the matrix).

Table 1:

q2	q3	q4	q5	q6	q7	q8	q9	
<.0001	0.6969	0.0825	0.0957	0.0999	0.0509	**0.0019**	0.4036	q1
	0.2929	0.1925	0.3295	0.8057	0.0707	**0.0049**	0.9983	q2
		0.1109	0.0860	0.6080	0.1237	**0.0096**	0.2836	q3
			<.0001	0.0545	**0.0048**	0.4689	0.4831	q4
				<.0001	**<.0001**	**0.0462**	0.6441	q5
					<.0001	8365	0.8365	q6
						0.0115	0.5069	q7
							0.4995	q8

As usual, we would reject the null hypothesis where characteristics defined by a pair of questions are independent, if the corresponding p-value is less or equal than 0.05. That level of significance was chosen given that the present study was exploratory.

Some of the cross-table is of special interest for our investigation. We reject the null-hypotheses when the items are independent. Hence, a high correlation was detected between the following items of interest: the impact dairy product price on buying decisions (q3) and age of the buyer (q8); personal perceptions about dairy price in the future (q4) and personal belief that milk is less expensive in Canada, compared to the U.S. (q5); personal belief that milk is less expensive in Canada, compared to the U.S. (q5), with age groups (q8); knowing the existence of the CDC (q6) and the proper description of the organization (q7); the proper description of the CDC (q7) and age groups (q8); whether the respondent consumes milk or not (q1), with age groups (q8); consumption of different types of dairy products (q2), with age groups (q8); and finally, the proper description of the CDC (q7), with personal perceptions about dairy prices in the future (q4).
In the following section of this paper, we interpret results from the survey and consider what these findings may signify for future public policy-making endeavours.

Discussion and Public Policy Implications

The findings of our survey indicate that there seems to be a contradictory relationship between dairy supply and consumer demand in Canada. Respondents in our field study were ambiguous as to what should be done with dairy retail prices in Canada. The number of respondents that answered *"prices should increase", "stay the same",* or *"decrease"* was almost equally split. Results were the same when asked whether retail prices impact their buying decisions. This outcome was not surprising. The results can be explained in part by milk's inelastic demand. Historically, fluctuations in retail milk prices have little or no effect on quantities demanded, which means that demand for milk is intrinsically inelastic (Garland and Hudson, 1969). That being said, results from our survey did not indicate any widespread discontentment related to retail prices of dairy products in Canada. Consumers seem to implicitly accept current market conditions.

However, close to 80% of respondents either believe that *"Canadian dairy product retail prices are higher in Canada than in the U.S.",* or *"did not know".* Because of more liberated market conditions in the U.S., it is difficult to demonstrate that the U.S. has lower dairy product retail prices, even though many studies claim that U.S. retail prices of dairy products are indeed generally lower (Stanbury, 2002; United States Department of Agriculture, 2005; Eurostat, 2006; Canadian Restaurant and Foodservices Association, 2006). For Canadian consumers, this could perhaps be a source of dissatisfaction. However, to dispel the notion that Canadian consumers may be paying high prices for dairy products, a recent survey carried out by the Dairy Farmers of Canada claimed that Canadians pay less for their dairy products than Americans (Dairy Farmers of Canada 2004). The survey's methodological inconsistencies did not warrant such a sweeping conclusion. Nevertheless, the results (and not the methodological shortcomings) were widely disseminated throughout the media. Such public relations efforts are aimed to desensitize the consumer over the high prices they actual pay for dairy products. Reguly (2004b) concluded that Dairy Farmers are perhaps the only group to claim Canadian prices of milk are reasonable.

Nonetheless, the majority of consumers surveyed (80.6%) were unable to state the exact purpose of the CDC. Given that the CDC's mandate is to serve the interests of consumers, this is evidence of consumer ignorance about how dairy products are priced in Canada.

It also seems that age groups have an impact on the perception of milk marketing systems. Five questions have high positive correlations with the questions related to age groups, which suggest that the older respondents were, the more they knew about milk marketing systems in Canada.

