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CASE READY MEATS: AN OUTSOURCING DECISION FOR FOOD RETAILERS

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CASE-READY MEATS: AN OUTSOURCING DECISION FOR FOOD RETAILERS

By

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ABSTRACT

CASE-READY MEATS: AN OUTSOURCING DECISION FOR FOOD RETAILERS

By

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Innovation in the way food products are processed and distributed through the supply chain has been an important source of productivity growth in the U.S. and economies worldwide. While process and product innovations have not ceased, the uneven adoption of certain technologies and processes by retailers and consumers in some product lines is curious.

The poultry industry long ago realized that case-ready chicken products added value and increased profits in its commodity product lines. These new products combined improved production techniques, new processing and packaging technologies, and a new retail marketing strategy in a way that completely revolutionized how retailers stocked and sold poultry and how consumers used the product.

In comparison to the experience of chicken, case-ready beef has seen limited success in the retail marketplace. The limited success of case-ready beef products is surprising given several external demand factors favoring adoption of this advanced technology of fresh beef products. The objective of this dissertation is to determine what critical factors may affect fresh meat processors and retailers' decision whether or not to integrate case-ready beef products into their product lines.

Decision-makers in the fresh beef industry have for years contemplated and attempted various strategies for increasing adoption of case-ready technology and this research project seeks to assist the industry in those endeavors. To develop a better

understanding of the operational concerns that help or hinder the successful introduction of case-ready beef products into retail grocery stores, this project developed six research questions to guide the research process. These questions were constructed by interviewing key industry experts, by directly observing case-ready meat products as they moved through the supply chain, and by conducting in-depth interviews with retail store managers and distribution center managers from a limited assortment grocery store chain with over 1,150 stores throughout the U.S. Also a thorough review of the Accounting, Strategic Management and Transaction Cost Economics literature was conducted as they relate to outsourcing and/or the "make or buy" decisions. From the six research questions a total of twenty-four testable research propositions were developed that will help identify the operational issues associated with the successful implementation of a case-ready meat strategy.

The academic literature was in agreement about firms outsourcing products and services. It is recommended that firms should outsource only those products that are not core to the business. However, in the instance of retail meat processing and packaging, the function is core to its business. This study focuses on the decision to convert its meat operations to case-ready beef products, which is a decidedly different approach to outsourcing. This research found that the adoption of case-ready meats is directly related to maximizing the opportunities within the six operational issues and mitigating others. An important observation is that central processing opportunities will become more evident to industry decision-makers if and when formal alliances are formed whereby retailers share point-of-sale data to firms throughout the supply chain.

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This dissertation is dedicated to my Lord and Savior, Jesus Christ, from whom all blessings flow. I saw His hand working in my life from the first day of graduate school classes. While walking across campus, I saw the Gideons handing out books of the New Testament, Psalms, and Proverbs to all takers. I accepted the book, walked a few steps, and then was asked, "Do you know Jesus Christ and have you accepted Him as your Savior?" When I responded, "Yes," they smiled and said "If you ever need extra advice or encouraging words, just open this book. All of the answers you really need can be found within those pages." They were so right!

I soon found myself searching that little green book for 'advice' and the following verses became my solace and inspiration as the intensity of my doctoral studies and the size of our young family both increased:

Romans 12: 2 "And do not be conformed to this world, but be transformed by the renewing of your mind, that you may prove what is that good and acceptable and perfect will of God. Romans 12: 11 "Not lagging in diligence, fervent in spirit, serving the Lord."

Romans 5: 3-5 "And not only that, but we also glory in tribulations, knowing that tribulations produces perseverance; and perseverance produces character; and character, hope. Now hope does not disappoint, because the love of God has been poured out in our hearts by the Holy Spirit who was given to us."

John 15: 7-8 " If you abide in Me, and My words abide in you, you will ask what you desire, and it shall be done for you. By this My Father is glorified, that you bear much fruit; so you will be My disciples."

Psalms 32: 8 "I will instruct you and teach you in the way you should go, I will guide you with My eye."

Reliance on these verses, daily Bible and devotional reading, and attending a church truly grounded in Scripture not only deepened my relationship with Jesus Christ, but also strengthened my determination to persevere the rigors of the Agricultural Economics department at Michigan State University in order to complete my Ph.D. and pursue the career path the Lord has laid out before me.

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I cannot end without acknowledging my mother who, during the 1950's and '60's, raised her three sons alone. Her enduring commitment to us, her ceaseless efforts towards excellence and professionalism, her steadfast spirit of adventure, her uncanny determination to 'live well' on an incredibly limited budget, and her straight-forward ability to 'tell you how the cow eats the cabbage' were the perfect training ground for graduate school... and for life. I dedicate all that is implied in the 'successful completion of the doctoral degree' to my dear mother, Mary Alice.

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KEY TO ABBREVIATIONS

HACCP .....Hazardous Analysis of Critical Control Points

IT.....Information Technology

TCE.....Transaction-Cost Economics

RFID .....Radio Frequency Identification

DC.....Distribution Center

POS .....Point of Sale

DSD.....Direct Store Delivery

FIFO.....First-In, First-Out

CHAPTER 1– INTRODUCTION

1.1 Study Organization

Innovation in the way food products are distributed in the supply chain has been an important source of productivity growth in the U.S. and economies worldwide. Visionaries such as Clarence Birdseye and Sam Walton, by seeking to fill important unfulfilled market needs, radically changed the way that Americans purchase and consume food. While this process of innovation continues unabated, the uneven adoption of case-ready meat's proven technologies and processes by some sectors of the food industry is concerning; and is the motivation for this study. We trust the study will contribute to enhanced market performance.

The objective of this research is to determine those critical factors that may affect fresh meat processors' and retailers' decisions whether or not to integrate case-ready beef products into their product lines. An important aspect of this objective is to obtain a greater understanding of how retail store managers perceive consumer preferences for case-ready beef products. In so doing there are several lessons to be derived from the experience of the poultry industry as it adopted case-ready processing and packaging.

This research identifies six operational issues that are associated with the implementation of a successful case-ready beef strategy. A more complete understanding of these issues is critical if the industry is to adopt these new fresh beef products and improve the performance of retail grocery stores. In addition, case-ready beef product and supply chain management information from this project should prove valuable to beef cattle producers, fresh beef processors and retail grocery firms.

The research questions and propositions were derived from six operational issues that retail grocery store managers, processors and distribution center personnel need to resolve as they consider adopting case-ready beef. The first stage of the project involved identifying issues from the pertinent literature and from direct field observations of fresh beef products (including case-ready) moving through the supply chain. Initial results were then confirmed by means of extensive consultation with industry experts that formed the basis for a questionnaire survey of 220 retail grocery store managers of the Save-A-Lot retail company.

The operational issues identified are grouped into six broad categories of issues which together compose the framework of the research project:

1. Food Safety Operational Issues–Do customers and store managers recognize the safety issues associated with and between both case-ready and in-store processed products? How might a food borne illness outbreak associated with fresh beef affect all store sales and meat sales?

2. Workmanship Operational Issues–The supply of qualified meat department personnel who can process meat and manage the inventory effectively is shrinking and their wage costs are increasing. What are the long run implications of this phenomenon on meat sales? How might the differences between the case-ready products and products processed in-stores affect sales?

3. Shrink Operational Issues–What are the respondents (store managers) viewpoints of shrink[1]? What are the advantages and disadvantages between the two product choices as they relate to shrink issues?

4. Packaging Operational Issues–These issues center on consumers' knowledge. Do they know or can consumers discern the differences and attributes between the two product choices by looking at the packaging?

5. Handling Operational Issues–Do store managers know the advantages and disadvantages between these two types of products and the effects on their profitability and customer satisfaction? What are the key handling issues for both product types regarding keeping meat cases fully stocked during typical peak shopping times between 4 PM and 7 PM?

6. Case-Ready Product Operational Issues–The assumptions of costs and benefits of case-ready products on store profitability and customer satisfaction. What are the key operational issues as they relate to the quality of the product?

In addition to addressing the above issues using qualitative and quantitative assessment techniques, the study also includes in-depth analysis of how they affect the decision to outsource a core grocery store item. When retailers are contemplating adopting case-ready beef products they are in reality negotiating with processors to outsource or produce fresh beef products that normally in the past are core to a retail grocery store's product mix. Strategic management theory is adamant that firms not outsource items that are core to their business line. But important changes in markets,

[1] There are several key issues related to shrink: customer/employee theft, incorrect inventory, workmanship, and out-of-date product.

technology, firm linkages, etc. can result in substantial changes overtime. While this is the traditional view of outsourcing, there is a new view or role for outsourcing taking place. The world's largest retailer Walmart, does not view outsourcing products such as case-ready meats through the lens of fresh meat products being core or non-core but whether a given decision to outsource improves its overall business model. Situations such as case-ready meat products need to be researched differently, using new perspectives and methods, which addressed in this study as well.

1.2 Retailer and Consumer Acceptance of Case-Ready Chicken

The poultry industry long ago realized that case-ready chicken products had the potential of transforming a commodity product line into a valued-added product line that would result in increased profit margins. Case-ready chicken programs utilized new and improved production techniques, processing and packaging technologies, and innovative retail marketing strategies in ways that transformed how retailers ordered, stocked and merchandised poultry. Consequently, case-ready poultry dramatically altered how consumers purchased and prepared chicken in their homes. The new marketing strategy involved segmentation of the market for whole fresh chickens, thus providing consumers with product choices that better reflected their preferences and needs. Moreover, case-ready chickens were simpler to prepare in the home. Early case-ready chicken product innovations included separating and packaging breast, leg, thigh and wings, satisfying customers increasing expectations for safer and more convenient poultry products.

Prior to the introduction of case-ready methods, the market for poultry products was strictly a commodity whereby whole broilers were displayed in meat counters on trays of ice. While this format was efficient for processors and retailers, it largely

ignored the latent consumer preferences for poultry in more convenience forms that held the potential for enhanced economic rewards associated with a marketplace differentiation strategy.

Case-ready chicken products added tremendous value to commodity poultry products and contributed to its surge in popularity over the past 50 years. Consumers benefited in two important ways. First and foremost, they no longer had to cut up the whole bird prior to cooking and decide how to use less desirable parts. Secondly, consumers could also choose the types of poultry meat they most preferred, and these packages could either be prepared or placed in the freezer for later use, with no apparent decline in quality.

Grocery retailers also benefited from case-ready chicken products. Prices they received for these value added products increased. Also, food safety was enhanced as a result of eliminating cross-contamination of poultry with other fresh meats. For example, retailers no longer stored fresh poultry in exposed wire cages in walk-in coolers.[2]

Long term success of the transformation of case-ready chicken was a result of the industry's acknowledgement of the role producers and input suppliers have on the ultimate success of these new products. As retail demand for the new case-ready poultry products grew, processors began to standardize poultry breeds, feeds, and health products to keep pace with demand. Soon, poultry producers and processors began raising broilers under strict supply chain management arrangements, with each actor concentrating on improving operations in its respective field of expertise. Processors expanded control along the vertical supply chain by implementing exclusive contracts, formula pricing and

[2] This storage practice was closely associated with cross contamination of other meat products that were also stored in the coolers.

other captive supply production arrangements to improve product quality and consistency. Further control of the vertical supply chain also allowed producers to lower production costs, increase supplies, provide a uniform product, shorten cycle times, and lessen the many uncertainties that can plague the production of commodity products (Hayes et al, 1999; Sharland et al, 2003).

Another important change in the poultry industry associated with case-ready chicken was that broilers became more uniform in size, allowing processors to introduce mechanized slaughtering, cleaning, cutting, and portioning. Mechanizing these stages contributed to processors' profits by increasing capacity utilization, which also improved the consistency of the finished products. The most significant result was lowered labor costs.

In the early 1960's, over 80 percent of broiler production was dedicated to whole fryers. By 2007, whole fryers accounted for 18 percent of production. In addition to fresh case-ready chicken products, new value-added products such as breaded strips, chicken patties, and nuggets have been introduced as the industry moved even further from its commodity orientation (Martinez and Stewart, 2003).

1.3 Limited Success of Case-Ready Beef

In comparison to the experience of chicken, the adoption of case-ready beef has seen limited success. In 2007, approximately 25 percent of all retail meats were sold as case-ready and only one major retail chain, Walmart, had committed to marketing 100 percent case-ready meats for all of its fresh meat offerings (Major, 2007). Many industry experts had expected that case-ready beef, with its inherent advantages for processors,

retailers and consumers, would have followed the same successful path case-ready chicken pursued over fifty years ago (Barkema et al, 2001).

The limited success of case-ready beef products is surprising given the existence of several favorable external demand factors such as consumers' tastes and preferences for good tasting and consistent fresh meat products, food safety issues, governmental/legal/environmental issues surrounding the production and processing of beef cattle, and new processing/packaging technologies favoring adoption of new processing and packaging methods. Paradoxically, these demand factors are similar to the ones the poultry industry faced when they considered the adoption of case-ready programs.

Moreover, consumers have a heightened concern and awareness about the safety of beef products due to highly publicized outbreaks of E. coli 0157:H7 in 1993 caused by tainted hamburger meat and other publicized food safety catastrophes (Barkema et al, 2001). In addition, the supply of qualified meat department personnel is dwindling and the wages paid for qualified meat journeymen are on the rise, driving cost of maintaining meat cutters employed in the retail setting to prohibitive levels (Keith, 2004; Salvage, 2003 and Brody, 2002).

In contrast with many other retail grocers that have introduced case-ready meats with limited success, Walmart has adopted a case-ready meat program for all poultry, lamb, beef and pork products for all of its retail store formats (Sam's Club, a wholesale store format, excepted). Several large retailers have succeeded with a partial adoption of case ready products, typically limited to ground beef and whole muscle pork items (Excel Meats, 2003).

1.4 Importance of New Packaging and Processing Techniques

Fresh beef and pork processors have recently gained the ability to successfully produce case-ready products by means of technological developments in packaging and processing, including new processing technologies that automate processing in new Hazard Analysis Critical Control Points (HACCP) certified "clean rooms". New packaging technologies include ways of encapsulating the fresh meat products with a modified atmosphere ensuring significantly extended shelf life. For many years, fresh beef has been centrally processed and packaged using conventional plastic films and trays providing a shelf life of no more than two or three days which is insufficient for fresh beef products to move through the supply chain and be sufficiently fresh for consumer to merchandise to consumers. Case-ready beef products now can be centrally processed within HACCP certified clean rooms, packaged and shipped throughout the United States with anticipated shelf lives of 16-21 days[3], providing sufficient time to flow through the supply chain and into consumer's homes before the expiration date (Bardic, 2003; Dolan, 2001; Bjerklie, 2001; Brody, 2002; Demetrakakes, 2001; Porter, 2002; Galosich, 1999; Keith, 2002; Barry, 2002; Galosich, 2000; Young, 2001; Tosh, 1999; Bennett, 1995).

1.5 Food Safety Concerns

Despite the enormous negatives of food borne illness to beef processors and retailers, the industry has not adopted case-ready programs which are generally acknowledged as the safer method of meat distribution. It is clear that each incident of

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[3] Case-ready products packaged using "Low-Oxygen" technologies can provide these extended shelf life periods.

food borne illness associated with fresh meat not only harms the reputation and profitability of the companies directly involved, but also of the entire meat industry.

Even with the beneficial attributes of case-ready meats with respect to lessening the incidents of unsafe meats, given the realities of the meat industry, food safety is and always will be a major concern for processors, livestock producers and grocery retailers. The consequences for "getting it wrong" are enormous. The Center for Disease Control and Prevention estimates that one in three Americans in (Buzby, 2001) became ill or had serious health conditions related to a food borne illness. Many others are hospitalized and several die each year (Mead et al, 1999).

On the demand side, consumers have heightened concerns about the safety of beef products due to highly publicized outbreaks of E. coli 0157:H7. In September 2007, Topps Meat Company of New Jersey and the USDA recalled 21.7 million pounds of ground beef containing E. coli 0157:H7. The tainted ground beef caused one fatality and 35 people to contract severe food poisoning. The total ground beef recalled due to E. coli 0157:H7 in 2007 was over 30 million pounds. This outbreak and other publicity of food borne illnesses associated with beef and product recalls has likely accentuated consumers' lack of trust in the safety of supply of beef.

In 2004, the USDA's Economic Research Service (ERS) estimated that five specific bacterial pathogens caused severe human illnesses that cost the U.S. economy $6.9 billion per year. As seen in Table 1, the five food borne pathogens cited by the ERS are Campylobacter (Guillain-Barré syndrome), Salmonella, and Escherichia coli 0157:H7 (hemolytic uremic syndrome), Escherichia coli non-0157:H7 STEC, and Listeria

Monocytogenes (congenital and newborn infections resulting in chronic disability or impairment) (Ollinger et al, 2004).

Table 1: Costs Related to Selected Food Borne Pathogens, 2004

Pathogen	Cases	Number of Hospitalizations	Deaths	Costs ($ Billions)
Campylobacter	1,963,141	10,539	99	$1.2
Salmonella	1,341,873	15,608	553	2.4
E.coli 0157:H7	62,458	1,843	52	0.7
E.coli non-0157	31,229	921	26	0.3
Listeria	2,493	2,298	499	2.3
Total	3,401,194	31,209	1,229	$6.9

Source: Ollinger et al, 2004

Beef cattle producers and processors are particularly concerned with E.coli 0157 because it can be introduced anywhere along the supply chain, its unparalleled ability to survive most environments, and its toxicity as a pathogen. E.coli 0157 is of particularly insidious because it is commonly found in the rumen stomachs and intestines of beef and dairy cattle.

Cross-contamination of fresh meat can occur along any stage of the supply chain if proper hygiene procedures are not adhered to. In the past, researchers believed that freezing fresh beef would kill many types of bacteria. However, only cooking at high temperatures has demonstrated to be effective in killing the E.coli 0157 pathogen. At any rate, both techniques negatively affect the taste that consumers desire, making proper food handling throughout the supply chain all the more important (Pennington, 2000). Meat processors have taken these facts about food safety and incorporated them into their business model, specifically by processing fresh case-ready beef products in HAACP certified clean rooms.

1.6 Shifts in the Structure of the Retail Grocery Store Industry

Food marketing in the retail grocery store venue has seen dramatic changes over the past twenty years, the most significant of which was the successful entry of general merchandisers such as Walmart, K-Mart and Target Stores into traditional food retailing.[4] Current market leader Walmart quickly reached the position of number one grocery retailer in the U.S. just a few years after entering the grocery business in 1989. This ascent was greatly aided by adapting their already highly efficient purchasing and supply chain structures and practices to accommodate the unique challenges of perishable grocery items like case-ready beef products. Key to Walmart's success is their efficient nationwide system of 99 distribution centers, 34 of these which are dedicated to the distribution of grocery products. Grocery store industry analysts agree Walmart could not sell as much product as they do without a very sophisticated distribution network.

The commitment of Walmart to sell 100 percent of all fresh meat products case-ready demonstrates that moving to case-ready products is likely to be profitable, but only for those retailers with a robust supply chain. A robust supply chain in a retail setting was must accommodate not only dry goods but they must be able to accept highly perishable fresh and frozen products as well. This is particular true of accepting the temperature sensitive case-ready products at ever stop along the supply chain. The good news from Walmart's perspective is the firm believes that switching to case-ready will allow it to better serve its customer base by providing a safe and fresh product that fit seamlessly within their existing supply chain competency.

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[4] It should be noted that shifts in the structure were also led by significant changes in consumer's preference for food, which is not covered in this research project.

The impact of Walmart's commitment to case ready products is significant in an industry where the concentration ratio of the top four (CR4) food retailers is 34 percent and 72 percent in the largest 100 U.S. cities. (King et al, 2001, Barkema, 2001) In 2006/2007 Wal-Mart operated 2,176 supercenters and 574 Sam's Club stores with over $232 billion in total sales, versus $455 billion for the industry as a whole in 2006. Kroger, the next largest retailer grossed over $66 billion in sales from 4,276 retail stores. Many other large grocery chain stores believe that fresh case-ready meat processors may sell to them and others, but they will cater to Walmart and not other retailers. The fear of other retailers centers around the sheer size and industry dominance Walmart exerts on the industry.

1.7 Disadvantages of Case-Ready Products

The total costs savings from adopting to case-ready beef products are not readily recognized by retailers employing the industry standard cost of goods sold methodology. Despite significantly lower costs of production for case-ready beef products, the switch to a case-ready format can be difficult to justify. The literature and industry experts cite difficulty in assigning costs savings to meat products produced under HACCP guidelines, products that have extended shelf life, and that result in fewer employee injuries (Miller, 2001 and 2002). Many large supermarket chains cannot switch to case-ready because of labor agreements with their employees that protect specific job classes, meat cutters in particular (Petrak, 2007 and Wagar, 2005). Wal-Mart, which does not have unionized employees, was not constrained by labor agreement issues.

Another hurdle to overcome is consumers' perception, with some justification, that fresh meat processed on-site has higher quality than case-ready. The two largest club

stores, Sam's Club and Costco, both sell fresh choice graded meat that is processed and packaged on-site. Currently, most case-ready beef products are of lower quality usually are select grade. Select grades of beef cannot compete against the higher quality choice grade for tenderness, marbling, and flavor. At the 2007 American Meat Institute (AMI) Meat Conference, the quality of fresh meat products was cited as a major reason underlying consumers' choice of shopping venues (Petrak, 2007 and Major, 2007). For this reason, retailers may hesitate to take a chance with a product where any gains may be offset by a loss of business, particularly to larger competitors. Walmart has chosen to keep their meat cases full 24/7 with HAACP certified case-ready meat products in lieu of processing a higher grade meat at each store within the entire chain.

The benefits of the longer shelf life of case-ready can be offset by the cost of potential diminished consumer perception of the quality of the meat. The "modified atmosphere" packaging that creates a long shelf life does not resemble the packaging of meat traditionally produced in the store. Case-ready packaging has a different color tray, a tray that is taller to create the large "headspace" required to accommodate the modified atmosphere gases, and uses a different looking film or overwrap. Together, these new components are different enough that customers realize that the meat is not produced on-site, causing concerns about freshness and quality (Enis, 2007 and Major, 2007).

The principal reason case-ready beef programs has not experienced higher adoption rates is that the per-unit costs of case-ready are higher for both retailers and consumers (Major, 2006). Processors charge retailers more per unit for case-ready products because the limited market for case-ready meats requires them to maintain their traditional processing lines, preventing processors from benefiting from economies of

scale. Retailers face a related problem in that not all types of whole muscle products are available in the case-ready format, forcing them to choose between losing business due to product lines that do not match their customers or maintaining their on-site processing capacity, but at a lower utilization rate and higher unit cost.

1.8 Research Issues

The objective of this dissertation is to determine what critical factors may affect fresh meat processors and retailers' decision whether or not to integrate case-ready beef products into their product lines. In order to meet this objective, it is important to better understand the operational issues that help or hinder the successful introduction of case-ready beef products into retail grocery stores. Decision makers in the fresh beef industry have for years contemplated and attempted various strategies for increasing adoption of case-ready technology. This research project seeks to assist the industry in those endeavors.

Sub-Objectives of the Project

- Of interest to this research project are the reasons why case-ready red meat products have not been accepted as readily by retail supermarket firms and consumers as case-ready broilers have been. Case-ready poultry programs have grown steadily over the past thirty years in food stores, growth which has encouraged many product innovations and provided a broad line of related convenience products. These case-ready programs have resulted in numerous beneficial outcomes, including improved food safety, efficient stocking, and highly functional packaging.

- In contrast, the beef industry is eager to accelerate the change to what many in the industry think someday will be the acceptance of case-ready beef. It is important to gain better understanding how to achieve the same kind of beneficial results for the beef industry that have accrued to the progressive poultry industry.
- The question this research addresses is why, despite the many apparent advantages of case ready beef products to retailers and consumers, as well as the success of Walmart, consumers and retailers have been slow to adopt these products. Fresh meat sales represent an important share of total store sales, yet relatively little research has been conducted on relevant meat industry operations. Because the trade and academic literature does not provide comprehensive answers to this central question, there is an apparent need for this research project. It is expected that retailers, processors and packaging companies will benefit the most from this research project.

1.9 Layout of Subsequent Chapters

The dissertation is divided into five chapters. Chapter 2 provides the industry setting of case-ready beef and its new packaging technologies and contains a literature review related to the project. Chapter 3 details the survey design, and the survey instrument used to address the research objectives. Chapter 4 provides data analysis results. Chapter 5 provides a summary of the research findings, conclusions and implications for further research.

CHAPTER 2 – LITERATURE REVIEW

2.1 Outsourcing Introduction

Successfully managed firms continually seek ways to lower their operating costs while maintaining or improving the integrity and quality of their products. As part of this process, firms often must decide whether or not to outsource production of components/services or even the entire product or service. While a desire to lower costs is the primary reason firms engage in outsourcing, potential other goals include; improving access to state-of-the-art technology, reducing product-to-market cycle times, removing low priority work in order to concentrate on core competencies, capturing the benefits of economies of scale and seeking performance and/or quality improvement (Kakabadse, 2006; Gay and Essinger, 2000 and Quinn, 1999).

Decisions to outsource confront all industries. Neither Apple nor Dell computer companies, for example, manufacture the components in their computers. These firms instead rely on a sophisticated international network of firms to produce and assemble the requisite electronic components—allowing them to concentrate their expertise in marketing and supply chain management of the finished products. Even the Ford Motor Company, whose River Rouge industrial complex was the world's first completely vertically integrated automotive plant, now outsources production of a majority of the automotive components in its cars and trucks. Ford and General Motors both anticipate the 25 percent per year expansion of their outsourcing agreements with China to continue until 2010 (Faircloth, 2007).

The strategic management literature has traditionally supported the precept that only a firm's "non-core" products or services should be considered for outsourcing, while

"core" items should always remain within the firm (Prahalad and Hamel, 1990; Porter, 1985; Quinn and Hilmer 1994)

Outsourcing decisions can be viewed from either a purely cost perspective or one that also considers other important strategic factors in major part due to greater globalization of industry. Economic integration has progressed, leading to a more complex version of outsourcing. Yet the overall goal of keeping firms competitive remains. New models of outsourcing are based upon several key points such as the availability of high speed data networks in many more countries (including many of the poorest countries), expansion of economies around the globe driven by even more hyper-competitive and open markets in the United States, and a world where international relationships are more defined by trading relationships than military actions. It is appropriate to reference Thomas Friedman, who has described this phenomenon in his book "The World is Flat." And it is in this context outsourcing is helping to drive this world-wide phenomena.

2.2 Early Outsourcing Decisions

The 1960's saw the first significant outsourcing of business support functions that had traditionally been performed in house. These included purchasing or "timesharing" computer time[5], payroll, inventory control, and accounts payable/receivable. Outsourcing these support functions was viewed as a cost-cutting measure because management was able to reduce the number of employees on the payroll (Fill and Visser, 2000). In the early 1960's Frito Lay and Blue Cross Blue Shield outsourced all of their

[5] In the 1960's several computer firms SIA, Baric, and Computel owned large and expensive mainframe computers. These firms outsourced computer time (Gay and Essinger, 2000).

data processing or Information Services (IS) to Electronic Data Systems (EDS). These early outsourcing contracts were very cost effective for the firms and those providing the outsourced service (Lacity and Hirschheim, 1993).

During the 1970's, large manufacturing firms struggling with dismal rates of return responded to Wall Street's lower stock valuations by outsourcing a large proportion of non-core products/services (Bettis et al., 1992; McIvor, 1997 and Probert, 1996). These same firms also began outsourcing facilities management tasks such as building maintenance, foodservice, engineering, and security. Outsourcing was seen as a viable strategic response to lower stock prices and helped firms reduce costs in non-core departments, thus allowing them to become more competitive and profitable (Hirschheim and Lacity, 2000).

The global recession of the early 1980s provided fertile ground for the strategic decision to outsource. Outsourcing became an immediate response to the need for corporate restructuring during these lean years, and allowed firms to produce the same goods and services and maintain their core businesses while lowering costs. Internal support services such as Information Technology (IT), payroll, billing, custodial, and foodservices became especially popular outsourcing targets.

In 1988, Eastman Kodak outsourced the majority of its IT operations, ushering in a new outsourcing wave for this all important support function that required unusual amounts of human and physical capital not directly related to production (Earl, 1996, Lacity and Hirschheim, 1993, Linder, et al., 2002, Lonsdale, 2001). Kodak's outsourcing decision allowed it to concentrate its managerial expertise, internal activities, and resources toward core activities and helped it avoid maintaining specialized skills in-

house not core to its business. This function was a logical choice to be outsourced since many of the IT costs were predicted to increase rapidly and would have required significant amounts of new capital to remain technologically current (Linder, et al., 2002). Kodak's successful move to outsourcing caused quite a stir among companies that were spending considerable resources on keeping the IT function in-house. Soon other major corporations were following this new trend. Chase Manhattan Bank, British Petroleum, General Dynamics, JP Morgan, McDonnell Douglas, Xerox and Continental Airlines were among those outsourcing to third party IT providers (Hirschheim and Lacity, 2000; DiRomualdo and Gurbaxani, 1998).

As the trend to outsource IT grew, IT quickly became viewed as a commodity, and demand surged for independent third party vendors whose core competencies were maintaining and expanding state-of-the-art technology and human resources for these all important areas of IT. These specialized IT firms offered economies of scale cost-reductions and less risk than the pioneers in the 1980's had faced. Fueling this trend was the proliferation of third-party logistics (3PL) outsourcing firms and think tanks devoted to the discipline of outsourcing. These included Electronic Data Systems (EDS), Outsourcing Institute, Deloitte-Touche, and Accenture (Lacity and Hirschheim, 1993).

Presently, more than 90 percent of U.S. companies outsource at least one activity or function according to the International Data Corporation (IDC), an international research organization (Outsourcing Institute, 2003; Gay and Essinger, 2000). Table 2 lists the top organizations engaging in major outsourcing activities according to a 2006 report from the Outsourcing Institute.

Table 2 Organizations Engaging in Major Outsourcing Endeavors

Allied Signal	Ford Motor Company	Mobil Corporation
American Airlines	GAP, Inc.	Morgan Stanley
American Express	General Electric	Motorola
Amoco Corporation	General Motors	NIKE
Apple Computers	Goldman Sachs	Owen Corning
Compaq Computers	Johnson Controls	Procter & Gamble
Delta Airlines	Kellogg Company	Quaker Oats Company
U.S. Dept of Defense	Merrill Lynch	Sharp Electronics
Dow Chemical	MetLife	Sprint
DuPont	Microsoft	Boeing

Source: Outsourcing Institutes' 2006 Outsourcing Audit

Companies currently outsourcing business functions indicate that reducing and controlling costs are important (54 percent) as is improving the focus of the company (55 percent). The ability to free resources for other activities (38 percent), gain access to world-class capabilities (36 percent), and to gain resources not available to the firm internally (25 percent) were also identified as important (Outsourcing Institute, 2006).

2.3 Principal Outsourcing Approaches

Several disciplines have contributed to the theory of outsourcing including accounting, economics and strategic management. From the retailer's perspective, adopting a case-ready meat strategy is outsourcing the production of at least a portion of their fresh meat. The most important tangible costs a retailer must consider when deciding whether or not to outsource are related to cost minimization. The literature refers to this as the "accounting approach" (Culliton, 1942; Gross, 1966; Cooper, 1990; Gambino, 1980 and Ellis, 1992).

The other consideration many retailers consider is categorized as being strategic in nature, and the pertinent literature cites this stream of literature as belonging to the transaction costs approach (Coase, 1937; Williamson, 1975 / 1985; van Hoek, 2000; Lonsdale, 2001; Poppo and Zenger, 1998; Logan, 2000; Park, 2000; Klass, 1999; Slater,

2000; Ellram and Carr, 1994; Maltz, 1992; Sislian and Satir, 2000; Maltz and Ellram, 1997; Prahalad and Hamel, 1990; Welch and Nayak, 1992; Venkatesan, 1992; McIvor et al, 1997; Probert, 1997; Schoemaker, 1992; and Alexander, 1996).

The earliest published research on how manufacturing firms should consider whether to outsource non-core products was conducted by Culliton (1942). Culliton's work was based strictly upon the firm concentrating on minimizing costs. He suggests firms should consider using a complete cost-analysis the alternatives and chose the cheaper alternative. While Culliton believes the decision criteria for choosing products/processes to outsource should be solely based upon the goal of lowering costs, his research suggests that firms making outsourcing decisions ought to balance its decision by considering the relevant strategic consequences as well.

The standard cost approach to outsourcing is driven by the critical assumption that firms engaging in minimizing costs are actually increasing profits based upon static revenue sales for the firm (Maltz and Ellram, 1997). This cost approach requires only accounting information for analyzing potential products that may be outsourced (Jennings, 2002). According to Gardiner and Blackstone (1991) the accounting information is fairly standard and will take into consideration fixed costs, such as general and administrative overhead and research and development, and variable costs, such as materials, direct labor, and variable overhead costs.

While the cost approach to outsourcing sounds straightforward, accurately documenting and allocating these costs can be a daunting task and many firms have inadequate costing systems that have not kept up with technology and firm expansion (Yoon and Naadimuthu, 1994; Ford et al., 1993; McIvor, 1997; Tayles and Drury, 2001;

Giffi, 1993). Gambino (1980) and Williamson (1975 and 1981) both stipulate that cost factors are the most important factors of determining whether to outsource. Williamson states his point very succinctly; "economizing is more fundamental to the firm than strategy." In contrast, Culliton (1942) warns potential outsourcing firms that growing via the cost approach only will hinder firms' ability to grow strategically.

According to Dr. Richard Levin, University of North Carolina professor who spent three years analyzing the accounting costs associated with retailers adopting case-ready meat products. Levin was convinced retail grocers were not fully accounting for all of the costs associated with processing meats in-stores. Levin thought retailers did not have a full accounting of several costs when considering case-ready meats. They include: shrink, cost of processing waste, out-of-date product and sales lost due to out of stock items. This lack of accurate accounting information indicates that many retailers may be underestimating the benefits of adopting a case-ready format (Hodgins, 2005).

2.4 Transaction Costs Approach to Outsourcing

The cost and strategic streams of outsourcing research both credit Ronald Coase (1937) for first discussing the phenomena of outsourcing and applying the tenets of economics toward the topic. Coase concluded outsourcing raised three important and questions: 1) Can firms minimize production costs through organization techniques? 2) Why is all production not carried out by one large firm? And 3) are there other costs to using price mechanisms? His seminal work, *The Nature of the Firm* (1937) provided valuable insights into the above questions.

Coase began his analysis in The Firm by considering the circumstances under which firms grow. He pondered the research question of: How firms should grow and

whether firms should hire new personnel or contract the labor out for a particular task? This is the classic outsourcing question. Coase believed that as firms become larger there exist decreasing returns to the entrepreneur function. Also, they increase their revenues, increased overhead in the cost of production will in turn decrease returns. Coase viewed these two costs as countervailing to the firm (Welch et al, 1992; McIvor et al, 1997).

From Coase's perspective, the willingness to outsource may be a function of the firm's size. As related to retail grocers, the question is: Should the retailer continue to employ meat cutters in-house or outsource their function to case-ready meat processors? According to Coase, as transactions increase with firm expansion, the entrepreneur often fails to use the factors of production to their optimal use. In addition, the price of one or more factors of production may rise because smaller, specialized firms often have competitive advantages over the larger firm for certain factors. Expansion costs will increase until they become equal with outsourcing the same transaction in the marketplace or creating another firm to accomplish production via vertical integration of firms. He maintained that the size of the firm is directly correlated with finding an optimal balance with all costs, and firms mitigating those costs will tend to increase in size. As these costs increase, the proclivity for firms to outsource will increase as well. In theory then, retail grocers' growth depends in part upon their success in outsourcing products and processes to more efficient and specialized firms for those factors.

Coase classified transaction costs into three main areas: costs associated with information, costs of negotiating, and costs of enforcement. According to Coase, new firms will form when existing firms try to avoid these costs internally or to economize on transaction costs (Logan, 2000). In Coase's language, transaction costs can be defined

further as those costs related to firms carrying out exchange that do not go through a price mechanism, yet they are costs that are incurred in the transaction (Hobbs, 1996). These often include food safety, inventory control and employee management. In a retail grocery setting, in-store meat processing success depends substantially upon the skill of the meat cutters and their ability to match inventories with customer demand. Food safety plays an important role as well. Case-ready processors are usually able to employ more sophisticated and stringent food safety processing protocols than a retail grocer. Outsourcing allows retail grocers to minimize their transaction costs by contracting with one specialized firm that will be in a better position to evaluate and mitigate these "hidden" costs.

Oliver Williamson in his seminal work *Markets and Hierarchies* (1975), states that the theory of transaction-cost economics (TCE) is the conceptual basis for outsourcing. In 1975 Williamson revived Coase's earlier work on transaction costs and attempted to determine the optimal business form a firm would take in the marketplace based on the type of transaction costs they faced, with a key assumption that firms are constantly engaged in mitigating transaction costs. Williamson believed the inherent properties of a transaction should determine the most efficient governance structure the firm should take to mitigate transaction costs. His governance structures lie along a continuum with market-based solutions at one end and hierarchical or strategic alliances at the other end (Williamson, 1975/1985; McIvor, 2000 and Hobbs, 1996).

Outsourcing transactions, according to Williamson (1975, 1985), have four key factors or assumptions that underpin TCE theory. They include opportunism, bounded rationality, asset specificity, and informational asymmetries. A central point of TCE

theory relates to the properties of transaction costs. The types and amounts of transaction costs will determine where on the continuum a firm will have its governance structure. Centrally processed case-ready meat processing requires highly specialized facilities and assets, skilled and carefully trained employees that are monitored for compliance with HAACP certification. This suggests that often outsourcing is a more efficient model for retailers to employ.

Another way Williamson (1975, 1985) complemented Coase's work was by positing that firms behave "opportunistically" in outsourcing relationships. Williamson defines opportunism as self-interest with "guile." He proposes that where few suppliers of products or services exist in a given market, the potential for opportunistic behavior will also co-exist. Globerman and Vining (2004) describe opportunistic outsourcing behavior occurs when one party changes the agreed terms of a transaction to its favor. This does not imply that all parties will act opportunistically, but the threat is present in the marketplace. The risk of opportunistic behavior on the part of suppliers is greatest when there are few firms for a buyer to choose from. Opportunistic behavior on the part of suppliers is when they demand higher prices than agreed upon because of the reality of few suppliers for the buyer to rely on (Hobbs, 1996).

With the complexity and prevalence of opportunistic behavior, costly contracting is resorted to in order to lessen exploitation form both parties. An example in the retail grocery industry occurs when there are a few suppliers of case-ready meat products for retailers to choose from. This increases the likelihood that a supplier or all suppliers will exploit the lack of competition and behave opportunistically. This requires carefully monitored contracts or the formation of strategic alliances.

Bounded rationality according to Williamson (1975, 1985) identifies the cognitive ability of humans to have and maintain rational boundaries. Williamson assumes humans will act rationally up to those boundaries or to the limits of their ability. McIvor (2000) agrees with the physical limitations aspects of bounded rationally as "the rationality of human behavior is limited by the ability of the actor to process information." Bounded rationality assumes that people intend to make rational decisions, but their capacity to accurately evaluate all of the possible decisions is physically limited or constricted by the enormous size of the choice set. It can also be interpreted as imposing limits on the decision maker's cognitive ability, which ultimately limits their rationality (Rindfleisch, 1997). Retail store managers, whose duties include monitoring many different classes of employee, may not have the time of skill set to adequately monitor activities in their meat department. This can provide a reason for outsourcing as a superior alternative.

Williamson's definition of asset specificity relates to the significant investments in assets for a particular business or exchange, and those assets have a limited ability to be converted into other uses for creating cash flow and are non-trivial in size and scope. The limiting ability to be converted into other uses presupposes these types of assets cannot be redeployable to any other activities (Bienstock and Mentzer, 1999). Therefore, asset specific investments possess a negligible residual value as well. An example is the specialized facilities required by mandatory HACCP food safety protocols may exceed the capacity of regional or smaller retailer grocery stores.

The relevance of asset specificity in outsourcing case-ready meat products is significant and important. Retail grocers may be interested in outsourcing fresh meat production to an independent processor of case-ready meat products, but this activity

requires high asset-specific capital equipment expenditures to package the case-ready products and would have severally limiting redeployable uses. It may prove difficult to replace a supplier that has invested heavily in assets to fulfill the outsourcing of case-ready meat production, because few processors may be willing to incur the requisite costs for limited and speculative uses. Interviews with a very large meat processor confirmed these assertions.

The mere existence of factors of production that possess high levels of asset specificity could mean there is a higher risk of opportunistic behavior from a supplier using those specific assists. Mitigating asset specificity effectively will require both parties to develop a trusting relationship and/or a formal alliance. Williamson (1985) argues for this course of action so parties to the contracts become locked into the relationship and the subsequent details for planning and cash flow purposes.

Bounded rationality in concert with asset specificity creates an atmosphere that hampers optimal decision making. This uncertainty is a fundamental supposition in TCE theory. Williamson (1975, 1985) believed the source of uncertainty is found in the bounded rationality of contracting in the market. He points out that the uncertainty in bounded rationality makes it impossible to deal successfully with the market complexities via contingent claims contracts. Market complexities are not only complicated to envision, they are impossible to adjudicate ex ante. A frequent premise in Williamson's (1985) research is that transactions subjected to the ex post opportunism will benefit if and only if safeguards can be created ex ante. Examples of these types of safeguards are performance incentives and superior governance structure (Slater and Spencer, 2000).

Slater and Spencer argue (2000) argue that Williamson's (1985) recognition of uncertainty is conditional upon the complexity and number of possibilities in the marketplace and the finite limits of cognitive ability humans possess to deal with every potential marketplace scenario. They believe that firms can further exacerbate transaction costs by operating in the presence of bounded rationality and uncertainty.

McIvor (2000) states the main sources of uncertainty in transactions are centered on the high levels of ambiguity found in the performance metrics. The presence of this type of uncertainty implies the necessity of integrating safeguards or performance metrics for all parties to adhere to. Transaction-cost uncertainty tries to protect against opportunistic use of asymmetrical knowledge and information. These types of uncertainties are of particular interest when knowledge and information can be used to the detriment or loss of one party (Vernimmen et al, 2000). It is not surprising that firms will often choose to internalize these types of uncertainties for mitigation purposes (Burke, 1998).

The amount of uncertainty that a firm faces has the potential to affect the transaction costs associated with the different governance structures. This uncertainty is directly dependent on the specific business environment associated with the firm. Klass et al (1999) found that firms reporting to be manufacturers operated in relatively stable business environments and faced very little uncertainty. Manufacturers have and exercise more control, thus controlling more factors of uncertainty. In contrast, firms in the information systems industry reported they faced highly uncertain and unstable environments due to the ongoing changes in technology requirements.

TCE theory states that firms facing high levels of uncertainty are more likely to make frequent labor adjustments and contracts that are not comprehensive in order to remain flexible when markets change. Firms facing staffing and labor decreases caused by outsourcing tend to forgo training and hiring investments to keep costs at a minimum. Firms outsourcing due to high levels of uncertainty will continue to incur costs associated with terminating management and employees. Firms that are suppliers of products and services (outsourcing firms) can more quickly adapt to changing labor needs versus firms that make products in-house (Klass et al, 1999).

Infrequency as a transaction cost, according to McIvor (2000) is one that is seldom undertaken, produced or incurred. The difficulties associated with infrequency are bound to the number of transactions. With relatively low asset specificity and with uncertainty combined with transactions that are fairly frequent, these types of combined transactions will be governed by market structures.

According to the TCE literature, retail grocery stores will outsource when the total costs of production and all transaction costs are lower than producing fresh beef and pork products in-house. These same results were seen in Walker and Weber's (1984) seminal work using structural equation modeling (SEM) of predictors of make-or-buy decisions.

TCE relaxes the requirement of perfect or full information assumptions found in neoclassical economic theory and posits that many business transactions are defined by their incomplete and uncertain information asymmetries. Opportunism by suppliers also includes asymmetrical information that will distort vital information from reaching parties wishing to deal with suppliers. Asymmetrical information is present when

although some information exists for both buyers and suppliers; additional information exists that is available only to suppliers. The asymmetry comes to fruition when the one-sided information is available only to certain parties, and they exploit that condition or situation.

Opportunistic use of asymmetrical information occurs in two ways. First is ex ante, where information is hidden or not disclosed prior to a transaction. Examples of ex ante occur when suppliers know of problems, but buyers cannot distinguish the problem, and thus they adversely select the problem product or one-sided conditions. Contract law and stipulations are used to mitigate this type of behavior. Ex post informational asymmetries take place after the transaction has been completed and because of hidden actions or characteristics of the product. An example of ex post asymmetrical information occurs when suppliers knowingly conceal information concerning product defects, any product recalls or discounts.

McIvor (2000) aptly summarizes TCE as the fundamental theoretical foundation for purchasing/buying departments to use to systematically analyze the relevant factors, other than cost, to determine the boundaries of the firm and the efficient form the firm will take.

In the past TCE theory has been used as descriptive theory to help predict choices made by firms about which governance structure should be chosen. TCE posits that when firms outsource they are depending on market contracting as the chosen governance structure. When firms depend on making the product internally they are relying on organizational hierarchy as the preferred governance structure. Either way firms will attempt to choose the governance structure that will minimize their total transaction costs.

Reducing transaction costs along the supply chain is fundamental to improving efficiency, net income, and gaining competitive advantage. Reduced transaction costs occur when suppliers and buyers form strategic alliances for cooperating and exchanging important supply chain information.

TCE, with its focus on the boundaries of a firm and governance structures, provides a plausible and helpful conceptual framework for examining the outsourcing of fresh meat products to an external processor. Outsourcing fresh meat production transaction costs include high uncertainty levels, unique asset specificity of producing fresh meat, technological change, and opportunities to develop economies of scale production by the processor which can also benefit the grocery retailer.

2.5 Strategic Management Approach to Outsourcing

Another theoretical approach to outsourcing is the strategic management method. While this approach incorporates components of the cost approach into its methodology, the strategic implications of outsourcing decisions are also considered (Cánez et.al., 2000; Prahalad, 1990; Porter, 1981; Probert, 1997; Welch, 1992; Venkatesan, 1992; and Winkleman, 1999). Considering significant changes in any business model requires operators to understand how those changes may affect the overall firm's strategy, from both the short and long term perspectives.

Porter (1981) views strategy or the strategic approach to management as "management's need to transform the daily chaos of events and decisions into an orderly way of sizing up the firm's position in the environment." His method of transforming or improving the firm is accomplished by implementing strategies that exploit a firm's strengths that are derived from internal opportunities, while accounting for the external

factors facing the firm. The strategic management literature stresses that the firm's endeavors should create customer value and competitive advantage. Porter (1980 and 1985) directly linked competitive advantage to a firm's set of core competencies (Barney, 1991). The transaction costs theory in this thesis research project includes the investments required to keep up with processing fresh beef and pork (asset specificity), the ability to develop economies of scale in case-ready meat production, and the levels of uncertainty as they pertain to food safety and liability issues. These are all reasons why retailers would consider outsourcing the production of fresh meats and the purchase of case-ready products.

Prahalad and Hamel's (1990) Harvard Business Review (HBR) article synthesized a new way of thinking about strategy that centered on the importance of a firm's set of core competencies. Prior to this article, most strategy debates revolved around increasing market share and vertically integrating the firm. Prahalad and Hamel (1990) define core competencies as combinations of production capabilities, skills and technologies inherent to a firm's product line. More precisely, they are a firm's set of core competencies which allows them to produce products that are technologically advanced and superior to the competition. The classic examples of strategic core competencies cited in their HBR article include Honda's engine and transmission, Sony's miniaturization, Canon's imaging/optics/micro processing.

Prahalad and Hamel's (1990) work fully articulated the strategy behind outsourcing. Their premise is built upon a firm's ability to compete under tremendous global competition. A growth strategy under these new circumstances will center on a firm's ability to "exploit" their core competencies and outsource all non-core activities

(Venkatesan, 1992; McIvor, 1997; Quinn, 1994; and Kakabadse, 2000). It is postulated that a growth strategy under these new circumstances will in reality fundamentally change the way the firm does business, and ultimately lead to a competitive advantage in the marketplace. It should be noted the strategy management scholars view outsourcing decisions should be made at the senior management level, not from purchasing agents, because of these types of decisions can fundamentally change a firm's business model. Therefore, these decisions are "strategic" in nature not tactical.

The strategy side of outsourcing is based upon the conventional wisdom that all activities that are core to the firm should be maintained in-house and to outsource the non-core activities. The literature consistently mentioned the strategy behind successfully outsourcing non-core items was designed to allow firms the time and resources to properly focus upon on the core business activities within the business model, as a strategy to stay more competitive (Barney, 1990 and 1991; Bettis, 1992; Quinn and Hilmer, 1994; Porter, 1980, 1981 and 1985; Welch and Nayak, 1992; Venkatesan, 1992; McIvor,1997; McIvor, 2000; Probert, 1997; Lacity, 1995; Schoemaker, 1992; Alexander, 1996; Heikkilä, 2002 and Kakabadse, 2005). Kakabadse (2005) called the focus on a core strategy a sort of "de-integration" of the firm.

2.6 Core Competencies

According to Prahalad and Hamel (1990), core competencies are a function of a firm's intangible assets that deliver unique value to its customers, and cannot be easily reproduced by the competition. There are three tests for identifying core competencies: 1) the core competence provides potential access to a wide variety of markets; 2) core competence should add noticeable benefits to the final product; and, 3) core

competencies should be difficult for a competitor to duplicate. Prahalad and Hamel are adamant in connecting a firm's set of core competencies with their long term ability to continually produce new products, compete profitably over the long term, and achieve a lasting competitive advantage in the marketplace.

Prahalad and Hamel (1990) further explain that core competencies centered on adding benefits are usually the byproduct of combining new technology, new inputs and production skills to improve a firm's product offerings. They also note that core competencies are not physical assets, because in time these assets can be readily replicated by the competition and over time become obsolete (McIvor, 2000 and Fleury, 2003).

Lonsdale and Cox (1997) clarify that core competencies should not be defined simply as those things the firm does "well." Hodges (2003) puts it rather succinctly; "if the process or activity didn't create competitive advantage or a clear market differentiation, it is likely not a core competency."

Alexander and Young (1996) have defined core competencies as the core activities a firm should not outsource. These are: activities traditionally performed internally with long standing precedent; activities critical to business performance; activities creating current or potential competitive advantage, and activities that will drive the future growth, innovation or rejuvenation of the firm.

Venkatesan (1992) does not refer to the terms core competencies in the decision criteria for outsourcing. Instead he maintains the decision to outsource products and services should be in accordance with three simple principles: focus on those components that are critical to the product and what the firm is good at producing; outsource

components where suppliers maintain the competitive advantage, and possess scale and cost economies, and strong performance incentives; use outsourcing as a means to generate employee commitment towards improving product and manufacturing performance. Venkatesan's viewpoints about outsourcing are a close fit with the subtleties of the grocery industry and with the outsourcing of fresh meat products.