The questionable economic functions of the Canadian Dairy Commission (CDC) raise important public policy issues that have implications for wealth redistribution, administrative law, and civil liberty. For years, consumers have benefited from globalization by having access to products made from all around the world; but this is not the case with dairy products (Reguly, 2004a). Severely criticized by many members of the World Trade Organization, the CDC has demonstrated serious supply management inefficiencies: with its price fixing mechanisms and quota setting powers that limit supply, and with control entry power. Too many dairy producers tend to protect themselves and to balk at the need for market efficiencies in order to protect or provide relief to producers that are weak, unprepared, or unable to upgrade their technological and managerial skills to compete in a more globalized and market–efficient world. Economic institutions of the 21st century require productivity and the ability to adapt and respond quickly to external changes and threats in order to ensure their survival. Certainly, the disproportionate share of wealth and political power enjoyed by this small market sector is no guarantee of longevity. After all, the 20,000 or so dairy farms represent less than 0.26 percent of the population (Stanbury, 2002). Yet the CDC and the marketing boards, through their government-mandated price fixing powers, enable them to impose a form of 'tax' on all Canadian dairy consumers to the tune of over $2.5B CND per year. In other words, high prices for dairy products amount to an indirect income transfer from consumers to producers, and the present study is evidence that consumers are largely unaware (Forbes, 1982, p. 28). The CDC replaces market mechanisms in order to ensure greater income to dairy farmers. In this age of market globalization and accelerated market dynamics, the CDC is perhaps vulnerable. If it does not adapt, the CDC may become anachronistic and, as a result, this sector of the Canadian economy may suffer due to a lack of competitiveness and consumers may become poorer (Stanbury, 2002).

In a possible rationalization for the CDC, one can suggest that there seems to be an underlying paradox between the effects of globalization as related to growth and food sovereignty. However, it is not yet clear that globalization increases the risk for domestic dairy industry advocates to be impoverished, or suffer from inequalities in income distribution (Bessler, 1952). Considering the need for better food supply governance, empirical results from our exploratory study stress a new orientation toward including the interests of consumers in public policy decision related to the dairy industry, along with other international institutions. While the inclusion of consumer interest in marketing boards has long been recognized by the Federal government, nothing has been done to limit the price fixing powers of the CDC dominated by dairy producers (Canadian Research Council, 1974). If the public interest and not just producer interest were considered, it would be an important step toward integrating concerns about inclusiveness, poverty, ethics, equity, sustainability and social justice into international trade theory and policy-making. Dairy products are an essential part of many consumers' diets, and high retail prices can deter consumers from buying them (Glanville and McIntyre, 2006;

Johnson-Down, Ritter, Starkey and Gray-Donald, 2006). Global governance in the 21st century will require defining the interplay between multilateral institutions (reformed or not), state governments, and civil society. The aims and goals of various stakeholders are bound to differ on many issues, including supply management. At the same time, collective action is required, and consensus building about shared values and development objectives must be pursued. The current structure of the CDC undermines any will to multilaterally develop trades with other countries.

Domestically, the CDC's purported relevance in today's civil society serves as a facade for a short-sighted strategy for market dominance and protection from foreign market forces. Dairy farmers' security is dependent on consumer acceptance of dairy products in a continuously more competitive food supply environment. Based on our survey, Canadian consumers seem to be kept in the dark as to the real role and function of the CDC. Knowing that per capita milk consumption in Canada has decreased by 10% since 1990 (Corcoran, 2005; Gifford, 2005b, Canadian Dairy Commission 2006b), market acceptance and understanding are the only assurance of continued increases sales for dairy products and concomitant economic prosperity for farmers. The interdependencies within the milk industry in Canada are so great that to ignore demand requirements is to leave the entire system vulnerable.

We must also consider the lingering but false nostalgic attitudes towards dairy farming in Canada. Many stakeholders, notably urban consumers, believe in the myth that farming is more than just a business. It is a way of life, and farmers are exemplars of civic virtue (Stanbury, 2002, p. 12). Such enduring sentiments suggest that if a farmer fails, the soul of the country fades away (Hart, 2005). Future dairy marketing policies in Canada will not only need to disengage themselves from such misleading falsehoods, they will also need to include the interests of all stakeholders, including urban consumers.

In today's civil society, a reform of the CDC will need to consider the consequences on consumers of the high prices of dairy products as well as the impact global market forces have on dairy prices. After all, the oil industry functions that way and oil is undoubtedly more important to the survival and economic well being of the nation than the 0.26% of the population represented by dairy farmers.. World markets exist for all types of dairy products, and it's about time the Canadian public is cognizant of this fact. The current dairy supply systems needs to be more in tune with Canada's global environment and consumers' modern needs. It is unbelievable that in this 21st c., an advanced economy, like Canada, industrial milk prices are set by the state to the benefits of dairy farmers. The repercussions on the price of all other dairy-based products are not taken into consideration. High dairy prices have increased the value of milk quotas to unprecedented level estimated to be $29,000 CND for each cow. It is now more expensive to buy milk quotas in Canada than what it costs to operate a dairy farm, including the cost of equipment,

feed, and so forth. The high milk prices have distorted the value of milk quotas to the point that farmers, after paying for the milk quotas, can ill afford to invest in modern machinery, new technology, invest in new product development or to sharpen their managerial skills. It has led to limited product choices (e.g. butter not available in different package sizes) or to certain dairy products (cheeses) to be unaffordable for many, with the end result of lower milk consumption and the switch to lower cost substitutes on the part of some consumers.