Schoemaker's (1992) definition of core competencies is that they must be unique, important, controllable, durable and able to generate excess profits. Schoemaker was adamant about the outsourcing decisions must produce short term profits. Jennings (1992) points out that ownership of core competencies is second to having or possessing the benefits associated with your products and the integration must appear to be seamless to customers, a more long term approach. Traditionally these items have been considered "core" to a retail grocery store: fresh meat processed in-stores, fresh produce and fresh bakery items. Fresh produce and bakery items are now largely outsourced or exist as high margin niche products. Red meat is one of the few remaining grocery items still processed in stores.

McIvor (1997) suggests defining what is core to a firm from the perspective of not only the customers, but the market and industry. This approach is consistent with the strategic management and the supply chain management literature's value chain approach to earning competitive advantage. The value chain approach of core competencies was discussed in Quinn and Hilmer (1994), where Ford Motor Company discovered tier one and tier two level suppliers possessed greater product knowledge, technology levels, specific research/development investments and specific human resources capable of producing products and services than did Ford. Therefore, Ford learned to partner with

suppliers. The supply chain management and logistics literature refer to these value chain improvements as "best in class". As the value chain contributes best in class products/services/components, to the finished product the firm must learn to manage and become best in class at their other core competencies, not just outsourcing.

Torkkeli and Tuominen (2002) developed a simple cognitive map (Figure 1) of the importance of core competencies towards adding value to the firm's end products. The casual relationship should not focus on every competence resulting in a competitive advantage and every competitive advantage being related to core competencies. The map simply means the core competence should lead the firm to perform better in the marketplace than its competitors (competitive advantage), and the competitive advantage should lead to superior products as defined by the firm's customers (added value), with the net result yielding improved customer satisfaction with the firm's products/services.

Figure 1 Cognitive Map of Core Competencies

Source: Torkkeli, 2002

Torkkeli and Tuominen (2002) have also added to the literature by developing a multi-step criteria that core competencies should adhere to if a firm is to successfully incorporate the competencies into a firm's strategy. Core competencies must remain essential to corporate survival in both the short and long term, be invisible or seamless to competitors and be difficult to imitate, along with a combination of skills, resources and processes. Core competencies are a capability by which the firm can sustain its business

model over time. They are essential to the implementation of the strategic vision of the firm.

2.7 The World is Flat Method of Outsourcing

Another approach to outsourcing that is relevant for this thesis is from the perspective of Thomas Friedman's critically acclaimed book *The World is Flat: A Brief History of the Twenty-First Century* (2005). Friedman made his observations about outsourcing while traveling in India when he realized the global playing field has been leveled or "flattened". As the author visited several high tech research centers, he concluded the "earth was really flat" because new digital technologies have enabled firms from around the world to gain access to global markets and a global workforce. It then occurred to Friedman that this phenomenon is not only taking place in India, but throughout the whole world. These new breakthroughs have created a great many opportunities for firms to collaborate and compete in real time with any firm, "any place" in the world, on equal footing, competing for the production of goods and services. Much of the knowledge and production pools from around the world are now connected through new digital technologies and ready to be used by almost anyone.

According to Friedman the world is now flat, because of ten events that occurred in the 1990s and culminated in about 2000. The first two "flatteners" are historical in nature, beginning with the monumental collapse of the Berlin wall on November 9, 1989. When the wall was brought down it represented not only the victory of freedom over oppression, it also signaled a win for Capitalism over Communism. This event is remarkable for regions of the world namely USSR, Eastern Europe and China that have rarely experienced market and personal freedoms.

Another historical event was the day Marc Andreessen's Netscape went public on August 9, 1995. This signaled the exact day the world became truly connected with each other, and firms from around the world could now become transformed into a global community. This day also is seen as the beginning of the world wide "dot com" boom where billions of dollars of investment capital were seeking to invest into this new economy. The new economy was soon referred to as the internet economy, and large capital investments were shortly flowing into global communication infrastructure and networks anticipating high returns. Instead these new investments yielded unusually high stock prices like Netscape was enjoying. In reality this environment proved to be very volatile for the new internet economy, because there was a lot of investment capital seeking too few functioning business models. While many of the early dot com firms went bankrupt and some merged with other firms, in their wake was left a very sophisticated and complex communication infrastructure and networks.

A third "flattener" is the efficient use of the newly developed infrastructure and networks to maximize work flow within firms. Work flowing in this new infrastructure became "interoperable" with many other systems. An example in Friedman's book is where the marketing department is connected with key suppliers, the suppliers are connected with their manufacturers, and the manufacturers are connected with their input suppliers. When the work flows are interoperable in an integrated supply chain it has a seamless interconnected communication system allowing information to flow where it needs to flow, uninterrupted. He describes the workflow before it became seamless as the marketing department would run Microsoft software and the inventory department would run Novell, information did not flow as easily as it could. The seamless travel of

information or work flow required a new data description language coupled with new internet language standards. New software developments designed to improve work flow began to flourish under the strictly enforced language standards.

Open source code was Friedman's fourth "flattener". Open source codes were not developed nor maintained from the protected position of Intellectual Property (IP) rights but, rather from a community perspective. The open source movement is a collaboration of software writers that begin their assembly from the bottom up versus a top down approach. The top down approach is standard when hierarchies are directed to be incorporated. Open source codes are the underlying programming language or instructions that allow software applications and different computer systems and devices to not only communicate with each other but to display web pages, exchange emails all in a standard form. While all IP software developers guard their source code from any duplication, open source code developers readily make theirs available online for anyone's use, with no charge. This new model challenged software and hardware developers to be creative and to bring their new products to market cheaper and quicker than past IP protected business models.

Number five on the list is the outsourcing of various products and services to global vendors and suppliers. This flattener is arguably Friedman's least developed, but combined with other flatteners he makes a compelling case for outsourcing as another cause for the earth being flat. Friedman postulated that the ability to move certain processes and services offshore has created a worldwide demand for quality employees that can produce high quality products and services cheaply. Friedman's book develops

several outsourcing examples which are decidedly global in nature and stress the importance of developing collaborations, versus outsourcing for lowering costs.

Number six is offshoring, which is decidedly different than outsourcing products and services to firms in other countries. Offshoring is moving the entire production facilities offshore, anticipating generous savings for labor and inputs. Friedman notes many firms will relocate offshore to save on production costs and to also build a marketing presence in the new host country. New offshoring business models that include (1) the ability to maintain market share in the United States, (2) lower production costs significantly and (3) enter new foreign markets where competition may be nonexistent can provide a formidable and often profitable strategy.

Supply chaining is number seven in Friedman's list of "flatteners". He says supply chain management practices have revolutionized a firm's ability to efficiently move and monitor product inventory as it flows through a supply chain. Friedman's view of supply chain management is related to the practice's ability to gain efficiencies and improve production. This view is also consistent with the supply chain management literature. His book cites Walmart's use of the latest Radio Frequency Identification (RFID) technology to track pallets as they move from the manufacturer's plant to the Distribution Center (DC) and ultimately into retail stores. Walmart has also utilized the RFID technologies to improve product demand modeling throughout the entire chain and to pass that information downstream to the distribution center and then back to the manufacturer.

Insourcing is Friedman's number eight "world flattener". Insourcing is defined by contrasting the vertically integrated firm with firms that contract with outside firms to

outsource any number of production and service functions. Typical examples cited are (1) the supply chain management and logistics management used by large firms that are performed within the firm as opposed (2) to smaller firms employing a tactic of hiring outside firms to work inside the firm to gain efficiencies. A key point is that in this case outside firms work with the firm. Friedman relates insourcing to creating value within the firm by collaborating horizontally, not vertically. The insourcing relationship is about yielding control and information through relationships, and developing each other's strengths and efficiencies. These relationships do not resemble the standard vendor-customer relationships of the past, which were adversarial by design.

"Flattener" number nine is termed "In-Forming", which relates to the development of various search engines such as Yahoo, Google, Safari, and MSN which were all created for the public's use and designed to be destinations for gathering information. In the early days of Yahoo, users were surprised at the amount of relevant information that was available just be entering a few search terms and then wait as Yahoo searched the entire web. Today we expect to find what we are looking for, instantly and not be awed with our new found results, compared to the early days of searching on Yahoo when people were in awe when the engine produced the desired results, time after time. One of the founders of Google, Sergey Brin, gives credit to their early success to the fact that people have a pent up demand for information, a desire to be "in-formed." These search engines flattened the world by allowing everyone to be connected without regard to geography, and competition amongst firms was not based upon asymmetrical information monopolies found in the marketplace before search engines provided almost perfect information.

The last "flatteners" are the "steroids," which are any devices that help or enhance a firm's ability to communicate and better compete in the global arena of products and services. Friedman states there are several factors that have allowed the communication steroids to flourish. They include the almost daily improvements in: computational and storage capability, along with the new universal wireless technology. All of these advancements, matched with the changes in hardware technology, have dramatically improved our ability to communicate professionally and personally. The world becomes "very flat" very quickly when all of the "flatteners" start to get "turbocharged" by all of the steroids.

Friedman hypothesizes a "flat" world creates useful and creative solutions when there is convergence of the ten or more flatteners as they work together with the goal of sharing of knowledge and work processes, in real time. This convergence creates a new playing field, one that is "flat". When the world goes "flat", all businesses should ask how they will adapt, how will the walls come down to operate differently? All firms working in a flat world will experience the reality of new and different partners possessing different ideas and new processes, along with new habits for building horizontal collaborations.

Friedman challenges outsourcing relationships to take on a new context, one that is organized horizontally. Horizontal collaborations are decidedly different from the traditional vertical relationship in outsourcing; they possess an almost organic atmosphere. Horizontal in Friedman's vernacular refers to the multiple forms of collaboration, and power is not wielded by size or IP rights. A necessary ingredient in two way collaborations is when power is taken out of the equation. When there is a true

collaboration in a flat world outsourcing relationship, all parties are destined to work together and share information. This arrangement helps firms become more efficient and traditional hierarchies naturally will become flatter. These types of collaboration allow small firms to act big, big players are allowed to act small and everyone has an incentive to work on their own and contribute to the collaboration.

Outsourcing in a flat world morphs the inner strengths of the collaboration not to build walls with supply chain partners, but to flatten them and increase one's ability to add value. Like all business relationship strains will develop between partners, and it is suggested firms should first reflect or look inward and then outward for solutions. History has shown hyper competition can turn value added products into commodities. The flat world suggests a way of dealing with increased competition should be through the development of collaborations and alliances. Flat world outsourcing means collaborating faster, and with your partners in order to grow and gain market share.

Friedman further states that firms should not outsource in a flat world to solely reduce costs, because cutting costs alone creates relationships built upon one partner making less money to keep the relationship viable. A one-sided outcome is the opposite of a win-win relationship. More importantly, simply lowering costs takes the focus away from the value consumer's purchase and may hinder any new product innovation. Product innovation thrives in collaborations and strategic alliances where information is readily provided to improve product quality and production processes. A collaboration mindset is a necessary prerequisite for firms to become flat and interested in developing new markets where customers pull the product through the supply chain versus

manufacturers/processors pushing the product through the system. Firms should instead outsource to grow the firm, satisfy their customers and improve their business model.

2.7.1 Implications of Outsourcing Methodology for Case-Ready Meats

Friedman's outsourcing methodology has several significant implications for retailers contemplating outsourcing their case-ready meat products. Here are the relevant sections of Friedman's outsourcing methodology as they relate to case-ready meats: (1) The advent of the net and its ability to link processors with retailers was key towards both firms maximizing the work flow between firms. Before these advancements were implemented and accepted successful case-ready meat programs were problematic, because there simply was too much data and information required between firms. Conventional methods of sharing data were too inefficient. (2) Case-ready meats require specialty processing/packaging equipment and materials; the internet facilitates the interaction between supply chain partners and the ability to stay current with new offerings being introduced around the world. (3) Supply chaining is a vital ingredient for case-ready meat products to move seamlessly from beef cattle producers to consumer's refrigerators. Supply chaining perceives outsourcing as "pulling" product through a supply chain versus, pushing it through. Pushing product through system begins and ends with the end user and connects all the relevant partners and stops of the supply chain together. (4) The final components for Freidman's outsourcing methodology are the steroids. Retailers must manage inventory moving through their supply chain and the use of wireless technologies for ordering and managing inventories are a critical component for successfully adopting a case-ready meat outsourcing strategy. Without wireless technologies the speed and accuracy of inventory management breaks down, making an

outsourcing strategy for case-ready meats nearly impossible. The steroids allow meat department personnel the necessary time to finally market these new products and make more connections and relationships with customers.

2.8 Concluding Remarks for Outsourcing

There is substantial evidence that the centrally processed and packaged case-ready beef is a complete product: no more processing or labor needs to be applied, and it is ready for the consumer. Another important point is true as well; grocery stores cannot easily and efficiently replicate the necessary HACCP infrastructure for processing and packaging in each and every retail grocery store.

Processors have developed case-ready beef products that are safe and non-labor intensive product. When retailers outsource fresh beef products and adopt case-ready beef products they are now able to concentrate on marketing products, building customer relationships and improving their business model. Retailers outsourcing meat production in a flat world can build relationships with and unite beef cattle producers, meat processors and retailers together with one common goal of providing an excellent center of the plate protein for consumers around the world.

CHAPTER 3– RESEARCH DESIGN: STRATEGIES, PROPOSITIONS AND METHODOLOGIES

3.1 Overview of Research Design

This chapter discusses the strategies and methodologies used to determine those critical factors that affect retailers' decision-making regarding outsourcing conventional in-store meat cutting and packaging to case-ready beef programs offered by meat processors. Choosing the correct research design must be appropriate for the topic of this thesis project, and a central theme and goal of this chapter. Section 3.2 describes the range of research categories available to the researcher; 3.3 describes the process of choosing the most appropriate strategy. Section 3.4 describes the merits of the case study as a research strategy; and section 3.5 discusses the use of case studies in this research. Sections 3.6 through 3.8 explain the strengths and weaknesses of the research design and the reasons for selecting the case study approach. Section 3.9 will explain how the case study was used in this research project.

Finally, section 3.10 presents the six basic research questions and twenty-four research propositions. The last two sections discusses the analysis of the supply chain for case-ready beef; and an explanation of the questionnaire and how it was used to survey a sample of retail store managers of the Save-A- Lot company.

3.2 Research Categories

Scientific research can be separated into five basic categories: field experiments, laboratory experiments, field studies, case studies and survey research (Yin, 2003, Churchill, 1999, Cook and Campbell, 1979 and Kerlinger, 1986). Each category possesses differing logic, techniques of data collection and ways to analyze the data; and

each has its own sets of advantages and disadvantages (Kerlinger, 1986). These five research categories are also associated with experimental or non-experimental research; or whether the data is collected in the field or in a laboratory setting (Cook and Campbell, 1979).

Experimental research is recognized by a simple causal hypothesis: *if X then Y*. It is designed to measure or manipulate X and record the results of Y. In Marketing and Supply Chain Management disciplines, experimental research is referred to as *causal research,* where the research design is concerned with determining *cause-and-effect* relationships (Churchill, 1999).

At a minimum, all experimental research involves a treatment, a unit of analysis, an outcome measurement, random assignment/selection[6], and some form of inferring outcomes associated with the treatment. The researcher manipulates the controls of one or more variables, called a treatment, and then assesses their effects on the dependent variable (Cook and Campbell, 1979). This research technique has traditionally been reserved for use in the "hard sciences" because of its ability to replicate the experiment for verification purposes. Recently, market researchers have begun to use experimental design, especially in the advertising discipline (Churchill, 1999; Hair *et al,* 1998).

Non-experimental research takes place when the researcher does not have control of the independent variables because direct control is not possible and random assignment is not an option. Kerlinger notes that non-experimental research has three glaring weaknesses: the incapability of incorporating independent control variables; the

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[6] Without random assignment or selection the experiment is a "quasi-experiment."

incapability of randomizing the variables; and a substantial risk of improper interpretation of the results (Kerlinger, 1976).

The most important differentiation between experimental research and non-experimental research is the ability to incorporate independent control variables into the research. Control variables are used to screen out unconnected forces that may infer specious inferences and is also related to the ability with which units receive treatments at a particular time. Control is related not only to the independent variables, but also to the research setting, where levels of treatment can be strictly applied and used in concert with other control variables. Therefore, control is used to mitigate issues of validity (Cook and Campbell, 1979 and Kerlinger, 1986).

Kerlinger (1976) defines field experiments "*as a research study in a realistic situation in which one or more independent variables are manipulated by the experimenter under as carefully controlled conditions as the situation will permit.*" The difference between laboratory experiments and field experiments is relegated to control; experiments enjoy a greater degree of control than field experiments.

The weaknesses of field experiments are related to issues of control. They do not have the same level of control as laboratory experiments. While independent variables can be controlled, the reality of extraneous effects found in the field can affect the research environment sufficiently to question the results; and it is extremely unlikely that conditions in the field can be adequately replicated as they can in laboratory experiments (Kerlinger, 1976).

The strengths of field experiments are their ability to study large processes, complex issues, and settings that cannot be replicated in a laboratory. Field experiments

are ideally suited to research questions about phenomena and theory, which benefit from the greater levels of flexibility (Kerlinger, 1976).

Kerlinger (1976) defines laboratory experiments "*as research study in which the variance of all or nearly all of the possible influential independent variables not pertinent to the immediate problem of the investigation is kept at a minimum. This is done by isolating the research in a controlled physical situation and by manipulating one or more independent variables under rigorously specified, operationalized, and controlled conditions.*" Kerlinger's definition clearly implies that lab experiments have a high degree of control of the conditions and variables.

Field studies are non-experimental research that focuses on the interactions of values, perceptions, behaviors, outcomes, attitudes, and relationships between dependent and independent variables. Katz and Kahn (1978) postulate that the majority of field studies are centered on hypothesis testing and exploratory research. Exploratory research endeavors to study and explain relationships among variables, gain insights, establish priorities for future research, clarify concepts, and develop hypotheses and testing (Cook and Campbell, 1986; Kerlinger, 1976; Churchill, 1999; and Selltiz, *et al*, 1976).

Case study research seeks to establish a framework for researching complex phenomena. While this method allows a researcher to retain the important characteristics and the real-life events related to researching a phenomenon, some argue that laboratory and field research are more rigorous in advancing knowledge (Yin, 2003 and Churchill, 1986).

Survey research, the most common method of collecting primary data in the social sciences, usually relies on the use of questionnaires as the instrument for collecting

primary data (Churchill, 1999 and Hair *et al*, 1999). Surveys are conducted using differing methods depending upon the research budget, target audience, and research questions. Survey techniques have several different methods available for use. They include; telephone interviews, personal (face-to-face) interviews, self-administered questionnaires, or a combination of methods. Personal interviews have a reputation of as one of the most effective ways of obtaining detailed/in-depth demographic information and it allows for posing extensive and probing questions. A self-administered mail survey is the most cost effective survey method (Converse and Presser, 1986).

Survey research is considered to be an effective technique in obtaining a wide variety of data and is viewed as the most economical of all collection techniques when all factors associated with the research project are taken into account (Kerlinger, 1976 and Churchill, 1999). The primary data collected using this technique can be accurate and within the sample error if properly drawn samples are used.

There are several criticisms associated with using survey research techniques as a means of gathering primary data, they include; a lack of depth in the information gathered and low response rates. Another disadvantage of survey research is having to sacrifice the ability of posing follow-up questions.

3.3 Selecting the Appropriate Research Strategy

Research design literature suggests the type of research strategy chosen should depend on the research questions to be asked; the amount of control the researcher possesses or has the ability to maintain over behavioral events to be studied, and finally, the focus or interaction amongst the contemporary events of the research project. Yin

(2003) developed a matrix to compare and contrast the differing research strategy choices, summarized in Table 3.

Table 3: Research Strategies Choice Matrix

Strategy	Form of Research Questions	Requires Control Over Behavioral Events?	Focuses on Contemporary Events?
Experiments	How, Why	Yes	Yes
Surveys/Questionnaires	Who, What, Where, How Many, How Much	No	Yes
Archival Analysis	Who, What, Where, How Many, How Much	No	Yes/No
History	How, Why	No	No
Case Study	How, Why	No	Yes

Source: Yin, 2003

Yin (2003) notes a common misunderstanding researchers encounter is the different research strategies should be arranged in a hierarchical order. Yin's notion of hierarchical order for research strategies surmises that research strategies should follow a prescribed order or "hierarchy", where this order negates any benefits from not following the prescribed order based upon what phase the research was in, either exploratory, descriptive, or casual (explanatory). Yin suggests a more suitable vision of the different strategies would be a "pluralistic one", where each strategy could be used in all three phases—exploratory, descriptive, or causal or explanatory or portions of each (Yin, 2003).

Following Yin's lead this research project began with an exploratory phase which included a series of interviews and observations[7] which were conducted with meat industry executives representing both fresh meat processors and a Limited Assortment retailer. After the exploratory phase the research project began the explanatory phase of

[7] In the observation phase the research focused on fresh meat products moving through the retailer's supply chain, beginning at the retail level where personnel took an inventory of fresh meat products in storage and displayed in meat cases.

the project by describing the results of the interviews and observations in a questionnaire. The questionnaire was the primary means of collecting data to be analyzed and interpreted by the project.

3.4 Case Study Research Strategy

Case studies are appropriate for exploratory research projects that ask "how" and "why" questions about phenomena where the setting is difficult to recreate outside its natural setting and the variables are difficult to quantify. Case studies are also a useful tool when used for the development of preliminary tools to be used in more structured analysis such as surveys and experiments (Eisenhardt, 1989), (Chetty, 1996), (Rowley, 2002). Yin, (2003) also suggests the constructs and variables may be too numerous to quantify and account for, making experiments inappropriate (Ghauri, 2002). Eisenhardt, (1989) states case study research can be used in theory building.

Many research studies of phenomena occurring in the business arena cannot be undertaken if they are removed from their real-life environment; as it is not feasible to attempt to recreate them in an artificial setting. Eisenhardt (1988) states the boundaries between the phenomena and the environment in which they occur are not clear. In particular a case study approach should be considered when the purpose of the study is to gain a better understanding of the dynamics surrounding a phenomena within a unique setting and in which multiple sources of evidence are used (Yin, 2003) and (Eisenhardt, 1988). An experimental research strategy would deliberately separate phenomena from its context or surroundings in order to highlight a few variables under controlled circumstances (Yen, 2003), (Churchill, 1999), and (Ghauri, 2002).

3.5 Appropriate Uses of the Case Study Research Strategy

Yin (2003), Churchill (1999) and Ghauri (2002) postulate the use of case-study research as technique to begin to build theory. The literature is replete with examples of research that yield generalizable, universal claims gained from case study research that are theory building projects. Burgleman (1983), Mintzberg & Hughes (1985), Eisenhardt & Bourgeois (1988), and Pettigrew (1988) provide examples of research problems that relate to strategic management. Burgleman (1983) studied the management of new ventures, Mintzberg & McHugh (1985) looked into the strategy formulation, Eisenhardt & Bourgeois (1988) researched a problem focused on strategic decision-making for firms in high velocity environments (retail grocery stores are an example of high velocity) and Pettigrew (1988) focused on the strategic problem of how to remain competitive and deal with strategic change.

While the data sources for each projects mention above differed, they all incorporated some use of archival information, observation techniques were also employed and person to person interviews were also used. Only Eisenhardt & Bourgeois (1988) incorporated the use of questionnaires into their data collection (Eisenhardt, 1989).

Data analysis is at the heart of creating or building theory from case studies. Mintzberg & McHugh undertook the examination of 2,500 movies, analyzing movie revenues, the subject of each film, film sponsorship, and many other criteria. Mintzberg & McHugh also used tabular graphs and displays about each case, a monumental assortment of data transformed into useful information. Data analysis is required in order to observe any unique patterns that may flow form the data and the use of cross-

tabulation of the data set should permit generalizable patterns to emerge (Eisenhardt, 1989).

Eisenhardt (1989) identifies three analytical tactics to employ in analyzing the data set. One way is to identify group similarities coupled with the intergroup differences. In this research project an example of this tactic would be to analyze all store similarities and compare and contrast among the intergroup differences of corporate and franchise stores. The goal of the first step is to search for patterns and attempt to match with intergroup or within group cross-tabulations. A second is to select pairs of cases and then list the similarities and differences among and between pairs. This method Eisenhardt (1989) states is to ferret out the subtle similarities and differences. The second is a useful exercise in breaking up what may be simple observations into a more sophisticated comprehension of the data.

A third approach is to divide the data by sources and observe any trends between the different data sources. Again, the researcher should seek to identify any patterns, cross-patterns, agreeing data, and disagreeing data. When disagreeing data is evident, stating the obvious results is the beginning of further analysis and postulating trends. Further analysis employing this tactic would be to separate the data into subgroups and cross-tabulate the "mini-groups" among the others, looking for and exposing interesting patterns Eisenhardt, (1989).

3.6 Strengths of Building Theory from Case Studies

The likelihood of generating new theory from case studies is found in producing novel theory from creative insights found within the data analysis. Creative insights are revealed from the agreeing and contradictory results found in the data and reconciling the

results across observations and among differing types of analysis. New theory emerging from this type of research can be tested with new constructs and hypotheses generated for a second-generation research project. Another reason for first employing the case study technique is that the new theory emerging from the analysis is closely associated with the consistent evidence found within the data analysis (Yin, 2003). Engaging in a case study that focuses on a phenomenon occurring a business setting before collecting data with a questionnaire has many benefits, and those benefits can add value to the entire project. The benefits include: a deeper and personal knowledge of the environment where the phenomenon occurs, an opportunity to gain insights from the field (not just from the literature review), an opportunity to witness the phenomenon operating in a supply chain setting and finally developing a survey instrument based upon the results of case study and the literature review could produce a more robust instrument to analyze.

3.7 Weaknesses of Building Theory from Case Studies

The most significant weakness associated with theory-building from case studies is the overwhelming amount of data and the enticement of building theory that attempts to encapsulate all of the data results. This weakness is caused in part by failure to carefully assess the most important relationships from the redundant and/or superfluous relationships (Eisenhardt, 1989).

Another weakness of building theory from case studies is that the research may not be capable of generalizing the theory and/or the theory describes an idiosyncratic phenomenon. Examples of moderate idiosyncratic theory-building are on Burgelman's (1983) work, which produced a process model that linked multiple levels within organizations. Mintzberg & McHugh (1985) developed strategy-making themes for the

Canadian Film Board. Eisenhardt & Bourgeois (1988) developed a mid-range theory linking power, politics, and firm performance. Harris & Sutton (1986) conceptualized a framework about the functions of parting ceremonies for displaced members. All of these theories are novel, testable, and valid; they are theories about and endemic to specific phenomenon and provide worthwhile understanding of theory building.

3.8 Case Study Research Design

A research design outlines the components of the research and the proposed plan for examining and analyzing the data collected. A well thought out research design problem directs the researcher to the following: the method of investigation, observations to study, and how many observations should be made, suggestions towards which respondents to target, how to ask the questions, suggestions towards which analytical tools should be used, and likely outcomes. A research design is basically the structure or framework developed to guide the collection of and analysis of the information gathered during the collection phase. It can also be useful in the development of an entire plan for linking and guiding the conceptual research problem into relevant and practical empirical research.

Yin (2003) stipulates five essential components for designing a case study research project. They include: a study's research questions, its research propositions (if any), its unit(s) of analysis, the logic linking the data to the propositions, and the criteria for interpreting the findings. This thesis research project has followed the case study rubric and methodologies espoused by Yin and Eisenhardt.

3.9 Case Study as the Preferred Research Technique

This thesis research project followed the case study rubric and methodologies espoused by Yin and Eisenhardt in light of the fact that the case study research strategy focuses on understanding a phenomenon and the dynamics present within a single non-replicable setting when the boundaries between the phenomenon and context are not clearly evident (Yin, 1993 and Eisenhardt, 1988). Case studies offer the researcher a unique and rigorous method to measure and record the behavior of phenomena.

In light of the research project's goals, objectives, and the numerous research propositions, the use of case study research strategy for documenting the operational challenges and concerns of case ready beef products constitutes a plausible use of the technique.

3.10 Case Study Beginnings: Key Informant and Industry Executive Interviews

From its inception, this researcher was granted remarkable access to operators in the meat industry with knowledge of and experience in both conventional and case-ready fresh meat programs. Moreover, several Michigan State University faculty members served as resources. Executives and faculty who participated in the study include the Executive Vice President, Hormel Foods Corporation; Vice President, Cargill Meats Solutions; Chairman of the Board, Alliance Foods; Senior Manager-Perishables, Save-A-Lot Foods ; Perishable Managers Alliance Foods; Distribution Center Manager, Save-A-Lot Foods; Marketing and Supply Chain Faculty and Meat Science faculty. This group of key informants provided invaluable insights about the issues facing the case-ready meat industry, in a forum that was conducive for exchanging ideas and suggestions. These individuals were of great benefit to the case study project because of their

knowledge of the issues, industry, and consumers. This access to industry practice was useful in successfully completing the qualitative study of meat industry practice and decision-making processes. It provided insights which enabled the creation of a process map of case-ready meat products that are distributed through the supply chain—from meat processors, distribution centers and retail stores. This resource team confirmed the operational issues to be studied, and they provided advice and counsel in the development of the questionnaire. Moreover, they provide valuable general industry knowledge for the researcher. Executives from Save-A-Lot Corporation provided the researcher access to retail store managers (respondents for the survey) located throughout the country, thus assuring a high response rate in the survey used in the study.

This high level of collaboration among these supply chain members was thought necessary given the unique biological characteristics of the fresh meat case-ready products and the significant new investments of the technology employed by all parties. With unfettered access to key industry companies, the case study was able to effectively study the case-ready meat phenomena in its distinctive environment.

The Cargill Meats Solutions executive explained that a key component of their efforts to market case-ready meats to retailers was going to be based upon an exhaustive Activity Based Costing (ABC) analysis showing that when all costs for case-ready meats are taken into consideration, case-ready meat programs product will be acknowledged as being "cost effective". The ABC takes into account, among other things, the true cost retailers incur when they experience out-of-stocks in the meat case as a result of the difficulty in maintaining adequate production in the store's meat department. Research conducted by Cargill revealed that most grocery stores experience out-of-stocks during

peak shopping times of the day between (4PM and 7PM), which coincides with meat department personnel cleaning up the processing and packaging area at the end of their shift. Therefore, Cargill was convinced the adoption of case-ready meats would accelerate when retailers were able to take all of the costs into consideration.

Another cost factor for retailers to consider is the "shrink". Shrink is defined as any dollar amount that is less than full-expected retail price for any and all fresh beef products. Most retailers have difficulty in quantifying shrink because accounting for it requires rigorous and time consuming accounting procedures. Indeed, merely counting shrink creates additional costs when time is lost filling out the reports. Several of the features and benefits of case-ready meats help to reduce shrinkage and reduce overall costs in the supply chain.

The Executive Vice President of Hormel Foods Corporation was supportive of Cargill, pointing out that case-ready programs potentially provide improved economic performance by processors, retailers—and benefits consumers, as well. Hormel is constantly researching ways of identifying retail customers who can create a positive cash flow for Hormel and finding way to reward those customers, a win for Hormel and win for the retailer. Hormel believes it is essential to promote the adoption of case-ready programs by identifying companies that envision the mutuality of benefits of connecting the entire supply chain, including cattle producers, feeders, processors distribution centers and retailers—as well as including the ultimate consumers in the value chain.

Since the supply chain for beef is not integrated from processors to retailers, as is the case of the poultry industry, essential data moving forward and back though the supply chain is lacking. In the absence of this data, Cargill is processing cattle according

to economic demand analysis techniques and Point of Sale (POS) data. Currently, daily demand curves are analyzed that drive processing models for plants, and for cattle purchasing to be processed. Although demand modeling is useful in calculating how many beef cattle to process; it does not reflect consumer's taste and preferences. Demand modeling is an example of pushing product through a supply chain. It is not as effective as marketing programs that are designed to more accurately meet the needs of customers in the supply chain and marketplace. Marketing effectiveness requires qualifying and quantifying all of the factors that shift demand. Firms that market products programs are have greater opportunities to obtain greater profits for the products that are differentiated in the minds of the consumers.

The Hormel executive added that effective marketing requires retailers to become more connected with its shopper's wants and needs; and sharing this information to processors who can take this into account as it develops products and programs. Information of this kind can be the basis for improving products, demand analysis and more accurate processing information. There is a great need for this kind of collaboration: it is the basis for creating true win-win relationships.

Hormel is interested in learning more about the decision-making process of retailers which will provided an explanation of why case-ready meats are not being adopted as rapidly as forecasted.

The Chairman of Alliance Foods is concerned that case-ready meats might meet the needs of the larger chain stores (Walmart and Kroger) but that the smaller chain stores might be ignored if there is a wholesale shift to all stores converting to a case-ready meat strategy. An example of this concern is related to the situation that an

average Kroger store orders $70,000 in fresh meat and a smaller store only orders $15,000, yet both stores will need case-ready meat products, they have different volumes, and different customers demanding different product at different times. When stores process fresh meat, each store becomes an expert in what products their particular store needs and when they need it. This reality may be causing smaller chain stores to resist adopting case-ready meats and not to give up their autonomy in processing product when they need it.

Alliance Foods executive suggested that with the more precise information throughout the supply chain, processors could Direct Store Delivery (DSD) fresh case-ready meats to individual stores, thus negating the cost for product to be warehouse at a distribution center. This is how many large volume products are distributed to grocery stores, thus reducing costs and improving efficiency. Such an approach to meat distribution has the potential to be managed by the processor supplying the stores, especially as the trust level between the supplier and retailer is fostered.

Direct Store Delivery (DSD) of case-ready meats would have a minimum amount of new infrastructure changes required to properly implement this strategy. Most stores have sufficient refrigerator space to accommodate current inventory levels, which would negate additional any infrastructure investment. However, a potential obstacle would be the need to train meat department personnel to manage this new business model. These points eventually became a central theme for the questionnaire.

3.11 Research Questions

To develop a better understanding of the operational concerns that help or hinder the successful adoption of case-ready beef programs into retail grocery stores, the project

developed six research questions to guide the research process. These questions were developed based upon several informational components. These include (1) interviewing key industry experts during a one day research seminar held at Michigan State University, (2) by directly observing case-ready meat products as they moved through the supply chain, and (3) by conducting in-depth interviews with retail store managers and distribution center managers from SAL grocery store chain with over 1,150 stores throughout the U.S.

From each research of the six research questions twenty-four testable research propositions were developed to identify the operational issues associated with the successful implementation of, or lack thereof of a case-ready meat strategy.

The SAL stores have two specific types of stores corporate stores and licensed stores. Corporate stores are stores that are managed by the parent company. Licensed stores are managed by individuals and corporations who have obtained a franchise. All stores, regardless of ownership receive all of their grocery products from the parent company via a sophisticated distribution system.

The six main research questions are:

RQ_1 What are the differences between corporate and licensed stores in their perceptions of the operational concerns associated with *case-ready products*?

RQ_2 What differences exist between corporate and licensed[8] stores in their perception of the operational concerns associated with *food safety*?;

RQ_3 What are the differences between corporate and licensed stores in their perceptions of the operational concerns associated with *workmanship*?;

RQ_4 What are the differences between corporate and licensed stores in their perceptions of the operational concerns associated with *shrink*?;

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[8] Licensed stores are similar to franchise stores.

RQ_5 What are the differences between corporate and licensed stores in their perceptions of the operational concerns associated with *packaging*?;

RQ_6 What are the differences between corporate and licensed stores in their perceptions of the operational concerns associated with *handling*?;

The twenty-four research propositions listed below were derived from the six operational concerns and underlie the survey instrument design. Each research proposition purports to have this null hypothesis: **HO_1:** There is no significant difference between corporate and licensed stores with respect to...

$RP_{1Case\text{-}ready\ products}$ There are several key success factors that all fresh meat products must possess in order to be considered viable in a retail grocery store format. These attributes include: product appearance, shrink management, profitability, shelf-life, food safety, out-of-stocks, product consistency, SKU varieties, and product traceability. **$RP_{2Case\text{-}ready\ products}$** Managers assume that case-ready meats are more expensive. **$RP_{3Case\text{-}ready\ products}$** Managers feel that case-ready meats are a more employee friendly program than in-store processed meats. **$RP_{4Case\text{-}ready\ products}$** Managers know how their customers perceive fresh meats with respect to color, servings per package, and package price. **$RP_{5Case\text{-}ready\ products}$** Managers would not have a problem training a traditional meat department manager to manage all perishables, not just meats. **$RP_{6Case\text{-}ready\ products}$** Managers have a poor perception of the relative costs between case-ready and non-case ready products.

$RP_{7Food\ safety}$ Store managers believe case-ready beef and pork products are safer than products processed in stores. **$RP_{8Food\ safety}$** An outbreak of food borne illness associated with fresh meat purchased at either corporate and franchise stores would be catastrophic to store sales. **$RP_{9Food\ safety}$** Store managers' perception is that customers

who do not recognize the safety of both products would respond by purchasing more fresh beef and pork products if they believed those products were the safest available.

$RP_{10Workmanship}$ Store managers are finding it more difficult to hire qualified meat cutters at competitive wages. $RP_{11Workmanship}$ Implementing a case-ready meat program will demand additional skills such as forecasting daily and weekly demand, along with proper inventory management and less meat processing workmanship skills. $RP_{12Workmanship}$ Case-ready beef and pork products compared to in-store produced products are more cost effective. $RP_{13Workmanship}$ Case-ready meats will have lower stock outs and therefore maintain a higher rate of customer retention.

$RP_{14Shrink}$ Store managers do not believe there is a significant difference in shrink levels when selecting fresh meat product options. $RP_{15Shrink}$ Store managers do not believe there is a significant difference between fresh meat product options as they relate to managing the other operational concerns and managing shrink levels. $RP_{16Shrink}$ Store managers are able to distinguish the top three sources of shrink. $RP_{17Shrink}$ Store managers do not believe there is a significant difference between fresh meat product options in formulating strategies for controlling and addressing shrink.

$RP_{18Packaging}$ Case-ready meat products that require "blooming" cause operational issues as a result of preparing that product to be displayed in the meat case. $RP_{19Packaging}$ Case-ready meat packing is considered "attractive." $RP_{20Packaging}$ Store managers prefer the case-ready beef that is packaged in low oxygen, low headspace. $RP_{21Packaging}$ Store managers believe the case-ready beef packaging alternative of high oxygen/high headspace is a detriment to fresh meat sales.

$RP_{22Handling}$ Store managers typically find it difficult to keep their fresh meat cases fully stocked between 4PM and 7PM and case-ready meats can resolve this problem. **$RP_{23Handling}$** Managers believe a key factor towards increasing the shelf life of fresh meats is holding and maintaining proper temperatures (e.g. rapidly transporting fresh meat products from the receiving area into the walk-in coolers in a timely manner) furthermore case-ready meats are at a disadvantage in this area. **$RP_{24Handling}$** Case-ready meats are easier to manage for proper rotation and to avoid out- of-date product and help maintain proper adequate inventory levels.

The research questions and propositions were the basis for developing the survey instrument, which is discussed later in this chapter.

3.12 Supply Chain Analysis of Case-Ready Meats

The fresh meat supply chain case study component of this research was initiated to document the operational issues case ready meats face as they move through the supply chain. This process begins with the retail grocer ordering the product and ends when the products are selected by the consumer and put in their shopping basket. This phase of the research project focused on analyzing the relevant activities, events and processes through which case-ready meat must pass within the fresh meat supply chain. This research was also instrumental in designing, testing and data collection of the survey instrument using the Yin (2003), Eisenhardt (1989), and Creswell's (2005/1994) research design frameworks.

Prior to conducting the supply chain analysis, phone interviews of top executives, mid-level executives and store managers were collected to get an overall sense of the industry, product knowledge, and to document any concerns they had about the research,

case-ready meat products, the state of the industry, and the role meat products play in overall customer satisfaction. Next, a series of visits to retail grocery stores and distribution centers (DC) throughout three Midwestern states were undertaken to collect data in person, to observe product movement and the facilities' operations. These visits corroborated the information gathered in the earlier phone interviews.

Observing product transactions and movements through the supply chain was important to identify weaknesses in the supply chain; and it was vitally important in developing a process map. During the store and DC visits the procedures retailers took before they ordered products from the processor were observed and how and when the order was placed. A follow-up visit to the same facilities was undertaken to observe fresh product arriving at the DCs and the third party logistics personnel in charge of driving the product from the centrally located meat processing plant to the DC were also interviewed. Of particular note were the turnaround times, from when the product was first ordered until that particular order arrived at the DC. The average turnaround time recorded was approximately 12 days.

The next phase of the research was to map product moving through the supply chain, beginning with product arriving at the DC. Hunt (1999) describes process mapping a supply chain as "product moving through a series of steps designed to ultimately produce a product or service." The stops along the supply chain should be viewed as value chains, denoted by the contribution each stop adds to the ultimate value of the product. Denoting where value occurs is the highest concern in producing a process map. Supply chain management activities are typically tasked with creating

value at each stop along the chain or the stop is eliminated or changed. Hunt (1999) further states the benefits to using process mapping below.

Benefits to process mapping:

- Confirmation of value being added at each stop;
- Reductions in product and service costs;
- Fewer system integration failures;
- Uniformly better process understanding;
- Improvement in overall business enterprise operations and performance.

Hunt (1999) found that firms can better understand their processes or systems better by creating process maps that show all of the activities associated in producing goods and services. Process maps should distinguish the functions a system is designed to perform; and confirm it is accomplishing those functions. It is essential that the process map reveals what is actually being accomplished, not what the system is intended to accomplish.

The process mapping literature suggested first to observe product/services flowing through the supply chain noting cycle times, temperature readings at each stop, personnel/equipment engaged in moving product, any guidelines or metrics in place associated with each stop and noting the inventory procedures in place (Damelio, 1996), (Lientz, 2002), (Burgess, 1998), (Biazzo, 2002), (Bond, 1999), (Collins, 1997), (Gourishankar, 2003), (Denton, 1995), (Hunt, 1999), (Fulscher, 1999), (Mason, 1997), (Keller, 1999) and (Anjard, 1998). To accomplish this phase, two DC were independently observed in preparation of the process map.

The results of the observation phase were compiled and a draft of the process map was constructed. A conference with corporate management was held to discuss the preliminary results and resolve any inconsistencies with the process map. Discussing the preliminary results was necessary to ensure an accurate representation was being provided in the process map. A conference with corporate management was held to discuss the preliminary results of process mapping and resolve minor inconsistencies in order to ensure an accurate representation. The process map is in Appendix A.

One of the most significant advantages of case-ready meat packaging is dramatically increased shelf life compared with conventionally packaged meats in retail stores. However, it is critically important to maintain the temperature at 40 degrees Fahrenheit or lower. Understanding that the product was vulnerable to temperature variations along the supply chain, a "Cold-Chain Vulnerability Index" was developed to analyze the temperature at each critical point.

Case-ready meat products are particularly vulnerable to factors in the cold chain including time, temperature and handling that may lead to product degradation. The index assigns a numeric value to potential risks at each critical control point. The index is a ranking from 1-10, 10 being the greatest risk or potential for degradation. The process map also cataloged all operational issues associated with product moving through supply chain.

Further analysis of the information gathered in the process mapping revealed that case-ready meat products were arriving from the processor at the DCs consistently in excellent condition; staged to enter the retailer's supply chain. The mapping analysis demonstrated that the quality of case-ready products was maintained throughout the

supply chain. Much of this success is due to DC configurations specifically designed for efficient movement of product into the appropriate storage areas. DCs were also designed to maintain refrigerated foods at a specific temperature on the receiving docks before being moved into refrigerated storage. Many older DCs do not have such advanced facilities; and when case-ready programs are expanded, renovations would be necessary.

Observations of case-ready products shipped from DCs and arriving at retail stores throughout the Midwest revealed that they were properly staged, inventoried, and stored prior to stocking the retail meat cases. Each store had metrics in place to facilitate these functions. It should be noted these metrics were developed by the Save-A-Lot senior perishable managers in collaboration with technical product advice provided by its supplying meat processor. The artifacts gathered in this phase of the case study further substantiated the sustained high quality of case-ready meats distributed through the supply chain. Additional insights gained from the mapping process led to the decision to conduct additional interviews of SAL management and hourly personnel.

Several important observations were made during the process mapping phase. There were no significant delays in product movement along the cold chain. This was true for both boxed beef[9] and case-ready products. This finding is a testament to the dedication and professionalism and collaboration of the meat processor and retailer's team members. The health and well being of their customers depends upon the adherence of food safety metrics designed in its systems. This finding contradicts the

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[9] Boxed beef refers to subprimal beef products (about 40-45lbs per box) vacuum packaged in heavy duty bags and shipped in sturdy corrugated boxes to grocery stores. These are the products that butchers process, portion and package.

conventional wisdom among case-ready meat processors that the retail personnel were mishandling the product.

3.13 Questionnaire Design

Each question was vetted and pre-tested for relevance by several industry executives. Faculty members and a graduate student in the Marketing and Supply Chain Department reviewed the questionnaire for content and validity. For statistical relevance, Michigan State University's Statistical Consulting Service (SCS) reviewed the survey's questions and possible answers. The SCS provided invaluable insights and suggestions toward improving the questionnaire's format, Likert scale designs, and consistency. The order of the questions was consistent with other survey designs in that it assumed respondents review the questionnaire prior to beginning (Churchill, 1999) and (Creswell, 1994).

The physical layout of the questionnaire was designed for ease of completion. All questions were preceded with explicit instructions that were highlighted so they could be differentiated from the answer set. Instructions were designed to explain to respondents precisely how to answer each question. These steps were important in maintaining survey instrument reliability and valid content. Respondents were instructed to review the entire questionnaire in advance of answering (Churchill, 1999) and (Creswell, 1994).

The questionnaire consisted of 10 one-sided pages and was estimated to take about 30 minutes to complete. A cover page was attached to the questionnaire describing the research project's challenges and opportunities, and explaining why the respondents' answers/comments would be essential to the success of the project. The cover page also showed the project's university affiliation.

The questionnaire packet also included an "Informed Consent Form," which Michigan State University requires of all research involving human subjects and/or data collected from living human subjects (including preexisting data). This is subject to University Committee on Research Involving Human Subjects (UCRIHS) review and consent prior to the questionnaire being sent and completed by respondents. The project fulfilled UCRIHS's protocol; and permission was granted. The consent form was included with the questionnaire; and was signed and dated before the respondent completed the questionnaire. One hundred ninety three retail managers of SAL managers completed the required UCRIHS forms and responded to the questionnaire.

3.13.1 Unit of Analysis

According to Yin (2003), the unit of analysis should be defined as the critical factor within the case study. Often times the nature of the research questions will pose problems in defining the unit of analysis. When this occurs Yin suggests that researchers should consider defaulting back to the phenomenon being studied for defining a clear and concise connection from the phenomenon to the original research question(s). It should be noted that if a prior case study research has been conducted the unit of analysis should follow the original research's unit of analysis.

In keeping with Yin's suggested methodology for choosing a unit of analysis and, given there is no prior research to draw from, this research project will present its analysis following the research questions which tie to the six operational issues. For this research project the unit of analysis will be the six operational issues of: Food Safety Operational Issues; Workmanship Operational Issues; Shrink Operational Issues;

Packaging Operational Issues; Handling Operational Issues; and Case-Ready Product Operational Issues.

The questionnaire began with a series of demographic questions designed not to influence answers to the specific attribute questions of the propositions. By asking specific attribute questions first, the attitude of respondents may be affected Churchill (1999) and Hair et al (1999). Therefore, demographic and general questions were positioned first in an "inverted funnel sequence" in the hope of gaining respondents' confidence and to calm possible anxiety associated with completing an academic questionnaire.

Next, the self-administered questionnaire addressed the six categories of operational issues discovered in the case study and process map phase of the research. Market research has shown that respondents rarely complete questions asking for personal opinions. One plausible explanation is that respondents may be afraid of making grammar and spelling mistakes. However, the project required the inclusion of specific open-ended "follow-up" questions to be a necessary part of the questionnaire.

With marketing research literature warning against the use of open-ended questions, one technique employed in this questionnaire was to obtain answers to important open-ended questions by asking a pertinent "yes" or "no" question and then asking a related open-ended question. The point of this technique was to obtain the valuable "yes" or "no" data and then allow the respondent an opportunity to further expound on the subject. The literature emphasized the importance of consistently coding the results of open-ended questions and look for patterns.

The questionnaire was comprised of a total of 87 questions. Of these, 15 questions were open-ended and required a written response. The remaining 72 questions were yes-no questions, ranking questions, and Likert scale questions. All Likert scale questions utilized a scale beginning with 1 and ending with 5 and remained constant throughout the questionnaire.

To keep the Likert scale constant for respondents, the first choice on the scale was 1 and always represented the lowest value. The Likert questions had three different scales for responses, ranging from 1 being "not satisfied" to 5 being "very satisfied." On a second scale, 1 represented "strongly agree" and 5 "strongly disagree." In the last Likert scale, 1 represented a "big concern" and 5 "not a concern."

3.13.2 Respondents to the Questionnaire

The target population was determined to be 220 store managers within one chain of a nationally recognized, Limited Assortment grocery store. The number of stores to survey was determined jointly with the project and senior corporate management of SAL. The 220 stores were represented equally by 110 corporate stores and 110 franchise stores throughout the United States. Each store had a manager who was personally responsible for the success of the store. This individual was identified as the respondent to the questionnaire.

The national chain is comprised only of corporate and franchise stores. Corporate stores are owned and operated by the corporation. Franchise stores operate under a licensing agreement with the corporation. Both stores appear identical and operated in similar ways, offering the same products and services.

To ensure the respondents had a working knowledge of case-ready meats, the project worked directly with corporate management in identifying 220 stores that met the criteria. The stores were evenly divided into geographically diverse groups. To further ensure success in obtaining a high completion rate, corporate management communicated essential aspects of the study with corporate and franchise Division Managers[10] and requested their support in the study. Division managers received the questionnaires and distributed them to their district managers, who in turn personally distributed the questionnaires to the individual store managers, thus demonstrating commitment to this important research project.

It was important to obtain survey data from respondents who possessed some knowledge of case-ready meat programs, which resulted in avoiding random sampling of respondents. A downside of not randomly sampling the entire population is the presence of sampling bias found in non-probability sampling. Nevertheless, it was decided that the information from the survey would offer valuable insights and outweighed the value of probability sampling.

Convenience sampling is a recognized sampling technique used in exploratory research when the project is interested in gaining insights represented as approximations. Convenience sampling is related to non-probability sampling. This is a method of selecting samples based on their availability and the judgments of the researcher that the samples will be representative. In probability sampling all respondents in a known population has a mathematical probability of being chosen for the sample. Likewise, a key component of non-probability sampling is the reality that a known segment of the

[10] Division Managers are in charge of several District Managers, and District Managers are in charge of several retail stores.

population has no chance of being part of the sample (Hair et al, 1999) and (Churchill, 1999).

A further consideration in the use of convenience sampling was the fact expressed by executive management that not all store managers within the SAL chain have experience with case-ready meats. It was therefore deemed logical that store managers who completed the questionnaire possess at least some knowledge of case-ready meat operations so that they were able to make informed responses to the questionnaire concerning the relevant operational issues. Corporate executives deemed this requirement was met if the store sold the product either currently or in the past. District managers had extensive knowledge of each store manager's current and past expertise, which was influential in the decision to choose convenience sampling.

It was determined that the validity of the results was directly related to the respondents' ability to understand the specific case-ready questions; and it seems certain that the respondents possessed sufficient knowledge of case-ready meat products and its operational issues.