The results of this survey do not, however, support any specific type of reform of the CDC. Even thought some results of the survey were unsurprising, such a study was never actually conducted before. This study is evidence that consumers are disconnected from the milk industry in Canada and policy makers should take note. The survey was intended only to measure consumers' perceptions at the retail level, whereas the CDC has a direct influence on industrial milk prices only. Our findings infer that consumers, specifically younger ones, know very little about how milk is marketed in Canada, and perhaps less about whether dairy products are fairly priced. The results imply that consumers are largely unconcerned about dairy product prices, and unfamiliar about the role and function of the CDC.

Historically, the CDC was created for legitimate underlying reasons. The creation of the CDC has largely been due to the concern for rural development, sustainability of agricultural systems and food sovereignty. But times have changed and the current structure of the Canadian milk marketing system is arguably inhospitable to consumers' perceptions. As a result, many stakeholders, especially consumers, have become apathetic about public policies related to the marketing of dairy products in Canada.

For policymakers, the indifference shown by consumers in this study should be taken seriously. As mentioned earlier, consumer groups are rarely well structured and their resources are often scarce. In addition, mobilizing consumers on such elaborate issues is challenging enough. Yet, their interests must be taken into account because market apathy, arguably, has maybe led to opportunistic behaviour by dairy industry authorities, which may detract from the industry's standing in the future.

Limitations

It is important to critically evaluate the results and the whole study. The present study has certain limitations that need to be taken into account when considering the study and its contributions. One of the major limitations of the study is the bias from the younger educated sample. The sample is limited in scope. The effects of the survey could be assumed to be different for older consumers with different educational backgrounds. It would therefore be very enriching to conduct a similar survey with a more significant sample of consumers of age 25-50 years. In general,

it would be valuable to use multigroup analysis to see how different perceptions are amongst demographic groups. Further research is also needed on the concept of food sovereignty. As this concept appears to be a prime prerequisite for the existence of marketing boards, perceptions on food sovereignty in a global context should be measured. Research in this context should reveal consumers' preferences in terms of domestic supply schemes and how they believe these schemes should be structured.

Another limitation of this study is the perspective adopted. Instead of trying to understand the market process in general, this study has been first and foremost limited to the consumer's perspective. Although the study has also taken into account other views along the conceptual analysis, the main perspective from which conclusions are drawn is that of the consumer. This can thus be seen as a limiting factor in this study. We believe that these limitations can be seen as fruitful avenues for future research under the same theme.

Conclusion

Canada is presently not a significant dairy market on the international scene– neither as an importer of certain products or as a source of supplies for export by international dairy firms. However, globalization of dairy markets provides a potential opportunity for producers for certain Canadian dairy products, such as dry milk powders. These and some others would like to capitalize on their competitive advantage in dairy products and expand their markets abroad but they cannot. The sheer size of the North American market and projected higher international prices, which could rise further if the current round of trade negotiations leads to further trade liberalization, suggests that there may well be international opportunities for the Canadian dairy sector in the future. But the current system controlled by the CDC does not encourage the industry to seek such opportunities (Troughton, 1989). Consumers could possibly gain from a dairy industry that actively seek new markets and acquire market intelligence. In turn, the industry would have the capacity to offer new innovative products to domestic markets.

If reform occurs in Canada, foreign direct investment in Canadian dairy production may contribute to the continued strength of the domestic market for Canadian goods produced from Canadian milk. Of course, traditional methods of analyzing trade liberalization scenarios do not readily anticipate the effects of strategic decisions of firms in international markets. Because of international market dynamics, dairy trade liberalization would foster both opportunities and challenges for Canadian milk producers, food processing firms and eventually, consumers.

As global dairy markets evolve, policies designed to limit foreign competition and restrict internal competition by imposing supply quotas will most likely become less relevant. Moreover, protectionist policies can only be detrimental to a country's long-run prosperity as new opportunities are squandered. Certainly, explanations

for how trade policy supports Canadian dairy farm income are less clear today than in the past, given rapid changes in the industry's structure. Nevertheless, to remain competitive in a global setting, the efforts of Canadian milk producers, food processors, and others need to adopt more to market forces not only to the benefit of Canadian consumers but also to dairy farmers themselves. Their future prosperity may well be at stake.

It is true that for dairy farmers, the CDC provides stability in an uncertain environment. While other stakeholders of the food industry may not be subject to erratic and unpredictable market forces as many commodity markets are, most dairy farmers still believe themselves to be part of a domestic agricultural sector that needs to be protected at all cost. In reality, they are part of a much larger global food market which includes consumers themselves. Canadian dairy farmers need to recognize very quickly that the insulated market position and price fixing powers they now enjoy divorce them from domestic consumers needs.

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Strategic Marketing Decisions for Organic Agricultural Producers[1]

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Abstract

A group of organic agricultural producers facing a strategic decision is featured. If they decide to form an organization to market their produce jointly, they will have to select a distribution channel. This case presents the demand conditions, requirements, advantages, and disadvantages of different distribution channels for organic vegetables, both on a general level and as they relate to this particular group. The following channels are addressed: roadside stands, farmers' markets, distributors, retailers, restaurants, institutions, and processors. Study questions for use in an academic course or workshop are included.

Keywords: organic agriculture, distribution channels, strategic management

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IAMA Agribusiness Case 10.1

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Background of the Project and the Growers

One evening in January, 2006, Jerry Elliot drove to the monthly meeting of the Central Scenic State Organic (CSSO) Growers. This grower group was a nonprofit organization made up of about 30 organic farmers and gardeners located in the area. Elliot was the president of the CSSO Growers, and had held this position for over two years. Elliot had been involved in organic farming for twenty years. He held a bachelor's degree in general studies from Centralia State University. This program allowed him to develop a background not only in the biophysical sciences, but also in philosophy, communication, and management. Elliot was well known and respected in the sustainable agriculture community of the Scenic State. As president of the CSSO Growers, he had the opportunity to hone his participatory management style. He believed that it was important to get all stakeholders to participate in the formulation of a strategy. That way, there was greater buy-in when it was time to implement what was planned. Elliot's interests included public speaking, hiking, and camping.

The January meeting of the CSSO Growers was an important turning point in a project Elliot had been working on for six months. This project involved the formation of a marketing cooperative. Elliot had been investigating the feasibility of a cooperative to market the organic produce grown by the members of the grower group. Despite the wintry weather, he looked forward to the upcoming production season, and reaping the rewards of his effort on the project.

Part of his investigation involved compiling an inventory of the resources the growers could potentially contribute to a cooperative. Six members of the CSSO Growers (in addition to Jerry Elliot) had expressed interest in jointly marketing produce at the prior meeting. In the weeks since the meeting, Elliot met individually with each of these growers to gather information about the resources at their disposal. One important set of information was the volume of organic products produced by the growers.

As indicated in Table 1 below, the seven growers, including Elliot, produced an extremely diverse selection of products. The products produced included fruits, vegetables, and grains. It should be noted that many of the products produced were specialty or heirloom varieties. Examples of these were blue potatoes and tomatoes with a camouflage-pattern appearance.

Table 1: Crops Produced in 2005 by Members of the Central Scenic State Organic Growers.

Crop	Volume Produced by CSSO Growers	Availability
Hay, alfalfa	6,515 bales	All year
Apples	555 tons	8/15 – 2/28
Soybeans	1,406 bu.	All year
Rye	980 bu.	All year
Blueberries	46 tons	7/13 – 9/15
Spelt	119 tons	All year
Oats	855 bu.	All year
Soft Red Winter Wheat	530 bu.	All year
Hard Red Spring Wheat	512 bu.	All year
Hairy Vetch	N/A, cover crop	N/A
Winter Squash	5,530.5 bu.	9/15 – 12/31
Sweet Corn	109,375 ears	8/1 – 9-30
Tomatoes	19,765.6 Twenty-five lb. cartons	8/10 – 10/31
Green Beans	17.2 tons	7/1 – 9/31
Peppers, Bell	4,285 bu.	6/15 – 10/15
Summer Squash	1,843.5 bu.	7/15 – 9/15
Cucumbers	18.2 tons	7/7 – 9/21
Cabbage	56.3 tons	7/1 – 10/31
Eggplant	1,513 bu.	7/1 – 10/31
Peas	2.1 tons	6/1 – 6/30
Spinach	7.5 tons	6/15 – 10/15

In addition to the crops produced, some of the growers raised animals. The applicable animals were beef cattle, chickens, sheep, and turkeys.

An overview of the characteristics of the growers and the resources at their disposal is given in Table 2.

Table 2: Resource Information for Members of the Central Scenic State Organic Growers.

Number of Growers	7
Total Acres Farmed in 2005	397
Irrigated Acres	71
Farm Size, in Acres (Mean and Range)	Mean = 56.5 Range: 3 to 110
Number of Growers with Internet Access on Their Home Computer	5
Years of Farming Experience (Mean and Range)	Mean = 29.8 Range: 7 to 42
Number of Growers Willing and Able to Research Customer Needs by Visiting a Library or Through the Internet	7
Number of Growers Willing and Able to Visit Potential Customers to Show Samples or to Describe Production Capabilities	7
Number of Growers With Access to an Adequate Amount of Debt Capital to Operate, and Expand, if Necessary	7
Age of Growers, in Years (Mean and Range)	Mean: 52 Range: 40 to 66
Annual Gross Sales in 2005	Mean: $32,400

The seven farming operations varied substantially in size and degree of commercialization. Four of the producers ran operations that were established businesses. The other three were smaller, and they expressed their intent to commercialize their businesses. Two of the larger farms were almost exclusively vegetable operations. The owners of these operations had established customer bases. They sold through a number of farmers' markets, which sometimes required them to travel close to 100 miles to reach a particularly desirable market. They also marketed to retailers (mainly natural food stores and food cooperatives). Minor marketing outlets for these growers were selling to individual consumers and restaurants. Among the other two relatively large producers, one had historically focused on grains and one on fruit. Both of these growers had minor vegetable enterprises.