CHAPTER 4– DATA ANALYSIS: CROSS-TABULATIONS, MULTIPLE REGRESSION AND BINARY LOGISTIC REGRESSION

4.1 Introduction

Chapter 4 discusses the results of the questionnaire data analysis. Because of the range and flexibility of the data collected from the questionnaires three statistical techniques were employed to analyze the data set: cross tabulations, multiple regression and binary logistic regression.

Respondents to the self-administered convenience survey completed and returned 193 of 220 questionnaires, yielding an overall 88 percent response rate. Of the 193 usable responses, corporate store managers completed and returned 99 percent of their questionnaires (n=109). Licensed store managers returned 76 percent of their questionnaires (n=84). The following section summarizes the respondents by category and geographical location.

A total of 109 corporate store questionnaires were returned from eight different geographic areas[11] throughout the United States. As Table 4 indicates, the corporate stores are predominantly located in states with large urban centers. The Southeast division returned the largest percentage of questionnaires at 27.5 percent, followed by the Pennsylvania division. The Chicago division has the lowest percentage of responses with 5.5 percent.

[11] The titles for the geographic areas come from the corporate headquarters of the Limited Assortment retail grocery store chain.

Table 4: Geography of Questionnaires Returned by Corporate Stores

Corporate Store Division	Corporate Stores	
	N	%
Southeast Division Florida and Georgia	30	27.5
Pennsylvania Division	19	17.4
Northeast Division Massachusetts, New York, New Jersey	15	13.8
Mid-Atlantic Division Maryland, Virginia	12	11.0
Ohio Division Canton and Cleveland	11	10.0
Midwest Division Tennessee, Mississippi, Louisiana	9	8.2
California Division California and Arizona	7	6.4
Chicago, Illinois Division	6	5.5
Totals	**109**	**100%**

Seen below in Table 5 the licensed store divisions are organized a bit differently. The Midwest division for licensed stores represents a more traditional definition of the Midwest states, and the Southeast division for licensed stores is a much larger division since it includes Mississippi, Louisiana and Tennessee. Licensed stores were given a total of 110 questionnaires and they returned a total of 76.3 percent. Table 5 indicates that the Midwest division returned the largest percentage of questionnaires at 46.4 percent followed by the Southeast division which returned 21.4 percent. The smallest return was from the Mid-Atlantic division with 3.6 percent.

Table 5: Geography of Questionnaires Returned by Licensed Stores

Licensed Store Division	Licensed Stores	
	N	%
Midwest Division Michigan, Ohio, Indiana, Wisconsin, and Iowa	39	46.4
Southeast Division Florida, Mississippi, Louisiana Tennessee, Kentucky	18	21.4
Northeast Division Pennsylvania New York	12	14.3
Southwest Division Texas Oklahoma Missouri	12	14.3
Mid-Atlantic Division Maryland	3	3.6
Totals	**84**	**100%**

Comparing Table 4 and Table 5 a greater number of corporate stores completed and returned questionnaires than the licensed stores. When it was determined that more of the licensed stores were choosing not to participate, corporate management contacted the respective division and district managers with a reminder about the missing questionnaires (n=26) to effect a higher response rate. The reminder did not yield any more completed questionnaires. The project is deeply indebted to corporate management for their follow-up efforts.

According to the literature, the self-administered convenience survey response rates enjoyed by the project were exceptionally high, and well above expected rates of similar instruments (Selltiz et al, 1976; Cook and Campbell, 1979; Yue and Cooper, 1983 and Ghauri et al, 2005). There are several plausible explanations for the high response rates. First, the corporate store managers maintain and foster a direct and open relationship with division and district managers. This point was apparent to the store managers (respondents) when they observed corporate management recruiting division and district managers to distribute the questionnaires throughout the entire retail chain.

Another possible explanation for high response rates is that corporate management was very effective in identifying stores that have a working knowledge of case-ready meats and are interested in the topic. These respondents may have deemed it worthwhile to spend their time completing the questionnaire. While the project enjoyed an astounding 99 percent response rate for corporate stores, the licensed stores had a high response rate of 76 percent. The response rate for both types of stores was 87 percent.

4.1.1 Cross-Tabulations of the Research Propositions

The questionnaire contained a series of ranking and Likert scale (interval) questions to address the twenty-four research propositions regarding the adoption of a case-ready meat strategy. The ranking questions asked respondents to rank their choices. The Likert scale questions sought an opinion from a range of interval choices on a scale of 1-2-3-4-5. The Pearson chi-square test statistic is appropriate for this data analysis, because the possible answers are simple counts that fall into specific category. The Pearson chi-square test allows for determining whether the observed counts in cells are different from expected counts. The Pearson chi-square test statistic assumes a discrete distribution rather than a normal distribution, but does not reveal the nature of any relationship. The statistic is states that a relationship exists or does not exist (Hair et al, 2000).

For the cross tabulation analysis a binary dependent variable was created for the 193 returned questionnaires. With corporate SAL stores coded "0" (n=109) and licensed SAL stores coded "1" (n=84). The hypothesis to be tested in the cross tabulations and chi-square test statistic was that corporate stores and licensed stores respond to the Likert scale questions in the same way at the .05 probability level. Therefore, if the hypothesis

can be rejected by the Pearson chi-square test statistic, then statistical evidence exists that two stores did not answer in the same way and the research could draw inferences about the results between store types. If the chi-square test statistic is not significant at the critical alpha value of .05 (test statistic > than .05), we would then fail to reject the hypothesis and conclude that there is no significant difference between corporate stores and licensed stores.

4.1.2 Analysis of General Case-Ready Product Operational Issues

This section of the data analysis is interested in the questions designed to elicit responses about both types of fresh meat products being sold in both formats (case-ready and products processed in-stores). The research propositions for case-ready products (CRP) are:

$RP_{1\text{-}CRP}$ There are several key success factors that all fresh meat products must possess in order to be considered viable in a retail grocery store format. These attributes include: product appearance, shrink management, profitability, shelf-life, food safety, out-of-stocks, product consistency, SKU varieties, and product traceability.

$RP_{2\text{-}CRP}$ Managers assume that case-ready meats are more expensive.

$RP_{3\text{-}CRP}$ Managers feel that case-ready meats are a more employee friendly program than in-store processed meats.

$RP_{4\text{-}CRP}$ Managers know how their customers perceive fresh meats with respect to color, servings per package, and package price.

$RP_{5\text{-}CRP}$ Managers would not have a problem training a traditional meat department manager to manage all perishables, not just meats.

$RP_{6\text{-}CRP}$ Managers have a poor perception of the relative costs between case-ready and non-case ready products.

This section also discusses the responses concerning specific attributes of case-ready products, and what case-ready product key success factors the alternative is able to produce for stores that market case-ready meat products. Questions in the survey pertaining to product operational issues include Q2, Q3, Q5, Q6, Q10, Q13, Q17, Q19-24, and Q31.

Table 6 displays the questions and responses as to which CRP store managers are marketing at their respective stores. The corporate stores sold 100 percent case-ready ground beef and 40.5 percent of the licensed stores sold the product. The percentage of licensed stores selling case-ready ground beef may be higher than what actually occurs because the question should have stipulated that case-ready ground beef does not include chubs[12].

The sample of respondents selling case-ready beef cuts was predictable and correlated to store type. A total of 90.8 percent (n=99) of corporate stores sold case-ready beef cuts and the majority of licensed stores 88.1 percent (n=74) did not. Stores that sell case-ready pork products had a different distribution. Eighty-nine percent (n=97) of the corporate stores sold case-ready pork products, and 8.3 percent of the stores did not. Three stores cited the question as not applicable. The licensed stores had an interesting response, note with 42.9 percent of the stores selling case-ready pork cuts. Why this response rate is so high deserves further investigation.

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[12] Chubs are tubes of ground beef similar that come in different weights and lean-to-fat ratios. Many bulk pork sausage products are sold in 8oz and 16 oz chubs.

Table 6: Case-Ready Meat Products Sold by Store Type.

Question #2	Responses	Corporate		Licensed	
		N	%	N	%
Does your store sell case-ready ground beef?	0=No	0	0	47	56.0
	1= Yes	109	100	34	40.5
	2=N/A	0	0	3	3.6
Does your store sell case-ready beef cuts?	0=No	7	6.4	74	88.1
	1= Yes	99	90.8	9	10.7
	2=N/A	3	2.8	1	1.2
Does your store sell case-ready pork cuts?	0=No	9	8.3	46	54.8
	1= Yes	97	89.0	36	42.9
	2=N/A	3	2.8	2	2.4

Respondents were asked several questions about specific case-ready meat products for sale in their individual stores. The questionnaire investigated store sales of the three major categories of fresh meats: ground beef, whole muscle beef cuts (e.g. steaks, roasts, etc.), and whole muscle pork cuts (e.g. steaks, roasts, etc.).

Sales of ground beef as a category is important in the product mix and contributes significantly; to profit for all retail grocers. According to the Food Marketing Institute's Meat & Poultry Fact Sheet, sales of ground beef products as a single category of meat products accounts for 42 percent (27.7 pounds per capita annually) of all meat sales. This is a close second to the sales of beef cuts at 44 percent (29.3 pounds per capita annually). With that in mind respondents were asked if the store grinds beef and/or pork products.

Question 3 asked respondents if their store grinds beef and/or pork products. A total of 99.1 percent of the corporate stores and 27.4 percent of licensed stores do not grind products. These results are perplexing in light of the responses to question 2 about selling case-ready ground beef. The number of licensed stores not grinding beef/pork products yet selling case-ready ground beef does not add up to a plausible figure (all stores sell these products, and they either grind the products or purchase case-ready). A partial explanation could be that some licensed stores sell only chub or bulk ground beef products.

Question 5 (see Table 7) was designed to identify and quantify specific attributes of case-ready meat products. The attributes are color, servings per package, and package price. Respondents from both types of stores thought that the number one attribute of fresh meat is price, followed by color of the meat, and then servings per package. These results are logical given the store format offers limited assortments of products for sale and deep discount pricing for all products.

Table 7: Product Attributes Ranked by Store Type.

Question Q5	Responses	Corporate		Licensed	
		N	%	N	%
How would your customers rank the **color** attribute of case-ready fresh beef and pork products?	1= First Preference	28	25.7	34	40.5
	2=Second Preference	60	55.0	23	40.5
	3=Third Preference	18	16.5	18	16.7
	N/A	3	2.8	2	2.4
How would your customers rank the **servings** per package attribute of case-ready fresh beef and pork products?	1= First Preference	4	3.7	4	4.8
	2=Second Preference	25	22.9	17	20.2
	3=Third Preference	77	70.6	61	72.6
	N/A	3	2.8	2	2.4
How would your customers rank the **package price** attribute of case-ready fresh beef and pork products?	1= First Preference	74	67.9	44	52.4
	2=Second Preference	21	19.3	31	36.9
	3=Third Preference	11	10.1	7	8.3
	N/A	3	2.8	2	2.4

Question number 6 was designed as a corollary question of question 5 and explores key demographic traits for Limited Assortment Store customers. Most of the customers who shop at Limited Assortment Stores seek low prices. This question sought to discern which of the three product offerings was deemed the most "price sensitive." Corporate and licensed store respondents were consistent in their responses that ground beef was the most sensitive, followed by beef cuts (see Table 8). The least sensitive was pork cuts.

Table 8: Price Sensitivity of Fresh Meat Products by Store Type.

Question 6	Responses	Corporate		Licensed	
		N	%	N	%
Rank how sensitive your customers are to the prices per pound charged for fresh whole muscle beef products.	1= Most Sensitive	50	45.9	18	21.4
	2=Moderately Sensitive	28	25.7	47	56.0
	3=Least Sensitive	20	18.3	16	19.0
	N/A	11	10.1	3	3.6
Rank how sensitive your customers are to the prices per pound charged for fresh ground beef products.	1= Most Sensitive	42	38.5	62	73.8
	2=Moderately Sensitive	32	29.4	13	15.5
	3=Least Sensitive	25	22.9	6	7.1
	N/A	10	9.2	3	3.6
Rank how sensitive your customers are to the prices per pound charged for fresh pork cuts and grinds products.	1= Most Sensitive	6	5.5	1	1.2
	2=Moderately Sensitive	39	35.8	21	25.0
	3=Least Sensitive	53	48.6	59	70.2
	N/A	11	10.1	3	3.6

Questions 10, 13, 17 were designed to better understand how respondents viewed the key success factors linked to product appearance, shelf life, and Store Keeping Units[13] (SKU). These questions are similar and in nature and will be discussed together. The results from Table 9 below show that both store types prefer the appearance of fresh meat products produced in-store by 61.6 percent. Case-ready product appearance was chosen by 24.2 percent of corporate and licensed stores. The composition of that figure masks the fact that only 8.6 percent of licensed stores viewed case-ready product appearance as superior to in-store. The opposite pattern is observed when respondents were asked the question regarding shelf life. Over 64 percent of the respondents from both store types chose case-ready as the superior product when considering shelf life as a key success factor. Question 17 was used to determine respondents' opinions on which product offered the most SKU varieties. The results confirmed what was learned from the case study namely, case-ready products had a limited offering, but the results were far from being a consensus. Over 52 percent of all respondents felt that meat produced in-store offered more SKU varieties. However, 25.9 percent of the respondents thought

[13] The Food Marketing Institute (FMI) defines SKU as a number that identifies each separate brand, size, flavor, color or pack of a product.

there was no difference. The licensed stores believing that there was no difference in SKU varieties were higher at 33 percent.

Table 9: Key Success Factors of Case-Ready Meat Products by Store Type.

Key Success Factor	Responses	Corporate		Licensed	
		N	%	N	%
Q10. Product Appearance	1= In-store	52	47.7	65	80.2
	2=Case-ready	39	35.8	7	8.6
	3=No difference	18	16.5	9	11.1
	0=N/A	0	0	3	3.6
Q13. Shelf Life	1= In-store	17	15.6	29	35.8
	2=Case-ready	78	71.6	45	55.6
	3=No difference	14	12.8	7	8.6
	0=N/A	0	0	3	3.6
Q17. SKU Varieties	1= In-store	52	47.7	48	60.0
	2=Case-ready	35	32.1	5	6.3
	3=No difference	22	20.2	27	33.8
	0=N/A	0	0	4	4.8

Question 12 was concerned with the highly important profitability "key success factor." It asked the respondents which fresh meat alternative they deemed more profitable. Aggregating the results from both store types yields an interesting result. Table 10 below indicates that 57 percent of all respondents thought that meat produced in-store was more profitable. It should be noted that 17.9 percent of licensed stores felt that the case-ready meat alternative was more profitable, an important point with respect of acceptance of case-ready meats by licensed stores.

Table 10: Key Success Factors Related to Profitability

Key Success Factor:	Responses	Corporate		Licensed	
		N	%	N	%
Q12. Profitability	1= In-store	47	43.1	63	75.0
	2=Case-ready	50	45.9	15	17.9
	3=No difference	12	11.0	3	3.6
	0=N/A	0	0	3	3.6

Table 11 highlights the results for Question 28, which is the question of "employee friendliness." Over 78 percent thought case-ready meat alternative was friendly toward employees.

Table 11: Employee Friendly Case-Ready Meat Alternatives by Store Type.

Question #28	Responses	Corporate N	Corporate %	Licensed N	Licensed %
Are case-ready meat alternatives "employee friendly?"	0=No	10	9.2	24	28.6
	1= Yes	99	90.8	41	48.8
	2=N/A	0	0	19	22.6

Table 12 shows the responses to the question about how "manager friendly" a case-ready meat alternative is in the marketplace. The results coincide with other questions asked in the questionnaire concerned with the managerial implications of a case-ready meat implementation. Manager friendly products are closely related to high levels of customer loyalty and customer loyalty in grocery store industry is closely linked with higher per customer sales. In addition, many industry experts believe customer loyalty is earned through direct interaction between store personnel and shoppers. Grocers that enjoy high rates of customer loyalty have in the past earned positive economic profits. Whole Foods, Wegmans, and Ukrops are three companies that have maximized their customer's store loyalty relationship by creating a positive experience in the meat and produce departments. These results regarding "manager friendliness" are very positive for case-ready meats for both types of stores, but less so for the licensed stores.

Table 12: Manager Friendly Case-Ready Meat Alternatives by Store Type.

Question #30	Responses	Corporate N	Corporate %	Licensed N	Licensed %
Are case-ready meat alternatives "manager friendly?"	0=No	4	3.7	18	21.4
	1= Yes	105	96.3	39	46.4
	2=N/A	0	0	27	32.1

Several other specific case-ready product Likert scale questions were posed to further understand respondents' views of specific case-ready product offerings. Table 13 below presents these results. For these questions it is important to focus at how licensed stores viewed case-ready product offerings since the corporate stores were fairly

unanimous in their responses. These results are related to the strength of having the case study provide insights for formulating research propositions some of which that ran counter to what some of the research and trade journals were espousing about case-ready product offerings.

As indicated in Table 13 over 60.3 percent of all respondents agree or strongly agree that case-ready ground beef products are available in the lean-to-fat ratios their store customers prefer, which was counter to what was revealed in the interview process. Having the correct ratios is instrumental towards providing customers with a product they desire at a competitive price. Similar results are reported for case-ready ground beef being available in the pack sizes (weight per package) their customers demand.

While the news is good for the availability of ground beef products, it is less so for whole muscle beef products. Only 34.2 percent of all respondents agree or strongly agree case-ready whole muscle beef products are available in the cuts their customers prefer. A partial explanation for this low figure coincides with several interviews of meat managers where they felt the strength of processing meat in-stores is the flexibility in meeting customer preferences on a location by location basis.

Table 13: Case-Ready Product Issues by Retail Store Type.

Case-Ready Meat Product Issues	Responses	Corporate N	Corporate %	Licensed N	Licensed %
Q19. Case-ready ground beef products are available in the lean-fat ratios my customers prefer.	1= Strongly Disagree	0	0	4	4.8
	2	7	6.4	7	8.3
	3	26	23.9	23	27.4
	4	52	47.7	22	26.2
	5= Strongly Agree	24	22.0	18	21.4
	N/A	0	0	10	11.9
Q20. Case-ready whole muscle beef products are available in the cuts my customers prefer.	1= Strongly Disagree	1	.9	13	15.5
	2	24	22.0	15	17.9
	3	49	45.0	26	31.0
	4	25	22.9	14	16.7
	5= Strongly Agree	20	18.3	7	8.3
	N/A	3	2.8	15	17.9
Q22. Case-ready ground beef products are available in the pack sizes my customers prefer.	1= Strongly Disagree	1	.9	7	8.3
	2	7	6.4	12	14.3
	3	22	20.2	16	19.0
	4	51	46.8	26	31.0
	5= Strongly Agree	28	25.7	9	10.7
	N/A	0	0	14	16.7
Q22. Case-ready whole muscle beef products are available in the pack sizes my customers prefer.	1= Strongly Disagree	1	.9	12	14.3
	2	9	8.3	17	20.2
	3	43	39.4	21	25
	4	41	37.6	13	15.5
	5= Strongly Agree	12	11	4	4.8
	N/A	3	2.8	17	20.2

The results for question 22 in Table 13 above shows only 36.3 percent of respondents agree or strongly agree that case-ready whole muscle beef cuts are available in the pack sizes their customers prefer. This result is particularly important given the observations and discussions with store customers during the case study phase. They indicated that their choice to purchase any center of the plate protein is dependent upon how many servings were in the pack ("pack size"). This viewpoint also concurs with interviews of meat department personnel and store executives. They felt that the pack size was more strongly influenced by the number of portions than the package weight.

4.2 Cross Tabulation Research Propositions: Case-Ready Product Issues

This section focuses on the Likert scale questions (Q72-Q76) that addressed specific operational issues for the case-ready meat products and stated in four of the research propositions (RP_2, RP_3, RP_5, and RP_6). These questions endeavored to shed light upon these specific issues: assumptions about the costs of case-ready products being more expensive than other products (RP_2), case-ready meats are considered an "employee friendly"(RP_3), the ability of meat department manager to manage all perishables, not only fresh meats (RP_5), and managers have a low perception of the relative costs between case-ready and in-store processed meats (RP_6).

Table 14 summarizes the respondent's answers to questions 72-76. Questions 73 and 74 were not significant at the critical alpha level and therefore we fail to reject the null hypothesis. The results for questions 73 and 74 indicate that corporate and licensed store answers for each scale contain approximately the same percentage.

Question 72 asked a fundamental question about adopting a case-ready meat scenario. Specifically, is it difficult to hire qualified meat cutters? Several journal and trade articles (Keith, 2004; Salvage, 2003; Brody, 2002 and Hodgins, 2002) have commented about the ever-increasing difficulty of hiring and retaining qualified meat cutters. Table 14 demonstrates that most respondents view this as a difficulty, as seen by the majority of responses are above the median.

Question 75 asked if case-ready products were as cost-effective as meat produced in-store. The results varied by store type. Corporate stores viewed the case-ready product as cost effective, licensed stores disagreed.

Question 76 asked if the increasing cost of workers' compensation related to hiring and paying meat cutters was becoming cost-prohibitive. While many respondents from both types of stores answered not applicable, most responses ranged from agree to strongly agree that workers compensation was becoming cost-prohibitive.

Table 14: Case-Ready Meat Management Operational Issues by Store Type

Case-Ready Meat Operational Issues: Likert Scale Questions	Likert Scale Responses	Corporate		Licensed	
		N	%	N	%
Q72. It has become increasingly more difficult to find qualified meat cutters for my store.	1= Strongly Disagree	9	8.3	8	9.5
	2	10	9.2	10	11.9
	3	19	17.4	9	10.7
	4	13	11.9	17	20.2
	5= Strongly Agree	18	16.5	31	36.9
	N/A	40	36.7	9	10.7
Q73. A traditional meat department manager and/or meat cutter could be trained to manage all perishables not just meats. **FAIL TO ACCEPT**	1= Strongly Disagree	6	5.5	5	6.0
	2	7	6.4	7	8.3
	3	11	10.1	9	10.7
	4	33	30.3	29	34.5
	5= Strongly Agree	42	38.5	27	32.1
	N/A	10	9.2	7	8.3
Q74, Implementing a case-ready meat program will shift meat mgmt. from production activities to forecasting/inventory management. **FAIL TO ACCEPT**	1= Strongly Disagree	2	1.8	2	2.4
	2	1	.9	5	6.0
	3	21	19.3	14	16.7
	4	43	39.4	35	41.7
	5= Strongly Agree	28	25.7	25	29.8
	N/A	14	12.8	3	3.6
Q75. Case-ready beef and pork products compared to in-store produced meat products are more cost effective.	1= Strongly Disagree	5	4.6	19	22.6
	2	7	6.4	19	22.6
	3	29	26.6	22	26.2
	4	37	33.9	11	13.1
	5= Strongly Agree	22	20.2	8	9.5
	N/A	9	8.3	5	6.0
Q76. Cost of workers' compensation for employees that cut meat is becoming prohibitive.	1= Strongly Disagree	2	1.8	5	6.0
	2	4	3.7	9	10.7
	3	35	32.1	35	41.7
	4	32	29.4	14	16.7
	5= Strongly Agree	18	16.5	9	10.7
	N/A	18	16.5	12	14.3

There are two questions that showed no differences between corporate and licensed stores. These questions asked managers about possible future scenarios for meat department personnel when using a case-ready meat strategy. Both store types overwhelmingly agreed or strongly agreed that meat department personnel could be trained to manage the entire perishables category of meat and produce. Processors were

enthusiastic about the marketing expertise current meat department personnel could provide customers on a daily basis if their primary duties were to manage the category versus processing meats.

4.2.1 Results of Packaging Operational Issues

The four packaging research propositions include:

$RP_{18\text{-}PK}$ Case-ready meat products that require "blooming" cause operational issues as a result of preparing that product to be displayed in the meat case.

$RP_{19\text{-}PK}$ Case-ready meat packing is considered "attractive."

$RP_{20\text{-}PK}$ Store managers prefer the case-ready beef that is packaged in low oxygen, low headspace.

$RP_{21\text{-}PK}$ Store managers believe the case-ready beef packaging alternative of high oxygen/high headspace is a detriment to fresh meat sales.

Twelve Likert scale questions concerning the key packaging issues were drafted from the proceedings of the March 19 videoconference at Michigan State University and after completing the case study with industry executives, retail Distribution Center (DC) and retail grocery stores in Michigan, Illinois, Wisconsin and Indiana. The packaging questions were intended to gather information about several aspects of case-ready meat packaging found within the four research propositions.

Nine of the twelve questions found in Table 15 and Table 16 fit into two categories: (1) Is the integrity of the product maintained in the case-ready pack? (2) Which packaging alternative is more visually attractive? The last three packaging questions address three completely different topics including the time required for the

product to bloom[14]. Question 69 asked manager's viewpoint about their customers' opinions of case-ready packaging alternatives and effectiveness of case-ready meat trays.

Three packaging questions were centered on the "very different looking" high oxygen/high headspace packaging alternative, which is different from products processed and packaged in-stores. Meat processors preferred the high headspace pack for a time because of the "protection" the high headspace provided during transit and storage in the retailer's storage cooler prior to being stocked in the meat cases. During several interviews store managers suggested that many of their customers felt that the high headspace package was too different from standard products and would have problems being accepted in the marketplace. The customers reactions were based merely on how decidedly different this new pack appeared from what they normally purchased. Knowing the perceptions store managers have regarding packaging alternatives was deemed important.

All of the five questions in Table 15 had significant Pearson chi-square *p*-values at the .05 probability level. These five questions indicate one obvious positive result. For question 26, which relates to the packaging of case-ready ground beef containing a very high lean-to-fat (85/15) ratio product, 56.5 percent of all respondents agree or strongly agree this packaging displayed a "cherry red" color for the meat. This result is promising for the adoption of case-ready programs because this is the color meat experts and retailers associate with "freshness." One partial explanation for 85/15 lean to fat ratio rating higher is that the 70/30 product does not contain significantly higher lean

[14] Case-ready products are shipped in boxes from the meat processor, within the boxes product is overwrapped with oxygen barrier bags. This bag must be opened to allow oxygen in the air to "bloom" the case-ready products. Once the products are bloomed they will have a "cherry red" color and be ready for the meat cases.

meat which contains more oxymyoglobin. Question 27 with the even higher 90/10 ratio scored lower than the 85/15, and higher than the 70/30. An explanation is that many SAL stores do not sell the more expensive 90/10 ground beef.

Table 15: Ground Beef Packaging Operational Issues by Retail Store Type.

Case-Ready Packaging Questions	Responses	Corporate N	Corporate %	Licensed N	Licensed %
Q25 (Packaging Environment) Case-ready **ground beef** (not chubs) with a 75/25 lean–fat ratio have a "cherry red" color.	1= Strongly Disagree	2	1.8	12	14.3
	2	12	11.0	8	9.5
	3	39	35.8	18	21.4
	4	42	38.5	22	26.2
	5= Strongly Agree	12	11.0	5	6.0
	N/A	2	1.8	19	22.6
Q26 (Packaging Environment) Case-ready **ground beef** (not chubs) with a 85/15 lean–fat ratio have a "cherry red" color.	1= Strongly Disagree	0	0	8	9.5
	2	5	4.6	7	8.3
	3	27	24.8	17	20.2
	4	59	54.1	27	32.1
	5= Strongly Agree	17	15.6	6	7.1
	N/A	1	.9	19	22.6
Q27 (Packaging Environment) Case-ready **ground beef** (not chubs) with a 90 / 10 lean–fat ratio have a "cherry red" color.	1= Strongly Disagree	2	1.8	8	9.5
	2	2	1.8	6	7.1
	3	22	20.2	14	16.7
	4	44	40.4	19	22.6
	5= Strongly Agree	18	16.5	4	4.8
	N/A	21	19.3	33	39.3
Q62 (Packaging Alternative) Low-Oxygen / Low Head Space packaging of case-ready ground beef **is not** a detriment to sales.	1= Strongly Disagree	5	4.6	3	.6
	2	10	9.2	2	2.4
	3	43	39.4	25	29.8
	4	38	34.9	28	33.3
	5= Strongly Agree	10	9.2	10	11.9
	N/A	3	2.8	16	19.0
Q63 (Packaging Alternative) High-Oxygen / High Head Space packaging of case-ready ground beef **is not** a detriment to sales.	1= Strongly Disagree	3	2.8	7	8.3
	2	21	19.3	13	15.5
	3	48	44.0	36	42.9
	4	23	21.1	8	9.5
	5= Strongly Agree	12	11.0	3	3.6
	N/A	2	1.8	17	20.2

The results of the two current packaging alternatives available to processors low-oxygen/low-head space and the high-oxygen/high-head space are shown in Table 15. The packaging alternatives for ground beef products, the low-oxygen alternative had 44.6 percent of all respondents agree or strongly agree is not a detriment to sales. Question 63 explored the high/oxygen high/head space packaging alternative for ground beef: the results showed this packaging alternative is not a detriment to sales with only 23.8

percent of all respondents agree or strongly agree it is not. The low-oxygen/low head space for ground beef[15] had a stronger following among respondents.

All twelve questions in Table 16 had significant Pearson chi-square *p*-values. Forty one percent of the respondents agree or strongly agree the low/oxygen low/headspace packaging alternative was not a detriment to sales. These results conflict with the case study, interviews and the literature review: that is they indicated the low oxygen alternative was the better alternative. In retrospect, these two questions could have been worded differently to better address which alternative was superior for marketing purposes to their respective customer base.

Question 68, indicated that 57.5 percent of all respondents agree or strongly agree that blooming case-ready meats causes operational problems. The results suggest that processors need to constantly adjust the time and metrics to successfully bloom product.

Question 69 asked respondents if their customers could tell the difference between case-ready meat packaging and in-store processed packaging. Fifty nine percent of all respondents agree or strongly agree that their customers could tell the difference. This result ran counter to the literature review and the case study results. One plausible explanation is that many SAL customers also shop at Walmart which only sells case-ready meats.

Responses to Question 70, also conflicts with prior research and interviews. New black case-ready trays were considered a more attractive tray than the standard white tray

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[15] It should be noted that the results for whole muscle meat cuts for the two packaging alternatives had the same results as ground beef; the low-oxygen alternative had more agreement than the high-oxygen alternative.

for in-store processed meats. Only 36.3 percent of the respondents agree or strongly agree that the trays are attractive.

Table 16: Packaging Operational Issues by Retail Store Type.

Case-Ready Packaging Questions	Responses	Corporate N	Corporate %	Licensed N	Licensed %
Q64 (Packaging Alternative) Low-Oxygen / Low Head Space packaging of case-ready beef cuts **is not** a detriment to sales.	1= Strongly Disagree	3	2.8	4	4.8
	2	7	6.4	6	7.1
	3	45	41.3	26	31.0
	4	43	39.4	19	22.6
	5= Strongly Agree	9	8.3	9	10.7
	N/A	2	1.8	20	23.8
Q65 (Packaging Alternative) High-Oxygen / High Head Space packaging of case-ready beef cuts **is not** a detriment to sales.	1= Strongly Disagree	4	3.7	6	7.1
	2	17	15.6	19	22.6
	3	50	45.9	32	38.1
	4	26	23.9	6	7.1
	5= Strongly Agree	10	9.2	2	2.4
	N/A	2	1.8	19	22.6
Q66 (Packaging Alternative) Low-Oxygen / Low Head Space packaging of case-ready pork cuts & grinds **is not** a detriment to sales.	1= Strongly Disagree	1	.9	7	8.3
	2	7	6.4	12	14.3
	3	22	20.2	16	19.0
	4	51	46.8	26	31.0
	5= Strongly Agree	28	25.7	9	10.7
	N/A	0	0	14	16.7
Q67 (Packaging Alternative) High-Oxygen / High Head Space packaging of case-ready pork cuts & grinds **is not** a detriment to sales.	1= Strongly Disagree	1	.9	12	14.3
	2	9	8.3	17	20.2
	3	43	39.4	21	25.0
	4	41	37.6	13	15.5
	5= Strongly Agree	12	11.0	4	4.8
	N/A	3	2.8	17	20.2
Q68 (Miscellaneous) Case-ready meat products that require "**blooming**" cause operational problems.	1= Strongly Disagree	1	.9	6	7.1
	2	6	5.5	7	8.3
	3	20	18.3	27	32.1
	4	62	56.9	29	34.5
	5= Strongly Agree	1	.9	19	22.6
	N/A	0	0	8	9.5
Q69 (Miscellaneous) My customers know the **difference** between case-ready packaging and in-store packaging.	1= Strongly Disagree	1	.9	7	8.3
	2	7	6.4	12	14.3
	3	22	20.2	16	19.0
	4	51	46.8	26	31.0
	5= Strongly Agree	28	25.7	9	10.7
	N/A	0	0	14	16.7
Q70 (Miscellaneous) Case-ready beef and pork products are packaged in **attractive trays.**	1= Strongly Disagree	1	.9	12	14.3
	2	9	8.3	17	20.2
	3	43	39.4	21	25.0
	4	41	37.6	13	15.5
	5= Strongly Agree	12	11.0	4	4.8
	N/A	3	2.8	17	20.2

4.2.2 Handling Operational Issues Data Analysis

Several meat industry research articles (Brody, 2004, 2003 and 2002) had concluded that case-ready meat products were not a success because of inadequate handling problems along the supply chain, beginning with the case-ready meat products arriving from the processor at the distribution center. The videoconference with industry experts contradicted those assertions. When conducting the case study, poor handling procedures were not observed. Moreover, follow up questions of supply chain personnel disclosed the handling problems had not been recently witnessed. They indicated that the handling issues in the past were attributed to the older case-ready packaging and not the handling metrics along the supply chain. The fragile nature of case-ready products in earlier product offerings was still being referenced even after those valid concerns were addressed and remedied by the packaging industry in conjunction with the meat processing industry.

The case study further revealed that case-ready meat processors have developed and disseminated metrics or best management practices for the proper handling of case-ready meat products to distribution centers and retailers. This step dramatically improved performance and fulfilled expected shelf-life dates. Retailers and distribution centers have made significant capital improvements to upgrade shipping and handling facilities, which have improved the performance of case-ready products.

The case study revealed several handling issues pertinent to implementing a successful case-ready meat strategy and those issues were the theme of the three handling research propositions. The research propositions for handling are:

$RP_{22\text{-}HD}$ Store managers typically find it difficult to keep their fresh meat cases fully stocked between 4PM and 7PM and case-ready meats can resolve this problem.

$RP_{23\text{-}HD}$ Managers believe a key factor towards increasing the shelf life of fresh meats is holding and maintaining proper temperatures (e.g. rapidly transporting fresh meat products from the receiving area into the walk-in coolers in a timely manner) furthermore case-ready meats are at a disadvantage in this area.

$RP_{24\text{-}HD}$ Case-ready meats are easier to manage for proper rotation and to avoid out-of-date product and help maintain proper adequate inventory levels.

Table 17 summarizes the findings of the Likert scale handling questions 49 through 55. These questions all had significant chi-square results except question 50. These questions address the underlying importance of factors that relate to the proper handling that case-ready meats. Managers of both corporate and licensed stores were satisfied with the way product is being handled. These results, like the findings from the video conference contradicted the meat industry journal articles about inadequate handling metrics along the supply chain have lead to poor adoption of case-ready meats.

Table 17: Handling Operational Issues by Retail Store Type.

Case-Ready Handling Operational Issues	Responses	Corporate N	Corporate %	Licensed N	Licensed %
	1= Not at all	2	1.8	3	3.6
Q49. How satisfied are you with	2	7	6.4	14	16.7
the way your store accounts for	3	32	29.4	11	13.1
every fresh meat package not sold	4	45	41.3	33	39.3
at full retail?	5= Very satisfied	22	20.2	21	25.0
	N/A	1	.9	2	2.4
	1= Not at all	0	0	0	0
Q50. How satisfied are you with	2	2	1.8	0	0
the way your store stocks meat	3	16	14.7	7	8.3
cases to ensure FIFO methods are	4	47	43.1	39	46.4
followed?	5= Very satisfied	43	39.4	38	45.2
FAIL TO REJECT $p = .353$	N/A	1	.9	0	0
	1= Not at all	0	0	0	0
Q51. How satisfied are you with	2	2	1.8	4	4.8
the way your store maintains	3	20	18.3	7	8.3
adequate inventory levels?	4	65	59.6	39	46.4
	5= Very satisfied	21	19.3	34	40.5
	N/A	1	.9	0	0
	1= Not at all	0	0	0	0
Q52. How satisfied are you with	2	1	1.2	1	1.2
the way your store manages fresh	3	19	17.4	10	11.9
beef and pork inventory in the	4	53	48.6	28	33.3
walk-in cooler?	5= Very satisfied	34	31.2	44	52.4
	N/A	2	1.8	1	1.2
	1= Not at all	0	0	0	0
Q53. How satisfied are you with	2	6	5.5	1	1.2
the way your store maintains	3	24	22.0	14	16.7
adequate inventory levels?	4	60	55.0	42	50.0
	5= Very satisfied	17	15.6	27	32.1
	N/A	2	1.8	0	6.0
	1= Not at all	0	0	0	0
Q54. How satisfied are you with	2	5	4.6	2	2.4
the way your store prepares for	3	22	22.0	8	9.5
monthly meat specials?	4	56	51.4	34	40.5
	5= Very satisfied	25	22.9	40	47.6
	N/A	1	.9	0	0
	1= Not at all	0	0	1	1.2
Q55. How satisfied are you with	2	5	4.6	6	7.1
the way your store prepares for	3	39	20.2	7	8.3
increased sales experience	4	42	51.4	31	36.9
associated with special meat	5= Very satisfied	19	22.9	40	35.7
promotions?	N/A	4	3.7	9	10.7

Table 18 shows the results of Question 4, which asked which times of the day, were difficult to keep the meat cases stocked. This question was asked because case-ready meat products do not need to be processed and packaged on premise; rather, they only require pricing and stocking in the meat display case. This is a critical point because

case-ready beef products require a minimum twenty minute bloom period. All stores chose 4:00 PM as the most difficult time to keep the meat case stocked. It is important to note that 10 AM-1 PM and 4 PM-7 PM periods were the most difficult times to keep the cases stocked. The Q4 results are consistent with information gained from interviews with meat cutters. The time between 4 PM and 7 PM can be the busiest times of the day for grocers, which coincides when meat department personnel end production activities for the day.

Table 18: Handling (Stocking) Case-Ready Meat Cases by Retail Store Type.

Case-Ready Handling Questions	Responses	Corporate		Licensed	
		Prob	Not Prob	Prob	Not Prob
Q4. When is it difficult to maintain adequately stocked meat cases?	9 AM-10 AM	108	1	74	10
	10 AM-1 PM	94	15	72	12
	1-4 PM	74	35	70	14
	4 PM-7 PM	42	67	36	48
	7 PM-until closing	94	15	58	26

4.2.3 Data Analysis Operational Issues Associated with Shrink

Fresh meat shrink is defined as any dollar amount that is less than full-expected retail price. Causes of shrink are of major concern for meat processors. They were adamant about benefits of case-ready meat programs: Numerous Activity Based Costing research projects revealed the costs of case-ready meat products was not higher compared with in-store processed meats when all in-store costs of processing meats are taken into account. Moreover, it was learned that many retailers underestimate shrink in its accounting systems.

There are four research propositions associated with shrink:

$RP_{14\text{-}SK}$ Store managers do not believe there is a significant difference in shrink levels when selecting fresh meat product options.

$RP_{15\text{-}SK}$ Store managers do not believe there is a significant difference between fresh meat product options as they relate to managing the other operational concerns and managing shrink levels.

$RP_{16\text{-}SK}$ Store managers are able to distinguish the top three sources of shrink.

$RP_{17\text{-}SK}$ Store managers do not believe there is a significant difference between fresh meat product options in formulating strategies for controlling and addressing shrink.

The cross-tabulations unveiled several key points about the sources of shrink and the associated relationships with either processing meats in-store or a case-ready meat program. Prior research discovered seven key sources of shrink associated with fresh meats. They include customer theft, employee theft, defective packaging, inadequate workmanship, incorrect inventory issues, out-of-date product, and, for case-ready products, the shrink associated with non-bloom packages of meat.

The seven issues listed are the basis for the shrink questions. Table 19 describes the results. Over 79 percent of respondents thought customer theft was a significant source of shrink. There are decidedly different scores to this category of shrink between stores. Corporate stores recorded 41.3 percent of their responses as a "big concern" compared to franchise stores recording 28.6 percent. The only other question of shrink that had significant results was the question of workmanship. Corporate stores indicated workmanship issues are as an important concern of shrink. More than 79 percent of store

managers thought that workmanship was a source of shrink. Whereas, licensed stores only 45 percent thought workmanship was a source of shrink with only 12 percent of that score above the median.

These results show a clear difference between store types and how they view workmanship as a source of shrink. The case study revealed that some case-ready meat products were being discounted and discarded due to inconsistent and/or poor workmanship issues coming from the processor. These results confirm the case study findings about workmanship of case-ready meat products being a key source of shrink. This is particularly important as corporate stores market 100 percent case-ready meat products.

Shrink resulting from employee theft (Question 45) reveals several important points. First, close to 75 percent of both store types rated employee theft in the range of 3 to 5. This outcome would substantiate managers concern that they do not have an internal theft problem; however, research conducted by the supermarket industry contradicts this finding. An industry report conducted by the National Supermarket Research Group and sponsored by the National Grocers Association entitled 2003-2004 Shrink Survey found that the largest single source of shrink in grocery stores is from employees. Employee theft has increased significantly the past five years; however, controlling employee theft in a retail setting is difficult and costly in terms of apprehending and prosecution. Radio Frequency Identification (RFID) products have a low cost tag that could be implanted into each case-ready package tray that accounts for the products movement along a supply chain (including aspects of inventory/product

traceability); and can be used to sound an alarm if the product moves outside the store without payment.

Table 19: Shrink by Retail Store Type.

Operational Issues Associated with Shrink	Responses	Corporate		Licensed	
		N	%	N	%
Q39. Customer theft **FAILED TO REJECT**	1= Big Concern	45	41.3	24	28.6
	2	22	20.2	15	17.9
	3	24	22.0	23	27.4
	4	17	15.6	18	21.4
	5= Not a Concern	0	0	4	4.8
	N/A	1	0.9	0	0
Q40. Defective and damaged packaging	1= Big Concern	10	9.2	10	11.9
	2	30	27.5	10	11.9
	3	40	36.7	26	31.0
	4	23	21.1	30	35.7
	5= Not a Concern	5	4.6	7	8.3
	N/A	1	0.9	1	1.2
Q41. Workmanship issues	1= Big Concern	15	13.8	2	2.4
	2	40	36.7	12	14.3
	3	31	28.4	24	28.6
	4	21	19.3	27	32.1
	5= Not a Concern	1	0.9	19	22.6
	N/A	1	0.9	0	0
Q42. Incorrect inventory issues	1= Big Concern	7	6.4	4	4.8
	2	14	12.8	14	16.7
	3	37	33.9	17	20.2
	4	43	39.4	27	32.1
	5= Not a Concern	7	6.4	22	26.2
	N/A	1	0.9	0	0
Q43. Non-bloom issues/ground beef	1= Big Concern	18	16.5	12	14.3
	2	33	30.3	15	17.9
	3	34	31.2	11	13.1
	4	14	12.8	13	15.5
	5= Not a Concern	9	8.3	12	14.3
	N/A	1	0.9	21	25.0
Q44. Non-bloom issues/beef cuts	1= Big Concern	19	17.4	11	13.1
	2	39	35.8	15	17.9
	3	33	30.3	9	10.7
	4	14	12.8	9	10.7
	5= Not a Concern	3	2.8	13	15.5
	N/A	1	0.9	27	32.1
Q45. Employee theft	1= Big Concern	12	11.0	8	9.5
	2	14	12.8	13	15.5
	3	36	33.0	25	29.8
	4	39	35.8	26	31.0
	5= Not a Concern	7	6.4	12	14.3
	N/A	1	0.9	0	0

Table 20 indicates that when comparing fresh meat processed in-stores with case-ready meat products, case-ready meats were superior in managing shrink, with case-ready

earning 48.7 percent compared to in-store with 37.3 percent. Managers of both store types clearly indicated that case-ready meats possessed characteristics conducive to managing shrink. This is an important finding for further adoption efforts.

Table 20: Shrink Management as a Key Success Factor by Retail Store Type.

Key C-R Success Factors	Responses	Corporate		Licensed	
		N	%	N	%
Shrink management	1= In-Store	27	24.8	45	55.6
	2=Case-Ready	65	59.6	29	35.8
	3=No Difference	17	15.6	7	8.6

4.2.4 Data Analysis of Food Safety Operational Issues

The next section discusses the results of the food safety survey questions derived from these three research propositions:

$RP_{7\text{-}FS}$ Store managers believe case-ready beef and pork products are safer than products processed in stores.

$RP_{8\text{-}FS}$ An outbreak of food borne illness associated with fresh meat purchased at either corporate and franchise stores would be catastrophic to store sales.

$RP_{9\text{-}FS}$ Store managers' perception is that customers who do not recognize the safety of both products would respond by purchasing more fresh beef and pork products if they believed those products were the safest available.

The role of food safety towards expanding the adoption rates of case-ready meats was unclear during the video conference and case study phase of the thesis project. It should be noted that food safety was not discounted in any way, but any specific role the issue played in furthering adoption rates was unclear. Food safety is and always will be a

major concern for cattle producers, fresh meat processors, grocery retailers and consumers.

Table 21 reveals the results of two very important food safety questions. Question 14 investigates which alternative was perceived as being "safer." The combined results for store types indicates that the case-ready alternative 80.3 percent as the "safest" meat product. Even the licensed stores selected case-ready as the safest alternative. Since these stores sell in-store processed meats this is a promising result for case-ready meats.

Question 18 explored the topic product traceability. There is a difference between how respondents answered this question (see Table 21). Corporate stores believe case-ready meat was a key success factor at 84.4 percent whereas only 67.9 percent of the licensed stores agreed. Together, 77.4 percent of respondents thought that product traceability as a key success factor were associated with the case-ready meat alternative. The results found in question 14, show another positive attribute for case-ready meats.

Table 21: Food Safety and Product Traceability Factors by Retail Store Type.

Key C-R Success Factors	Responses	Corporate		Licensed	
		N	%	N	%
Q14. Food safety	1= In-Store	2	1.8	15	18.5
	2=Case-Ready	101	92.7	54	66.7
	3=No Difference	6	5.5	15	18.5
	0=N/A	0	0	3	3.6
Q18. Product traceability	1= In-Store	5	4.6	15	18.5
	2=Case-Ready	92	84.4	55	67.9
	3=No Difference	12	11.0	11	13.6
	0=N/A	0	0	3	3.6

Table 21 addresses food safety as a "key success factor" from only two factors; overall food safety and product traceability. While the food safety issues have been addressed earlier, product traceability is new component within the food safety category. There is a substantial literature on the subject of fresh meat food safety and how it can be

improved and product traceability will be an option that helps ensure a safer supply of fresh meats in the long run. Product traceability is a component of acquiring more information as it relates to exactly where in the supply chain the food safety incident occurred. Further upsides to tracing product along a supply chain is the potential for gathering more data at stops along the supply chain (including customers) and providing information to all to improve product quality and safety.

In Table 22 specific questions concerning retail meat sales and problems associated with food safety are analyzed. Only two questions were not significant in the chi square test at the .05 probability level, question 57 and question 59. A further review of the data for those two questions reveals respondents from corporate and licensed stores supplied similar responses.

Question 57 was interested in obtaining manager's viewpoints on a possible food safety issue occurring at their store and how that would affect overall sales. Over 91 percent of all respondents indicated that the occurrence would cause overall sales to fall dramatically.

Question 58 asked about a food safety incident and the consequences the incident would have only on meat sales. Over 70 percent of corporate store managers thought the incident would jeopardize just meat sales. Close to 26 percent answered at the median and above to 'strongly agree," which suggests that the incident would affect all sales. While the licensed stores' answers were more evenly distributed across the scale, these were at and below the median, suggesting an incident would harm mainly meat sales. Several explanations for these results include the lack of competition for customers shopping at the SAL stores (there is little competition amongst grocery store retailers

located in these areas) and customers may not associate a meat food safety issue other food purchases.

Question 59 explored the volume of meat sales associated with perceived safety of the product. Over 91 percent of all respondents scored at the median and above, revealing the respondents agreed their customers would indeed purchase more fresh meat products if they believed the products were the safest available. The percentages for each interval in the Likert scale were roughly the same percentages for both store types and thus not pass the chi square test. Managers' perceptions of safe meat products towards customers purchasing more fresh meat are an important finding and consistent with the literature review.

The important question in the survey addressing whether case-ready meats are the safest available was covered in question 60. Over 92 percent of corporate and licensed store managers indicated case-ready meats are the safest possible alternative. Corporate stores "strongly agreeing" to the proposition were 45.9 percent of their total sample. Licensed stores responded less enthusiastically, and the chi-square was significant. The difference between stores was found in the ranking above the median.

The last question in this series attempted to gather specific data as to whether the respondents believe case-ready meat products are the safest. Corporate stores at the 98 percent level at the median and above felt they were the safest products. Licensed stores were not as enthusiastic of the proposition. While over 70 percent were at or above the median, there was 63 percent of the sample population at or below the median, suggesting these store managers are not as convinced that case-ready products are the safest.

Table 22: Food Safety Operational Issues of Case-Ready by Retail Store Type.

Operational Issues Associated with Food Safety	Responses	Corporate N	Corporate %	Licensed N	Licensed %
Q57. A food borne illness outbreak associated with fresh meat purchased at my store would be catastrophic to **overall store sales**.	1= Strongly Disagree	1	.9	1	1.2
	2	3	2.8	9	10.7
	3	9	8.3	12	14.3
	4	18	16.5	16	19.0
	5= Strongly Agree	77	70.6	45	53.6
FAIL TO ACCEPT *P=.115*	N/A	1	.9	1	1.2
Q58. A food borne illness outbreak associated with fresh meat purchased at my store would be catastrophic to **meat sales only**.	1= Strongly Disagree	45	41.3	21	25.0
	2	21	19.3	25	29.8
	3	13	11.9	15	17.9
	4	9	8.3	14	16.7
	5= Strongly Agree	20	18.3	7	8.3
	N/A	1	.9	2	2.4
Q59. My customers would respond by purchasing more fresh beef and pork products if they believed those products were the **safest** available.	1= Strongly Disagree	4	3.7	2	2.4
	2	7	6.4	8	9.5
	3	22	20.2	20	23.8
	4	39	35.8	22	26.2
	5= Strongly Agree	36	33.0	30	35.7
FAIL TO ACCEPT *P=.660*	N/A	1	.9	2	2.4
Q60. Case-ready beef and pork products are "**safer**" than beef and pork products processed in-store.	1= Strongly Disagree	1	.9	7	8.3
	2	1	.9	8	9.5
	3	12	11.0	30	35.7
	4	43	39.4	18	21.4
	5= Strongly Agree	50	45.9	16	19.0
	N/A	2	1.8	5	6.0
Q61. Case-ready meat products are the **safest** meats available	1= Strongly Disagree	1	.9	9	10.7
	2	1	.9	11	13.1
	3	24	22.0	33	39.3
	4	49	45.0	13	15.5
	5= Strongly Agree	32	29.4	13	15.5
	N/A	2	1.8	5	6.0

4.2.5 Data Analysis of Workmanship Operational Issues

The presence or absence of workmanship in meat products can be found in several areas: well trimmed fat, the positioning of the meat product in the tray, uniformity among all other packages, neatness in wrapping, and proper positioning of the label. The workmanship operational questions in the survey were derived from these research propositions:

$RP_{10\text{-}WK}$ Store managers are finding it more difficult to hire qualified meat cutters at competitive wages.