Each of the seven growers maintained that they had individually achieved a high level of customer satisfaction. All of the growers mentioned that they were willing and able to research customer needs and demand trends. Each also indicated a willingness to visit potential customers (e.g., restaurants, processors, and retailers) and to provide samples. The commercial-sized operations generally had strong and recurring cash flow. All of the growers reported having good credit, which indicated they had access to debt capital if needed for expansion.

Three of the farms used part-time, temporary employees on a seasonal basis. These employees primarily assisted with harvesting. The other four farms could be described as "one-man operations," with help from family members as needed. The growers and their families, however, had a strong belief in producing safe and healthy food. These beliefs translated into a good work ethic in performing production tasks. The buildings and equipment of the growers were adequate for their enterprises. Six growers had at least one barn, and one grower stored his equipment outside. Each grower had a tractor. They had a good assortment of cultivation tools and harvesting equipment. A couple of growers mentioned that they had greenhouses to start seedlings. Generally speaking, the growers in the group were well educated. All had at least a bachelor's degree or some technical training beyond high school. Four of seven growers had graduate degrees. Most of the operations had family members, such as, spouses, adult and minor children, who participated actively in production and/or marketing.

The growers generally did not engage in systematic, long term planning, either individually or as a group. Elliot sensed that the two major challenges of a possible marketing cooperative would be establishing goals that all participants could agree on, and coordinating production and logistics to achieve scale economies or other synergies. It was vital for the growers to overcome these challenges.

At the meeting, Elliot planned to present a great deal of information to the CSSO Growers. First would be an assessment of the demand for organic produce (broadly, and at a local level). The resources and skills of the group of growers involved with the project would also be reviewed. Finally, different potential future directions for the group would be laid out.

Organic Farming and Organic Food

Elliot and all of the other CSSO Growers were certified organic. Organic agriculture could be defined as "good farming practices without using synthetic chemicals." (Kuepper and Gegner) According to Greene, there were 2.2 million acres of certified organic cropland and pasture in the U.S. in 2003. The National Organic Program was implemented by the USDA starting in 2002. Its goal was to provide uniform national standards for organic food in the U.S.

From a practical standpoint, a list called the National List of allowed and prohibited substances identifies the inputs that are permissible for organic foods. The National List is maintained by the National Organic Standards Board (NOSB). Members of the NOSB are appointed by the Secretary of Agriculture and serve five-year terms. Following is a summary of the technical requirements for a firm to be certified organic.

- "Abstain from the application of prohibited materials (including synthetic fertilizers, pesticides, and sewage sludge) for 3 years prior to certification and then continually throughout their organic license.
- Prohibit the use of genetically modified organisms and irradiation.
- Employ positive soil building, conservation, manure management and crop rotation practices.
- Provide outdoor access and pasture for livestock.
- Refrain from antibiotic and hormone use in animals.
- Sustain animals on 100% organic feed.
- Avoid contamination during the processing of organic products.
- Keep records of all operations." (Organic Consumers Association)

To receive organic certification, farms must complete and submit an application to an Accredited Certifying Agent (ACA) and pay a fee. ACAs must be accredited by the USDA. In August, 2006, there were 94 ACAs. Part of the application process is the development of an organic systems plan. After the application is received by the ACA, an inspector from the ACA visits the farm to perform an audit. The audit primarily consists of reviewing documentation to confirm that no inputs besides approved substances on the National List were used on the applicable farmland in the prior three years. Handlers and processors of organic foods also must be certified. Producers of inedible fibers (e.g., cotton and wool) may be certified, but there is no certification for processors of these fibers. An exception to the certification requirement is that farms with gross receipts less than $5,000 per year may label their products as organic without going through the certification process described above. (USDA Agricultural Marketing Service)

The Demand for Organic Produce

The word organic emerged in the marketplace to differentiate agricultural products based on production methods (Klonsky and Tourte). The key point is that organic

has positive brand capital in the collective consciousness of consumers. Many consumers assume that food products labeled organic are safer, more healthful, and more wholesome than other products. Table 3 presents information regarding demand for organic products in the U.S. and the EU.

Table 3. Statistics concerning demand for organic products in the U.S. and the EU.

A. Organic Sales and Growth Rates	Date	Source
Annual sales of organic food in the US: $13.8 billion	2005	Organic Trade Association
Annual sales of organic food in the EU: nearly $13 billion	2003	Dimitri and Oberholtzer
Annual per capita sales of organic food products: $34USD for the EU and $36 for the US	2003	Dimitri and Oberholtzer
Annual sales of organic fresh fruits and vegetables in the US: $4.019 billion	2003	Nutrition Business Journal (NBJ)
Annual compound growth rate of sales of organic products: 20%	1995-2005	Govindasamy, et al
B. Domestic Market Penetration of Organic Food		
Nearly 10% of Americans consumed organic food regularly (several times per week).	2004	Whole Foods
73% of US consumers purchased organic food products occasionally, and 23% purchased them at least once per week.	2006	Hartman Group
C. Organic Products Availability		
Organic products were available in 20,000 natural food stores and 73% of all conventional food stores.	2002	Dimitri and Greene
Organic food experienced an increase in distribution in foodservice venues, including national parks, resorts, major league ballparks, universities, and hospitals.	2005	Haumann

Local Demand Conditions

In seeking out markets for agricultural products, it is often a good idea to start locally. If customers can be obtained locally, then transportation costs and time in transit can be minimized. Minimizing time in transit is especially important with fresh produce, due to its limited shelf life. The central part of the Scenic State (i.e., the local market for this grower group) was comprised of two counties, Olsen and Glasgow Counties. These counties had a combined population of 243,000, and a median household income of nearly $40,000.

The central part of the Scenic State was a reasonably well-populated area. More than 3 million people lived within 150 miles of Olsen and Glasgow Counties. This population was mostly urban and suburban, with a broad distribution of incomes and ages. There were two major urban areas near the Central Scenic State. A city with 950,000 residents was roughly a two hour drive to the east, and a major urban center with a population of more than 2 million was two hours west. An interstate freeway connected these two cities. The CSSO Growers were all located within forty miles of this freeway. Also, there was a strong union presence and tradition in the Scenic State. This contributed to a preference of many consumers there to buy local products.

Distribution Alternatives

There were several different methods, or distribution channels, that could be used to market organic vegetables. Each had pros and cons to be considered by the grower group. The methods to be considered include farm markets (roadside stands), farmers' markets, distributors, retailers, restaurants, institutions, and processors. Estimated costs of pursuing each of these distribution channels is listed in Table 4 at the end of this section. Both the start-up cost of becoming established in each distribution channel and the annual, recurring costs are listed.

Selling directly to consumers through farm markets (i.e., roadside stands) was a marketing method commonly used in the Scenic State. Advantages that apply uniquely to selling through a farm market include the following: transportation and commuting time is minimized, family members can readily get involved with marketing, and growers control the days/hours of the market. The following advantages apply to farm markets as well as farmers' markets (to be considered next): these channels are easier to enter than selling through intermediaries, growers receive full consumer price, growers can provide information and promote products directly to customers, and growers control the presentation of their products.

Limitations of using a farm market include the following: success depends largely on the quantity/quality of the traffic in front of the grower's farm, a farm market allows for sales from one location (versus the multiple locations that distributors and retailers provide), farm markets tend to have a more limited selection of produce than other outlets, an investment in fixtures (e.g. tables and a canopy) must be made, resources are required to staff the sales booth, and problems with zoning and neighbors may arise.

The second potential distribution channel for the growers was farmers' markets. There were also a number of farmers' markets in the Central Scenic State and nearby areas. Some of these markets operated year-round, but most of them were seasonal (June through October). Organic producers who sold at farmers' markets in the more affluent communities received a substantial premium for their fresh

produce, with prices sometimes as much as 75% higher than for conventional produce in supermarkets. The advantages of selling at a farmers' market include the following: more traffic (than a farm market), customers are more desirous of locally-grown produce than customers in typical retail outlets, growers can pool their investment in fixtures and booth rent, and growers can pool their products and sales efforts. Disadvantages of farmers' markets include the following: transportation costs (i.e., time, fuel, and vehicle wear-and-tear) and space rental must be incurred, area farmers' markets had limited days and hours, and pricing tends to be competitive due to comparison shopping.

The Scenic State had a well developed distribution system for fruits and vegetables. Because of the distance to out of state distributors, it would not be economically feasible for this group to do business with any distributor outside of the Scenic State. The only certified organic distributor in the Scenic State, Veryfine Produce, was located in Glasgow County. Veryfine had positive customer relationships and a favorable reputation among retail and food service buyers in the Scenic State. This firm had specified a minimum volume of produce that growers had to supply in order to qualify as a supplier. There were only two members of the CSSO Growers who had sufficient individual volume to meet this requirement.

A couple of advantages of marketing through a distributor (specifically, Veryfine) are that this would allow the CSSO Growers to market a much higher volume than would be possible through farm markets or farmers= markets, and that Veryfine could take over some of the essential marketing functions (e.g., selling to and communicating with retailers, and making deliveries). Veryfine also contributed a number of resources and skills to its supply chain, including: distribution and logistical experience, a reputation for service, and access to their network of retail, food service, and institutional buyers.