$RP_{11\text{-}WK}$ Implementing a case-ready meat program will demand additional skills such as forecasting daily and weekly demand, along with proper inventory management and less meat processing workmanship skills.

$RP_{12\text{-}WK}$ Case-ready beef and pork products compared to in-store produced products are more cost effective.

$RP_{13\text{-}WK}$ Case-ready meats will have lower stock outs and therefore maintain a higher rate of customer retention.

The workmanship category had several issues that were addressed in the research propositions. The first and obvious issue relates to the finished products consumers purchase and the importance workmanship has on those consumer decisions. During the case study retail executives and managers stressed the quality (not necessary the highest possible quality of meat) of meat products as being very important and closely related to consumers choices of center of the plate proteins. Quality has a major impact on the finished meat products that consumers purchase and quality of the product was directly related to the "workmanship" involved in processing. While quality is implied for all consumer products (and protected by consumer laws and regulations) the perception of quality for fresh beef products is on display in each and every package of beef. These lessons on quality were first learned by retailers in consumer satisfaction surveys that revealed the first criteria consumers use to judge an entire grocery store is the produce department, followed by the meat department. After these results were discovered, retailers around the country began to dramatically improve the quality of the produce

section by upgrading the produce departments and changing the size and layout by adding new fixtures, and using continuous replenishment strategies. It may be argued that meat departments are more difficult to enhance; however, research has demonstrated the importance of making efforts to do so. The first two operational issues associated with the quality of workmanship were addressed in product appearance and product consistency. Table 23 reveals both corporate and licensed stores rated fresh meat processed in-stores to have better product appearance. Over 47 percent corporate stores rated in-store product as being the better alternative. This statistic is revealing because corporate stores market mainly case-ready meat products. This result is stipulating respondents view in-store processed meats as possessing a higher level of workmanship.

Choosing which fresh meat alternative was superior in product consistency followed the option each store is selling. Only twenty-two percent of case-ready managers thought meat processed in-store was more consistent than case-ready meat products. Whereas, twenty-six percent of the licensed stores thought case-ready was the superior alternative in product consistency. Clearly, the workmanship issues residing with the case-ready meat program alternative need to be addressed in any efforts towards improving adoption rates.

Table 23: Workmanship Operational Issues by Retail Store Type.

Key C-R Success Factors	Responses	Corporate		Licensed	
		N	%	N	%
Product Appearance	1= In-Store	52	47.7	65	77.4
	2=Case-Ready	39	35.8	7	8.3
	3=No Difference	18	16.5	9	10.7
Product Consistency	1= In-Store	24	22.0	43	51.1
	2=Case-Ready	64	58.7	21	25.1
	3=No Difference	21	19.3	17	20.2
	0=n/a	0	0	3	3.6

The Likert scale questions for workmanship can be found in Table 24 (questions 72, 73 and 74). Question 72 addressed the potential problem for stores that continue to

cut and process meats in-stores, finding a consistent/reliable source of labor. The other two questions were developed to address the concern of how to manage a meat department if it was no longer necessary to employ meat cutters. One key point discovered in the case study on this subject was that the meat department requires capable managers. The case study revealed that current meat department personnel would need varying levels of management training in order to succeed in these new management positions. However, meat operations experience would facilitate their preparation for effectively managing the department.

The results for question 72 revealed that 28.5 percent agreed there is perceived difficulty in finding qualified meat cutters. Many corporate store managers chose not to answer because they do not hire meat cutters. Over 57 percent of licensed store managers agreed it was becoming more difficult in attracting qualified meat cutters. It was anticipated that the results for this question would show an even higher agreement; nevertheless, this result paralleled what was discovered in the literature review.

Table 24 highlights the results of question 73 that asked respondents about meat department personnel being retrained to manage all perishables, in addition to fresh meats. Over 68 percent of managers from corporate stores thought this approach could be achieved. Licensed store managers had similar viewpoints with over 67 percent agreeing. The results could provide valuable insights when implementing and managing a case-ready meat strategy.

Finally, Table 24 addresses the question of meat department personnel shifting responsibilities towards forecasting and inventory management which is an essential aspect of managing case-ready meat programs. This question was included in the study

as a result of meat processors' expressed interest in better understanding demand for fresh meat at the store level. Having trained personnel dedicated to the important task of forecasting and corroborating micro demand models for inventory would greatly impact both retailer and processor. Properly executed, this new position could begin to bring consumer's tastes and preferences into micro-demand models. Processors expressed the need for more consumer input for the products they produce especially, case-ready meats. These results demonstrate both store types either agree or strongly agree that current personnel could accomplish these new forecasting and inventory management tasks; as well as possibly managing the entire perishables (meat and produce) category.

Table 24: Additional Workmanship Operational Issues by Retail Store Type.

Case-Ready Workmanship	Responses	Corporate		Licensed	
		N	%	N	%
Q72. It has become increasingly more difficult to find **qualified** meat cutters for my store.	1= Strongly Disagree	9	8.3	8	9.5
	2	10	9.2	10	11.9
	3	19	17.4	9	10.7
	4	13	11.9	17	20.2
	5= Strongly Agree	18	16.5	31	36.9
	N/A	40	36.7	9	10.7
Q73. A traditional meat department manager and or meat cutter could be trained to manage all perishables not just meats.	1= Strongly Disagree	6	5.5	5	6.0
	2	7	6.4	7	8.4
	3	11	10.1	9	10.8
	4	33	30.3	29	34.9
	5= Strongly Agree	42	38.5	27	32.5
	N/A	10	9.2	6	7.2
Q74. Implementing a case-ready meat program will shift meat management from production activities to forecasting and inventory mgmt of fresh meats.	1= Strongly Disagree	2	1.8	2	2.4
	2	1	.9	5	6.0
	3	21	19.3	14	16.9
	4	43	39.4	35	41.7
	5= Strongly Agree	28	25.7	25	29.8
	N/A	14	12.8	3	3.6

4.3 Multiple Regression Analysis

Six regression models were developed, one for each operational issue (except the case-ready[16] meats operational issue) and one model exploring a combination of the operational issues. The dependent and independent variables for each model were chosen from the research propositions which were based upon the interviews with retail and meat processing industry executives, visits to retail Distribution Centers, grocery stores throughout Michigan, Illinois Indiana and Wisconsin and the literature review. Both the dependent and independent variables are based on Likert scale questions.

The use of Likert scale data as a dependent variable has its detractors and advocates. Likert scale data is considered interval data, other definitions for Likert scale include categorical and ordinal. To use likert scale data as a dependent variable in multiple regression a key assumption is made about the intervals of the Likert scale. The key assumption is there is an equal distance between points in the scale. For example in this research project a five point Likert scale is used, where the implications of the scale are:

1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree

From the above Likert scale the differences between each interval in the scale is the same and equal to 1 and therefore sufficiently continuous between intervals.

Several research articles employing the multiple regression technique have used Likert scale data as both dependent and independent variables (Graham and Nafukho, 2006; Toffalo and Pederson, 2005; Champion and Leach, 1989). These articles cite the importance of using Likert scale data as the dependent variable for its capability of

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[16] It was determined this operational issue was significantly covered by the other regression models.

capturing the "richness" found within the Likert scale. Researchers who have performed due diligence in drafting research propositions can yield one seminal question for the purpose of "capturing" the essence of the topic of interest. For this project six multiple regression models were drafted and each model has a seminal Likert scale question that incorporates the key dimensions and perceptions of this topic collapsed into one interval scale dependent variable. The next sections will cover these multiple regression models.

4.3.1 Multiple Regression Model: Food Safety Operational Issues

The dependent variable for this regression is found in Table 25 and it was derived from several literature review articles hypothesizing case-ready meats were demonstrably safer than the fresh meat processed in-stores (Major, 2007 and Brody, 2005). Store managers and industry executives also confirmed the realities of processing meats in-stores over time has proven to be more difficult to maintain when zero tolerances for safety is required.

Table 25: Summary of Data: Food Safety Regression

Variable Description	Mean	Standard Deviation
Dependent Variable:		
Q61 Case-ready meat products are the safest meats available. 1=*Strongly Disagree* to 5=*Strongly Agree*	3.76	1.285
Independent Variables:		
Q57 A food borne illness outbreak associated with fresh meat purchased at my store would be catastrophic to overall store sales. 1=*Strongly Disagree* to 5=*Strongly Agree*	4.33	1.071
Q58 A food borne illness outbreak associated with fresh meat purchased at my store would be catastrophic to meat sales only. 1=*Strongly Disagree* to 5=*Strongly Agree*	2.43	1.453
Q59 My customers would respond by purchasing more fresh beef products if they believed those products were the safest available 1=*Strongly Disagree* to 5=*Strongly Agree*	3.81	1.171
Q72 It has become increasingly more difficult to find qualified meat cutters for my store. 1=*Strongly Disagree* to 5=*Strongly Agree*	2.62	1.946
Q2 Store Type (Dummy Variable)	.44	.497

For N=193 Observations

4.3.2 Independent Variables in the Food Safety Regression Model

The explanatory variables can be seen in Table 25 above, where the first two variables were drafted in response to the second research proposition concerning the impact of food borne illness associated with meat purchased from the respondent's store. The two concerns of these variables relate to lost sales of the entire grocery store and lost sales within the meat department. Many fast food restaurants associated with customers contracting food borne illnesses have experienced a near loss of the entire brand for the chain. Consumers have a difficult time separating the food borne illness from other menu items in restaurants/fast food establishments, whereas retail grocery stores have been able to isolate and contain any losses to the meat department, while maintaining a majority of revenue from other categories within the grocery store.

The third explanatory variable is related to the third research proposition about consumer's demand for safer meat products. From a marketing perspective case-ready meats has an important feature; namely, product processed under the "safest" possible protocols and conditions. And, the question relates to potential sales increases resulting from this safety feature. From the fairly high mean score for this question it appears store managers agree with the proposition.

Many store managers began their retail careers in the meat department; working their way into management ranks. Store managers observe that pool of talent to draw from for future meat cutters continues to dwindle; and that it is becoming more difficult to find a steady source of meat cutters to process meats in-stores (Keith, 2006). The dwindling pools of talent with more meat department personnel seeking higher paying

management positions has caused retail grocery executives and top management to contemplate the long term disadvantages associated with in-store processing.

4.3.3 Regression Results for Food Safety

Table 26 shows the regression results for the food safety model, including the variables of interest, standardized coefficients, standard errors, t-statistics and P-values.

Table 26: Regression Results: Food Safety

Variable	Estimated Coefficient	Standard Error	t-Statistic	P-Value	Expected Sign
Intercept	1.842	.435	4.238	.000	
Q57 Foodborne illness all sales	.267	.080	3.330	.001	Positive
Q58 Foodborne illness to just meat sales	.139	.057	2.451	.015	Positive
Q59 More sales if meat products were safer	.215	.071	3.022	.003	Positive
Q72 Difficulty finding cutters	.011	.043	.257	.798	Positive
Q2 Store Type (Dummy Variable)	-.374	.169	-5.715	.000	Positive

F=16.051 (p-value=.000) R^2=.300 Adjusted R^2=.282

The overall statistical significance of this model is acceptable. Within the ANOVA results the F-stat is 16.051 which was statistically significant below the .01 level (p-value=.000), where the hypothesis of the independent variables having zero explanatory power or no effect over the dependent variable is rejected. In fact, three out of four variables were significant, including the dummy variable for store type. All variables were significant at the 1 percent level, except the variable for finding a steady supply of meat cutters. The R^2 (Coefficient of Determination) for this model was a respectable 30 percent and adjusted R^2 was 28.2 percent, where the independent variables explained 30 percent of the variability of case-ready meats being considered the safest meats available.

The results of this regression provide a better understanding of the food safety factors resulting in case-ready programs being viewed the safest meat alternative. The

signs for two of the independent variables associated with food borne illness make sense from a manager's perspective. If managers believe the more effective case-ready is relative to product safety as compared to in-store processing, the more likely they are to accept that alternative.

The negative sign for the dummy variable along with the significant p-value means the licensed stores view case-ready meat products are "safer" than in-store processed meats.

4.3.4 Multiple Regression Model: Workmanship Operational Issues

The dependent variable of interest for this regression model centers on the difficulty of recruiting steady supplies of meat cutters to process meat in-stores. Meat cutters are directly responsible for the quality of the end product and all of the tangible and intangible benefits associated with their efforts and resources at their disposal.

4.3.5 Independent Variables in the Workmanship Regression Model

The explanatory variables of interest for this regression model can be viewed in Table 27. The first explanatory variable concerns case-ready meat processors and grocery store executives believing meat department personnel could with the requisite training manage the entire perishables category.

The reality of it being difficult to find meat cutters is especially problematic for corporate store senior management as it pertains to producing high quality meat products on a daily basis. A partial explanation is the rising costs of workers compensation, the second independent variable of interest.

Also impacting the dependent variable are the tangible and intangible shrink losses associated with workmanship issues. In retailing to document and manage the

tangible and intangible factors of shrink is a daunting task, a few examples will be provided. The tangible factors include waste in processing/cutting meat products from subprimals into individually portioned and packaged products. An example of the intangibles associated with workmanship of meat products are inconsistent portions and defective packages. These products typically are not sold before the "sell by date" has expired, become a shrink statistic and harm the image of the store.

Table 27: Summary of Data: Workmanship Regression

Variable Description	**Mean**	**Standard Deviation**
Dependent Variable:		
Q72 It has become increasingly more difficult to find qualified meat cutters for my store.	2.63	1.951
1=*Strongly Disagree* to 5=*Strongly Agree*		
Independent Variables:		
Q73 A traditional meat department manager and / or meat cutter could be trained to manage all perishables not just meats.	3.60	1.569
1=*Strongly Disagree* to 5=*Strongly Agree*		
Q76 Cost of workers compensation for employees that cut meat is becoming cost prohibitive.	2.92	1.552
1=*Strongly Disagree* to 5=*Strongly Agree*		
Q41 Workmanship as a source of shrink		
1=*Big Concern* to 5=*Not a Concern*	2.99	1.160
Q2 Store Type (Dummy Variable)	.43	.497

For N=193 Observations

4.3.6 Regression Results: Workmanship

Reviewing Table 28 below reveals the overall statistical significance of this model is acceptable and checking the ANOVA results the F-stat is 22.856 and it was statistically significant below the .01 level (p-value=.000), where the hypothesis of the independent variables having zero explanatory power or no effect over the dependent variable is rejected. In fact, three out of four variables were significant, including the dummy variable for store type. All variables were significant at the 1 percent level, except the variable for about shrink associated with workmanship. While this variable is not within the desired less than 5 percent category for being significant, it is a respectable

6.8 percent. The R^2 (Coefficient of Determination) for this model is respectable at 32.8 percent and adjusted R^2 is 31.4 percent.

The results of this regression are positive for developing a better understanding of the factors associated with workmanship. All of the signs for the independent variables associated with workmanship make sense from a manager's perspective and are consistent with the literature review.

Finally, given the research propositions for workmanship, this model shows variables of interest that are significant towards explaining the dependent variable along with a respectable R^2 makes an encouraging interpretation of this model.

Table 28: Workmanship Regression Results

Variable	Estimated Coefficient	Standard Error	t-Statistic	P-Value	Expected Sign
Intercept	.229	..461	.497	.621	
Independent Variables					
Q73 Meat cutters manage perishables	.336	.078	4.309	.000	Positive
Q76 Cost of workers. Comp.	.384	.079	4.846	.000	Positive
Q41 Workmanship	-.208	.113	-1.834	.068	Negative
Q2 Store type (Dummy Variable)	.404	.264	6.006	.000	Positive

F=22.856 (p-value=.000) R^2=.328 Adjusted R^2=.314

4.3.7 Multiple Regression Model: Shrink Operational Issues

Table 29: Summary of Data: Shrink Multiple Regression

Variable Description	Mean	Standard Deviation
Dependent Variable:		
Q49 How satisfied are you with the way your store records (accounts for) every fresh meat package not sold at full retail? 1=*Not at all* to 5=*Very satisfied*	3.64	1.114
Independent Variables:		
Q7 How satisfied are you with the way your store verifies that fresh meat deliveries from the Distribution Center (DC) are within acceptable temperature ranges? 1=*Not at all* to 5=*Very satisfied*	3.79	.925
Q8 How satisfied are you with the way your store transfers fresh meat products from the receiving area to the walk-in coolers? 1=*Not at all* to 5=*Very satisfied*	4.42	.711
Q9 How satisfied are you with the way your store writes the delivery date on each fresh meat box received from the Distribution Center? 1=*Not at all* to 5=*Very satisfied*	4.13	1.055
Q50 How satisfied are you with the way your store stocks fresh meat cases to ensure that First-In-First-Out (FIFO) methods are followed? 1=*Not at all* to 5=*Very satisfied*	4.26	.774
Q53 How satisfied are you with the way your store maintains adequate fresh meat case levels of fresh beef? 1=*Not at all* to 5=*Very satisfied*	3.92	.856
Q39 Customer theft (source of shrink)	2.30	1.205
Q40 Defective and damaged packaging (source of shrink)	2.95	1.115
Q41 Workmanship (source of shrink)	2.99	1.157
Q42 Incorrect inventory issues (source of shrink)	3.39	1.113
Q43 Non-bloom issues associated with case-ready-ground beef (source of shrink)	2.46	1.479
Q44 Non-bloom issues associated with case-ready beef cuts (source of shrink)	2.26	1.456
Q45 Employee theft (source of shrink)	3.17	1.144
Q46 Out of date product (source of shrink)	2.99	1.170
Q2 Store Type (Dummy Variable)	.44	.497

For N=193 Observations

4.3.8 Independent Variables in the Shrink Regression Model

There are several explanatory variables for this regression model shown in Table 29. These independent variables fall within three distinct categories of shrink. The first relates to product's arrival at the shipping dock (questions 7-8-9). This category is about discerning proper procedures for the meat: either case-ready or boxed beef moving from the receiving dock to the walk-in storage coolers. The second category concerns several

of fresh meat's inventory issues (questions 50 and 53); and the last is about specific sources of shrink (questions 39-46).

4.3.9 Regression Results for Shrink

Table 30 shows the regression results for the shrink model, including the variables of interest, standardized coefficients, standard errors, t-statistics and P-value.

The overall statistical significance of this model is acceptable. Within the ANOVA results the F-stat is 3.756 and it was statistically significant which is well below the .01 level (p-value=.000), where the hypothesis of the independent variables having zero explanatory power or no effect over the dependent variable is rejected. Only one of the explanatory variables was significant below the 5 percent value. This was the variable relates to inventory arriving to a store and the concept of First-in-First-Out (FIFO). One other variable concerning satisfaction about keeping inventory levels of the retail meat cases at satisfactory levels. This variable had a significance level of 5.4 percent, barely above the 5 percent acceptable range. The R^2 (Coefficient of Determination) for this model was only 22.8 percent and adjusted R^2 was 16.7 percent.

The results of this regression were disappointing given what was suggested by the literature and the involvement of stores and DC from four states were involved in the development of these independent variables. There is some consolation in knowing that the two significant variables were identified as being critical towards proactively minimizing shrink and is a critical factor in maximizing the shelf life of fresh meat, either in-store processed or case-ready. Inventory management of all fresh meat products begins with the theory of FIFO. The second independent variable that related to

maximizing store sales and minimizing shrink by keeping the meat cases adequately stocked at all times.

Table 30: Regression Results: Shrink

Variable	Estimated Coefficient	Standard Error	t-Statistic	P-Value	Expected Sign
Intercept	.196	.632	.310	.757	
Independent Variables					
Q7 Verifies delivery date	.064	.092	.698	.486	Negative
Q8 Transfers meat into coolers	-.027	.123	-.216	.829	Positive
Q9 Writes delivery dates	.097	.082	1.183	.238	Positive
Q50 Satisfied with FIFO	.458	.115	3.989	.000	Positive
Q53 Satisfied meat case levels	.195	.100	1.940	.054	Positive
Q39 Customer theft (source of shrink)	.094	.074	1.277	.203	Positive
Q40 Defective and damaged packaging (source of shrink)	-.056	.082	-.685	.494	Positive
Q41 Workmanship (source of shrink)	-.024	.088	.274	.785	Negative
Q42 Incorrect inventory (source of shrink)	.018	.086	.212	.832	Positive
Q43 Non-bloom grd beef (source of shrink)	.054	.083	.644	.521	Positive
Q44 Non-bloom beef cuts (source of shrink)	.001	.083	.010	.992	Negative
Q45 Employee theft (source of shrink)	-.031	.084	-.373	.710	Positive
Q46 Out of date product (source of shrink)	.070	.080	.873	.384	Positive
Q2 Store type (Dummy Variable)	-.083	.194	-.955	.341	Positive

F=3.756 (p-value=.000) R^2=.228 Adjusted R^2=.167

4.3.10 Multiple Regression Model: Packaging Operational Issues

The dependent variable for packaging operational issues for this regression is found in Table 31 which is based upon a literature review of the case-ready packaging alternative. Store managers and industry executives were mixed in their assessment of the packaging options of case-ready meats. They stated that their opinions were based upon years of producing and marketing in-store meats. The packaging dependent variable encapsulates the research propositions related to "case-ready meat attractiveness."

Table 31: Summary of Data: Packaging Regression

Variable Description	Mean	Standard Deviation
Dependent Variable:		
Q70 Case-ready beef products are packaged in attractive trays. 1=*Strongly Disagree* to 5=*Strongly Agree*	3.40	1.148
Independent Variables:		
Q63 High-oxygen/high head space packaging of case-ready ground beef is not a detriment to sales. 1=*Strongly Disagree* to 5=*Strongly Agree*	2.76	1.285
Q65 High-oxygen/high head space packaging of case-ready beef cuts is not a detriment to sales. 1=*Strongly Disagree* to 5=*Strongly Agree*	2.69	1.289
Q68 Case-ready meat products that require blooming cause operational problems. 1=*Strongly Disagree* to 5=*Strongly Agree*	2.51	1.215
Q69 My customers know the difference between case-ready packaging and in-store packaging. 1=Strongly Disagree to 5=Strongly Agree	3.20	1.309
Q2 Store Type (Dummy Variable)	.43	.497

For N=193 Observations

4.3.11 Independent Variables in the Packaging Regression Model

The explanatory variables are shown in Table 32. From interviewing store managers and DC management, these independent variables were identified as relating to the research propositions for packaging. These four questions (variables) were repeated throughout visits to stores and DC when discussing case-ready meat packaging.

The first two questions were drafted in response to the packaging research proposition about store managers and DC believing case-ready meat packaging using high oxygen/ high head space is detriment to fresh meat sales. These variables related to meat processors who at the time required this extra head space to successfully "modify" the packaging atmosphere to obtain the additional days of shelf life. From their perspective, this type of packaging alternative was too different from the packaging of in-store meats and would encounter customer resistance. Offsetting these negatives is the benefit of the extra headspace to protect the meat from being unnecessarily bruised in shipping, while being stocked in meat cases and handled by consumers. If the meat was

bruised in any way, degradation would begin and the extra shelf life would not be beneficial.

The blooming variable was in response to store managers and DC management experiencing certain case-ready meat products needing time to bloom before the package was ready to be displayed. These times were non-negotiable for certain products, especially the beef products. The blooming phase was required to bring the product from a dormant stage where the product was a purple color (resulting from a complete lack of oxygen) to a bright cherry red color (in the presence of oxygen). Many retailers shared negative experiences of not "blooming" the case-ready beef products in time to keep empty meat cases fully stocked.

Retailers and processors alike value customers' opinions of packaging. Store managers who are in contact with customers on daily basis realize those customers are able to identify where meat is packaged by the type of packaging displayed.

The third explanatory variable relates to the third research proposition concerning consumers' demand for safer meat products. From a marketing perspective retailers on case-ready programs would like to market the attributes of the product being processed under the "safest" possible protocols and conditions in order to maximize sales. From the fairly high mean score for this question it looks like store managers agree with the proposition within the question.

Table 32: Packaging Regression Results

Variable	Estimated Coefficient	Std Error	t-Statistic	P-Value	Expected Sign
Intercept	2.882	.289	9.984	.000	Positive
Q63 High oxy grd beef	.181	.115	1.576	.117	Negative
Q65 High oxy beef cuts	-.093	.119	-.784	.434	Negative
Q68 Blooming problems	.092	.071	1.298	.196	Positive
Q69 Cust. know pkg	.091	.068	1.350	.179	Positive
Q2 Store type (Dummy Variable)	-.603	.184	-3.274	.001	Positive

F=5.039 (p-value=.000) R^2=.119 Adjusted R^2=.096

4.3.12 Regression Results for Packaging

Table 32 above shows the regression results for the packaging model. The overall statistical significance of this model is not acceptable. Within the ANOVA results the F-stat is 5.039 and it was statistically significant below the .01 level (p-value=.000), where the hypothesis of the independent variables having zero explanatory power or no effect over the dependent variable is rejected. The problem with this model is that all of the explanatory variables are not significant at the 5 percent level. The R^2 (Coefficient of Determination) for this model was a very low 11.9 percent and the adjusted R^2 is even lower at 9.6 percent. Overall, there are inconclusive results regarding packaging options.

4.3.13 Multiple Regression Model: Handling Operational Issues

The dependent variable for this regression is found in Table 33 and it is designed as a proxy for all four research propositions, where the term handling is defined as the human interaction/treatment of meat products.