Like other distributors, Veryfine had their own needs in addition to what was required by the consumer. Examples of these needs included uniform product size, packaging, and labeling. For the CSSO Growers, meeting the specific needs/requirements of this distributor would involve overcoming major barriers, especially the minimum volume requirement. It was possible, however, that the CSSO Growers could combine forces to overcome these barriers. Importantly, Veryfine already had a group of growers whose products they handled. If the CSSO Growers wanted to break into Veryfine' s distribution pattern, they would have to displace other growers who had traditionally provided the supply. If these growers selected Veryfine as their distribution channel, incremental costs (e.g., for stickers, labeling, and packaging) would have to be accounted for. Finally, the CSSO Growers would receive a wholesale price for their produce from Veryfine. This would generally, but not always, be less than the price they would receive if they were selling directly to consumers (Ricks).

Another distribution alternative for the CSSO Growers was to market through retailers. Both of the nearby urban areas had an established, competitive retail food infrastructure. While supermarkets were the food retailing format that sold the largest volume of fresh produce, other formats also existed. These other types of stores included produce markets, convenience stores, and natural foods cooperatives, among others. The major supermarkets had centralized purchasing operations. These retailers dealt in extremely large volumes and required consistent quality produce on a year-round basis. The owners of some of the independent grocery stores and produce stores expressed an interest in buying produce locally. It was difficult to determine, however, if these comments were sincere or merely public relations.

In recent years, natural food retail chains including Whole Foods, Wild Oats, and Randall' s Better Health Food Stores established themselves in the two nearby metropolitan areas. They had even begun to open retail stores in medium sized cities in counties adjoining Olsen and Glasgow Counties. One of the natural food chains mentioned above had implemented a system in which produce buyers traveled up and down the local interstate highway, stopping to buy produce from local growers. Finally, there were two natural foods cooperatives that operated retail outlets in the Central Scenic State. These organizations had historically favored produce from smaller, local farms.

Marketing through retailers would have a number of advantages, including the potential to sell a substantially larger volume than would be possible with direct-to-consumer methods and that certain investments and expenses related to selling directly to consumers (e.g., fixtures, rent, and wages) would be avoided. In addition, the growers would have access to the customers and marketing skills of retailers.

Retailer customers would also have their own needs, beyond those of the consumer. These needs would correspond generally with those mentioned in the discussion of the distributor (Veryfine Produce), with the additional need for convenient delivery. Further, potential retailer customers that sold produce already had produce suppliers. This would require the CSSO Growers to displace the current suppliers. In addition, many area retailers only bought through distributors, and sometimes retailers in the area charged suppliers a slotting fee to get new products onto their shelves. Finally, if the CSSO Growers chose to sell to retailers, they would have to build trust and establish relationships. This would take time and effort.

The Central Scenic State had many restaurants. There were at least 120 independently-owned restaurants in Glasgow County and at least ninety in Olsen County. These restaurants were typically stand-alone enterprises where the owner did the purchasing, which allowed for flexibility in menu composition. These characteristics made the independently-owned restaurants relatively good candidates as customers for the CSSO Growers. But due to the variation in the quality of fare at these restaurants, substantial investigation would be required to

determine which were the most promising prospects. Another prime potential set of customers for the CSSO Growers was the group of gourmet restaurants located in the metropolitan areas to the east and to the west. Further, chefs at gourmet restaurants often preferred to use organic produce in their recipes, and they were willing to pay a high price for the desired ingredients.

As customers, restaurants (especially upscale, gourmet restaurants) would be more amenable to accepting unusual varieties and small quantities compared to retailers. Some area restaurants had demonstrated a demand for locally-grown, in-season produce. Products sold to restaurants generally would not have to look as good as products destined for markets where the consumer selects the produce. Marketing to restaurants would require a lot of time in relation to the volume of product delivered. This alternative would involve frequent deliveries of small quantities. Kazmierczak and Bell mentioned high delivery costs and delayed payment of accounts as drawbacks to this marketing alternative. Finally, selling to upscale establishments located in the metropolitan areas outside of the Central Scenic State would require the growers to incur substantial transportation costs and delivery time.

There were a number of institutional foodservice customers in the area. The largest of these was Centralia State University, which was fifty miles northeast of Lake City, the county seat of Glasgow County. The university had over 40,000 graduate and undergraduate students, about 15,000 of whom lived in dormitories. A student group at the university (the Sustainable Agriculture Action Group) had made a request to the administration for more locally grown, organic food to be served in the cafeterias at Centralia State. Other major local institutional foodservice customers included the public school systems in Olsen and Glasgow Counties, a community college with 8,500 students, three large hospitals, and a county-operated senior citizen housing complex. Marketing to institutional customers would be similar in many ways to supplying restaurants. Institutional customers, however, could allow for larger volume than individual restaurants. On the other hand, there is more pressure on institutional buyers to keep costs down. A possible exception would be if the CSSO Growers could arrange preferential treatment at Centralia State University, due to lobbying by the Sustainable Agriculture Action Group.

Marketing organic fruits and/or vegetables to a processor was another option for the CSSO Growers. In order for the processed product to be labeled organic, the processor as well as the grower had to be certified organic. There were approximately eighteen certified organic processors in the Scenic State. One quarter of these processors processed fruits and vegetables.

One positive aspect of marketing to processors would be the possibility for the growers to market some produce that did not look good enough for fresh sales.

Table 4: Costs[2] of Pursuing the Distribution Alternatives Available to the CSSO Growers.

Alternative	Start-up Cost	Annual Recurring Costs
1. Farm market	$5,000	$15,876
2. Farmers' markets	$ 960	$21,960
3. Distributor	$ 320	$14,400
4. Retailers	$2,560	$25,200
5. Restaurants	$4,800	$32,600
6. Institutional Foodservice	$1,600	$14,000
7. Processor	$5,200	$13,800

Table 5: Estimated Demand for Each Distribution Alternatives Available to the CSSO Growers.

Alternative	Estimated Annual Demand	Assessment of Variability/Risk of Revenues	Risk Notes
1. Farm market	$44,100	Medium	Risk arises primarily from location factors
2. Farmers' markets	$36,000	Medium/Low	Can expect a steadier flow of customers than with a farm market, although weather can negatively affect sales
3. Distributor	$33,075	Medium/High	May not be able to arrive at a deal with the distributor, or have the capability of meeting the distributor's needs
4. Retailers	$33,075	Medium	There are diverse segments of potential retailer customers, some of which are well-suited to the products grown by the CSSO Growers
5. Restaurants	$35,280	High	Requires ~9 restaurant clients to move sufficient volume, tends to be a turbulent industry
6. Institutional Food service	$26,460	Medium/Low	Some potential institutional foodservice customers may have the discretion to give local producers preferential treatment in purchasing
7. Processor	$26,460	High	May not be able to arrive at a deal with processors for the selected commodities, or have the capability of meeting the processors' needs. Possibility of a product line being discontinued.

[2] Costs were estimated by the authors.

Perhaps more importantly, selling to processors would provide the opportunity for the CSSO Growers to market a much larger volume of produce than would be possible through direct-to-consumer channels. In addition, some processors in the Scenic State gave their growers a purchase commitment prior to planting season. This limited the marketing responsibilities of the growers.

Marketing to a processor would include a risk of non-payment, if payment was not received at the time of delivery. If the CSSO Growers would establish a supplying relationship with a processor, they would run the risk of the processor closing or changing product lines, which could result in a lack of a market for the grower' s crop (Ricks). Organic fruit and vegetable markets were thinner than conventional markets, which would magnify the problem if a processor were to discontinue a product with an organic fruit or vegetable ingredient. Marketing to a processor would involve transporting the product, possibly over substantial distances, which would require the grower group to incur significant transportation costs. As with the other channel customers discussed above, marketing efforts would be required to sell to processors. This would probably involve making sales calls and delivering samples.

Elliot faced a dilemma regarding what recommendations to make at the meeting of the CSSO Growers. At the prior meeting, four other growers expressed interest in marketing their produce jointly. Elliot interviewed these four plus two other growers since the meeting, to ascertain the resources at their disposal. There were other organic growers in the region who may have been interested in a joint marketing organization for produce, but Elliot was unable to set a meeting with them to discuss the group' s plans and the resources they could contribute.

Keeping all this in mind, Elliot pondered what recommendation would be best for the group. As he conceived it, the future direction of the group would have at least two dimensions. First, the members of the group would have to agree to go ahead with a joint marketing project. Elliot felt strongly that they should pursue such a project, and he planned to energetically make his case for this at the meeting. If the group responded as he expected and decided to go forward with a joint marketing approach, they would face other decisions. They would have to decide how to cooperate and which marketing channel to pursue.

Discussion Questions

A. List the strengths, weaknesses, opportunities, and threats for the group.

B. Which two or three factors from the previous question have the most bearing on the ability CSSO Growers to organize and achieve success in jointly marketing their products? Explain why.

C. What market opportunities are available to the CSSO Growers?

D. Develop a number of strategic alternatives for the group related to how they could work together.

E. Prepare a quantitative analysis using the information from both Table 4 and Table 5.

F. What course of action would you recommend for the group? Address specifically whether the group should organize, and, if so, how they should proceed. Please provide justification for your answer, i.e., tell why your recommended action plan is the best alternative. Be sure to state your assumptions.

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