Meat department personnel and grocery store management are in full agreement that amply stocked meat display cases throughout the day is the main goal. A daily challenge for stores that process meat in stores is keeping the cases full. Because of the multi-step processes it takes to achieve this goal, one of the biggest draws to case-ready meats is the ability of any store personnel to keep the cases full, 24/7. In stores where

they process meat, if a particular item is sold out and the butcher/meat cutter has left the department, slots in the meat cases will remain empty until the next day, with consequent lost sales. Moreover, many customers do not have substitutes for particular cuts and grinds of fresh beef and may elect to shop elsewhere.

4.3.14 Independent Variables in the Handling Regression Model

The explanatory variables for the handling regression model are shown in Table 33. The first three variables are concerned with handling the product after it is delivered to the store. These questions are particularly pertinent to stores that sell case-ready beef where temperature tolerances are much stricter than for boxed beef. The next three variables are concerned with standard operating procedures for handling fresh meat to ensure correct inventory practices are followed. These handling procedures are necessary to maximize shelf life and manage shrink. The last two variables are related to maximizing fresh meat sales during the first of the month.

Table 33: Summary of Data: Handling Operational Issues

Variable Description	Mean	Standard Deviation
Dependent Variable:		
Q53 How satisfied are you with the way your store maintains adequate fresh meat case levels. 1=*Not at all* to 5=*Very satisfied*	3.92	.856
Independent Variables:		
Q7 How satisfied are you with the way your store verifies that fresh meat deliveries from the Distribution Center (DC) are within acceptable temperature ranges? 1=*Not at all* to 5=*Very satisfied*	3.79	.925
Q8 How satisfied are you with the way your store transfers fresh meat products from the receiving area to the walk-in coolers? 1=*Not at all* to 5=*Very satisfied*	4.42	.711
Q9 How satisfied are you with the way your store writes the delivery date on each fresh meat box received from the Distribution Center? 1=*Not at all* to 5=*Very satisfied*	4.13	1.055
Q50 How satisfied are you with the way your store stocks fresh meat cases to ensure that First-In-First-Out (FIFO) methods are followed? 1=*Not at all* to 5=*Very satisfied*	4.26	.774
Q51How satisfied are you with the way your store maintains adequate inventory levels of fresh beef products stored in walk-in coolers 1=*Not at all* to 5=*Very satisfied*	4.06	.795
Q52 How satisfied are you with the way your store manages fresh beef inventory to ensure the oldest product in the walk-in cooler is stacked in a way it is the next product to be picked for restocking. 1=*Not at all* to 5=*Very satisfied*	4.17	.905
Q54 How satisfied are you with the way your store prepares for the increased sales experienced during the first days of each month. 1=*Not at all* to 5=*Very satisfied*	4.09	.846
Q55 How satisfied are you with the way your store prepares for increased sales experienced with special meat promotions. 1=*Not at all* to 5=*Very satisfied*	3.62	1.306
Q2 Store Type (Dummy Variable)	.44	.497

For N=193 Observations

4.3.15 Regression Results for Handling

Table 34 shows the regression results for the handling model.

Table 34: Handling Regression Results

Variable	Estimated Coefficient	Standard Error	t-Statistic	P-Value	Expected Sign
Intercept	.484	.364	1.331	.185	
Q7 Verifies temp	.019	.056	.333	.740	Negative
Q8 Transfers meat to walk-in	.042	.074	.551	.575	Positive
Q9 Writes date	-.013	.050	-.256	.798	Positive
Q50 Satisfied FIFO	-.065	.082	-.796	.427	Positive
Q51 Satisfied inventory levels	.123	.084	1.464	.145	Positive
Q52 Stock walk-in cooler	.335	.069	4.843	.000	Positive
Q54 Store prepare FOM	.335	.075	4.476	.000	Positive
Q55 Satisfied prep for sales	.055	.040	1.383	.168	Positive
Q2 Store type (Dummy Variable)	.057	.103	.949	.344	Positive

F=19.300 (p-value=.000) R^2=.487 Adjusted R^2=.462

The overall statistical significance of this model is acceptable. Within the ANOVA results the F-stat is 19.300 and it was statistically significant below the .01 level (p-value=.000), where the hypothesis of the independent variables having zero explanatory power or no effect over the dependent variable is rejected. However, only two variables in the handling regression were significant. These are the variables about satisfaction of handling fresh meat products to ensure the walk-in storage room is organized for employees to pull the oldest product first and the last variable that relates to how well stores prepare for increased sales at the first of the month.

The R^2 (Coefficient of Determination) for this model was 48.7 percent and the adjusted R^2 was 46.2 percent. The results of this regression are positive for developing a better understanding of two key factors related to handling of fresh meats and the satisfaction stores have towards maintaining adequate fresh meat case levels.

4.3.16 Multiple Regression Model: All Operational Issues

The final regression model was developed from a combination of research propositions. The dependent variable for this model tests the hypothesis that case-ready beef products compared to "in-store" produced meat products are more cost effective (see

Table 35). The independent variables of interest and their respective research propositions are listed below.

Table 35: Summary of Data: All Operational Issues Regression

Variable Description	Mean	Standard Deviation
Dependent Variable:		
Q75 Case-ready beef products compared to "in-store" produced meat products are more cost effective.	2.96	1.471
1=*Strongly Disagree* to 5=*Strongly Agree*		
Independent Variables:		
Q22 Case-ready ground beef products are available in the pack sizes my customers prefer.	3.38	1.395
1=*Strongly Disagree* to 5=*Strongly Agree*		
Research Proposition: Case-Ready Issues		
Q42 Incorrect inventory issues are a source shrink.		
1=*Big Concern* to 5=*Not a Concern*	3.39	1.113
Research Proposition: Shrink Issues		
Q53 How satisfied are you with the way your store maintains adequate fresh meat case levels of fresh beef product?	3.92	.856
1=*Not at all* to 5=*Very satisfied*		
Research Proposition: Handling Issues		
Q60 Case-ready beef products are safer than beef products processed in-stores.		
1=*Strongly Disagree* to 5=*Strongly Agree*	3.76	1.285
Research Proposition: Food Safety Issues		
Q70 Case-ready beef products are packaged in attractive trays.		
1=*Strongly Disagree* to 5=*Strongly Agree*	3.39	1.146
Research Proposition: Packaging Issues		
Q76 Cost of workers compensation for employees that cut meat is becoming prohibitive	2.91	1.554
1=*Strongly Disagree* to 5=*Strongly Agree*		
Research Proposition: Workmanship Issues		
Q2 Store Type (Dummy Variable)	.44	.497

For N=193 Observations

4.3.17 Regression Results for All Operational Issues

The overall statistical significance of this model is within the acceptable range. The ANOVA results the F-stat is 14.953 and it was statistically significant below the .01 level (p-value=.000), where the hypothesis of the independent variables having zero explanatory power or no effect over the dependent variable is rejected. Indeed, all of the variables of interest were significant except the dummy variable for store type.

The R^2 (Coefficient of Determination) for this model was 36.1% and the adjusted R^2 was 33.7 percent, where the independent variables and one dummy variable explained 36.1 percent of the variability of case-ready meats being more cost effective.

The results for this regression are positive for developing a better understanding of the operational factors that help explain case-ready meats being a cost effective alternative for marketing fresh beef products. The signs for all of the independent variables are what were predicted. Initially the sign for the shrink variable (Q42) was determined to be positive. If incorrect inventory issues for fresh meat increase (this would be negative) then case-ready programs would be considered more cost effective.

Table 36: All Operational Issues Regression Results

Variable	Estimated Coefficient	Standard Error	t-Statistic	P-Value	Expected Sign
Intercept	-.252	.596	-.423	.673	
Q22 Grd beef pack sizes	.190	.073	2.591	.010	Positive
Q42Shrink inventory issues	-.215	.081	-2.653	.009	Negative
Q53 Satisfied with meat case levels	.314	.109	2.886	.004	Positive
Q60 C-r products safest	.214	.083	2.582	.011	Positive
Q70 C-r meats attractive trays	.222	.085	2.612	.010	Positive
Q76 Cost of workers. comp.	.213	.060	3.525	.001	Positive
Q2 Store type (Dummy Variable)	-.087	.209	-1.239	.217	Positive

F=14.953 (p-value=.000) R^2=.361 Adjusted R^2 =.337

The next section will discuss the results from the econometric analysis of the data set.

4.4 Econometric Analysis of Case-Ready Meat Data Set

A further analysis of the case-ready data set is warranted given the flexibility of the research design. Logistic regression is an econometric technique that is e useful in illuminating the decisions retail grocery store managers face about expanding the adoption of case-ready meats. It is particularly useful in further explaining the presence or absence of unique characteristics in a binary dependent variable for a set of

explanatory variables. The binary dependent variables in this research project are designed to capture the richness and inherent power of the explanatory independent variables as they relate to the adoption of fresh case-ready meat programs. Explanatory independent variables in logistic regression have specific data requirements; the data must be either interval or categorical. A central theme for the survey questions in this project were designed around acquiring responses based upon a five point Likert scale where data points are considered interval data.

The nature of binary dependent variables causes statistical and methodological difficulties and opportunities. In particular, predicted probabilities from a standard Ordinary Least Squares (OLS) regression may exceed either the lower limits which is (0) or the upper limits (1). Given the desire of the project to employ binary dependent variables along with Likert scale explanatory/independent variables, the literature suggests using two alternatives, logistic and probit regression analysis (Maddala, 1992; Kennedy, 1993; Kmenta, 1986 and Gujarati, 1995).

Maddala (1992) suggests research projects possessing these types of binary dependent variables are closely associated with using linear and non-linear probability models where the dependent variable is binary and the variable takes the usual value of 1 or 0 with the option of including many explanatory independent variables. Both logistic and probit regression analysis techniques are plausible choices. The literature (Maddala, 1992; Kmenta, 1986; and Gujarati, 1995) suggests using either technique where the data analysis is concerned with dependent variables that offer two distinct alternatives (binary dependent variables).

Kennedy (1993); Kmenta (1986) and Gujarati (1995) offer insights into choosing between logistic regression and probit regression. The probability difficulties of binary dependent variables are overcome in both the logistic and probit functions "S" shaped distribution curve. The "S" shaped curves, while somewhat linear in the middle; they are curved at both ends. The logistic regression model produces fairly similar regression lines to the probit model; with the logistic regression having "fatter" tails in the logistical distribution. It should be noted the differences in these curves is negligible. The fatter tails in the logistic regression model are particularly useful when the data is clustered in the tails and the probit distribution curves "approach the axes more quickly". The probit regression tail is "skinnier" and is considered more appropriate for outliers in the data and looking for differences (Kmenta, 1986). More importantly to this research project when logistic regression is compared to probit regression, is that the area in the tails in the logistic regression may yield larger probability estimates, not as close to 0 when the Z is small; and possibly smaller probability estimates as the Z gets larger.

Another reason for choosing logistic regression is the ability to underscore the relationships and strengths amongst the explanatory independent variables of interest with the binary dependent variables. Kennedy (1993) discusses specific use of logistic regression is for analyzing the classic "make or buy" decisions facing many business leaders, similar to this project. Hoetker (2007) further cites the "appropriate" use of logistic regression when a firm is deciding on making or buying a component (outsourcing). The project is similar to Kennedy and Hoetker's make or buy research where the retail stores surveyed either sold case-ready meat products (buy) or otherwise (make). Given a review of the relevant literature this research project will use the logistic

regression technique. The next sections will cover the logistic regression analysis of the data set.

4.4.1 Logistic Regression

Bliss (1935) is credited with first popularizing the applied use of the probit regression in the mid-1930s in the field of biology to research the dosage/response relationships of biological organisms. He was interested in knowing how much insecticide (dosage) needed to be applied in order to kill the predation. The eradication of the predation would be coded (1) or if the predation lived the value would be (0) (Lai and Chan, 2004).

Following Bliss's successful introduction of probit analysis researchers in the social sciences also adopted the technique (Aldrich and Nelson, 1984). In 1944 Joseph Berkson developed logistic regression, the ancillary technique for Bliss's probit regression. Overtime the use of both techniques has flourished. According to Hoetker (2007), the use of probit and logistic regression models in the strategic management journals alone has grown exponentially from early 1980's at which time the techniques represented only 10 percent of all published articles.

The decision to use a logistic regression is further based upon the ability of the technique to explore the behavioral choice or an event classification, such as adoption of case-ready meat programs. A better understanding of the binary choice to adopt case-ready meats is a central goal of this research project. It is generally accepted a priori, researchers do not know the underlying relationships between variables and possible complexity. Therefore, a better understanding is attainable by using this technique.

Agri-food marketing decisions about brand choices and product selections or non-selections are considered examples of behavioral choice events.

The logistic regression model differs significantly from the OLS regression, and offers a powerful tool for analyzing binary dependent variables with explanatory independent variables derived from interval data.

Kennedy (1993) outlines the classic make or buy logistic regression model below, where the observable binary dependent variable specifies that the probability a store sells (buys) case-ready meats is:

$$\text{prob (buy)} = \frac{e^{X\beta}}{1 + e^{X\beta}}$$

This in turn implies that the probability of not buying (make) is

$$\text{prob (make)} = 1 - \text{prob (buy)} = \frac{1}{1 + e^{X\beta}}$$

The likelihood function is formed as

$$L = \prod_i \frac{e^{x_i\beta}}{1 + e^{x_i\beta}} \prod_j \frac{1}{1 + e^{x_i\beta}}$$

Where *i* refer to stores who buy fresh case-ready beef and *j* refers to those make (process fresh beef in stores).

Kennedy (1993) further explains that maximizing this likelihood with respect to β produces the maximum likelihood (MLE) of β. Where the MLE is not the most "probable" value of β, but the value of β that maximizes the probability of drawing the sample actually obtained from the data set. For the *n*th individual, then, the probability of buying fresh case-ready meats is estimated as

$$\frac{e^{x_n\beta^{\mathrm{MLE}}}}{1+e^{x_n\beta^{\mathrm{MLE}}}}$$

For the expression given above, the logit model implies that

$$\frac{\text{prob(buy)}}{\text{prob(make)}} = e^{x\beta}$$

so that log likelihood (LL) is

$$\mathrm{LL}\left[\frac{\text{prob(buy)}}{\text{prob(make)}}\right] = x\beta$$

4.4.2 Logistic Regression Coefficients

There are two distinct logistic regression models that will be developed. The two models attempt to predict or further explain the presence or absence of case-ready meat adoption based upon the explanatory independent variables (predictors) found within the survey questionnaire instrument. The presence or absence of any relationship between the binary dependent variable and the explanatory variables is based upon the statistical significance of the Homer-Lemeshow chi square test statistic for the entire model. The analysis will also determine the coefficient's significance levels and in which direction they move. Berry (2007) stipulates social scientists in the past have used binary dependent variables with logistic and probit regression research and those efforts were restricted to interpreting the "sign and significance of the maximum likelihood estimates for the coefficients." Plausible presence of interaction can be inferred by significance levels and the sign between the binary dependent variable and the explanatory variables.

This research follows the same path for inference amongst the variables of interest. It should be noted, if the coefficients are not significant we reject the hypothesis of interaction of the independent variable with the dependent variable.

4.4.3 Evaluating the Performance of Logistic Regression Models

There are five recognized statistics that evaluate the performance of the binary logistic regression model: 1) the model chi square, 2) Wald statistic, 3) Hosmer-Lemeshow model chi square, 4) percent correct predictions (classification table) and 5) two pseudo R^2 statistics (Cox & Snell and Nagelkerke).

The first statistic produced in logistic regression using SPSS is Omnibus Tests of Model Coefficients which is a chi square statistical test concerned with how well the overall model performs (Garson, 2008). In particular this chi square test reveals the interrelationship between the dependent and the explanatory variables, first a chi square is performed from the perspective of an intercept only model (titled Block O) and the final omnibus chi square test is performed on a second model that incorporates all of the explanatory independent variables (Block 1). These separate tests are designed to confirm the existence or presence of relationships between variables. As a check of the significant levels of the variables a chi square test statistic will reveal any effects the explanatory variables have on the binary dependent variable. A significant chi square test statistic implies there is an "adequate fit of the data to the logistic regression model" (Garson, 2008). The null hypothesis for this chi square implies that when the *p*-value is significant the test denotes the model is considered statistically significant, and the data fits the model.

The second statistical test is the Wald test statistic which is designed to test the significance level of the model coefficients. To determine the individual importance of each explanatory variable a Wald chi square test is conducted. This statistic is gathered by taking the ratio of the logistic coefficient β to the variable's standard error, then squaring the product, yielding the Wald chi square statistic.

$$\text{Wald Test Statistic} = \left(\frac{\beta \text{ coefficient}}{\text{SE coefficient}}\right)^2$$

The Wald statistic and its uses are similar to how a t-value in an OLS regression is used and interpreted. The statistic shows if the coefficient is meaningfully different from zero: If so, it can be concluded the explanatory variable is making a significant contribution to the binary dependent variable. As the above equation notes, SEs are an important part of the statistic and it is suggested by Menard (2002) that large SEs will produce non significant coefficients. The Wald is also instrumental in ascertaining the signs for each explanatory/independent variable coefficient.

The third statistic is the Hosmer-Lemeshow (2000) test which is considered a form of a goodness of fit test designed just for logistic regression. It tests the assumption that the data was generated by the model and is considered a more robust test than a traditional chi square (Garson, 2008). The Hosmer-Lemeshow (H-L) test is computed from a chi-square using the observed and expected frequencies to test the "fit" of the logistic regression model. It should be noted that a "well-fitting" logistic regression model should show non-significance in the H-L *p*-value. The non-significant *p*-value illustrates the model's prediction is not significantly different from the observed values and, therefore, the model's coefficient's estimates fit the data at an acceptable level. If the *p*-value is <.05 we reject the null hypothesis that there is no difference between the

observed and model predicted proportions. This logistic regression chi square test statistic if significant does not imply the degree of variance explained of the dependent variable, only significance (Garson, 2008 and Menard, 2002).

The fourth statistic is the percent correct predictions. This statistic can be found within the Classification Table, and is deemed the "practical" results from running the logistic regression model. The percent correct predictions originate from a simple two by two matrix which aggregates the correct and incorrect estimates based upon both the explanatory and the constant. The matrix assigns the binary probabilities of 0s or 1s for each cell and compares those to the actual; and the matrix yields the percent correct tables along with an overall calculated score. The statistics within the classification table postulates the estimated p is greater than or equal to .50 when a store sells (in this project buys the product from a processor) and not occur otherwise (make case-ready beef products). Logistic regression makes an assumption about that the two rows in the matrix having a different percent correct, if they were the same the model has homogeneity (Garson, 2008). According to Menard (2002) complete homogeneity in the classification table is an "unacceptable" solution, and heterogeneity in the percent correct predictions is the acceptable norm. According to the results found within the classification table a good model that offers predictive success will have a higher percent correct when the explanatory/independent variables are included (Menard, 2002 and Garson, 2008).

The final test statistics for judging or assessing model performance are the pseudo R^2 test statistics. Hoetker (2007) and Garson (2008) both suggest predicting whether a logistic regression model has "goodness of fit" is problematic and is decidedly different than in OLS regression analysis. In OLS, R^2 is the classic test of how well the model fits

the data, or goodness of fit. In logistic regression, Hoetker (2007) and Menard (2002) both cite numerous researchers incorrectly reporting "pseudo-" statistics as a predictor of how well their logistic regression model performed. The downside to relying on the pseudo R^2 is the test statistic must report which pseudo R^2 they are reporting, and without that specific information the interpretation and reliance on the models fit is precarious. Most importantly the pseudo R^2 does not correspond to the percent of variance in the model that is explained and does not have any interpretable meaning (Hoetker, 2007). SPSS reports two pseudo R^2 statistics, Cox and Snell and Nagelkerke.

Garson (2008) explains the Cox and Snell R^2 for logistic regression was developed to replicate the traditional R^2 for OSL. To try and replicate the traditional R^2 Cox and Snell based their "pseudo R^2" on the log likelihood function of the final model as compared to the log likelihood of the baseline model[17]. Noting the maximum value is less than 1, this presented problems with interpretations and it created an opportunity for the development of another R^2 statistic.

$$\text{Cox \& } \textit{Snell} \text{ Pseudo } R^2 = 1 - \left[\frac{-2LL_{null}}{-2LL_k}\right]^{2/n}$$

Veall (1996) states that the pseudo R^2 measures cannot be used to measure a model's goodness of fit when the dependent variables are binary in value. Amemiya (1981) offers a contrarian view to the use pseudo R^2 for goodness of fit where he cites using the R^2 in the probit situation will approximate the model's goodness of fit and Dhrymes (1986) suggest using the pseudo R^2 by incorporating the F statistic for testing the explanatory power of the coefficients.

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[17] Notation for all Pseudo R^2 models: LL= Log Likelihood, null = model with predictors, k = model without predictors, just the intercept.

Nagelkerke centered his analysis on the weakness of the R^2 of Cox & Snell which could not reach 1.0. He made the necessary updates and modifications to ensure the R^2 could range from 0-1.0. According to Garson (2008) Nagelkerke's R^2 "divides Cox and Snell's R^2 by its maximum in order to achieve a measure that ranges from 0-1.0. Therefore Nagelkerke's R^2 will normally be higher than the Cox and Snell measure but will tend to run lower than the corresponding OLS R^2. The Nagelkerke R^2 is considered the most reported "pseudo" R^2."

$$\text{Nagelkerke Pseudo } R^2 = \frac{1 - \left[\frac{-2LL_{null}}{-2LL_k}\right]^{2/n}}{1 - (2LL_{null})^{2/n}}$$

Menard (2002) and Veall (1996) cite another example of a logistic regression pseudo R^2 test statistic, the McFadden Pseudo R^2. The McFadden R^2 is also known as the likelihood ratio index because the ratio must fall between 0 and 1. The resulting R^2 are typically smaller in magnitude than the previous three pseudo R^2 and these lower R^2 ratios typically demonstrate the model that includes the predictors is a better fit than the model with just the intercept. While the McFadden pseudo R^2 results tend to be smaller as compared to other pseudo R^2 results. McFadden R^2 values that range between .20 percet and .40 percent are considered very acceptable. Below is McFadden's pseudo R^2.

$$\text{McFadden's Pseudo } R^2 = 1 - \frac{LL_{null}}{LL_k}$$

Given the conflicting statistical assessment for determining the goodness of fit for logistic regression models, Hoetker (2007) offers researchers some intuitive advice on reporting how well the logit model fits the data set. His suggestion is to provide the reader the exact proportion of correct predictions the model made along with each of the Pseudo R^2 figures reported in the SPSS Logistic Regression output. While this method is

not unanimous, it is one method of showing the model's goodness of fit. This project will only report the Cox & Snell and the Nagelkerke pseudo R^2 test statistics.

4.4.4 Binary Logistic Regression Relative to Case-Ready Meat Adoption

Of primary interest for the binary logistic regression analysis will be why fresh case-ready programs have been slower in their adoption rates. This analysis was designed to help identify the qualitative traits or explanatory variables that may affect a retail grocer's propensity to adopt the fresh case-ready meat alternatives. There are two primary proteins that make up case-ready meat products; ground beef and whole muscle cuts[18]. Two binary logistic regression models were designed with these two primary product categories in mind. The two binary logistic regression models will now be referred to as Model 1 and Model 2. Model 1 will focus on adoption of case-ready ground beef and Model 2 on whole muscle meat products. Both models will examine hypotheses about the qualitative traits or characteristics that impact adoption rates.

4.4.5 Binary Logistic Regression Base Model 1: Ground Beef

The binary dependent variable in Model 1 centers on the propensity of the two retail store types to choose to adopt case-ready ground beef products. Ground beef is one of the larger selling categories purchased in grocery stores today (Major, 2008) and thus a very important product in a retailer's fresh meat product mix. Ground beef is a category of products that consumers remember the price per pound for when shopping for their weekly products. It should be noted that the average household shops at three to four stores every week for their entire list of grocery products, including health and beauty

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[18] Whole muscle cuts include all of the various roasts and steak products.

items. Many retailers including SAL use the price of hamburger as a loss leader to attract consumers to purchase their entire array of grocery products. The binary dependent variable in Model 1 represents a discrete choice of adopting case-ready ground beef products from a set of mutually exclusive choices. The differentiation between store types was deemed important to this project. Because of the initial importance of knowing whether the respondents sold these types of case-ready meats and the variable being binary, no changes in the coding of the dependent variables was required. The binary dependent variable for the Model 1 was constructed from *crbeef- adopted case-ready ground beef 1=Yes and otherwise=0.* Of the 193 stores in the survey, 143 have adopted the fresh case-ready ground beef alternative, 50 stores have chosen otherwise.

As mentioned earlier, an important ingredient of logistic regression is the technique's rigid data requirements. The data for the dependent variable must be binary and the data for all explanatory variables is limited to either interval data (Likert scale) or categorical data. The binary dependent and explanatory variables for both models conform to these requirements.

Model 1 started with a base model that incorporated the explanatory variables or predictors in the data set that relate to further adoption of case-ready ground beef. These variables were based upon the retail store and DC visits, interviews with industry/store executives and literature review. The base Model 1 has for the dependent variable: adopted case-ready ground beef = f (verifies temp ranges of delivered meat, writes delivery dates on boxes, c-r has the lean/ratios stores require, customer theft source of shrink, defective packaging source of shrink, workmanship issues source of shrink, non-bloom issues of ground beef source of shrink, satisfaction level of the accounting of meat

not sold at full retail, satisfaction of FIFO of meat in walk-ins, satisfaction meats are stacked in walk-in, satisfaction store keeps meat case inventories, satisfaction store preps for first of the month sales, satisfaction store preps for specials, more sales if meat products were thought to be safer, c-r meats are safer than in-store processed meats, blooming of c-r meats is a problem, c-r products use attractive trays, difficult to find qualified meat cutters, meat cutters could be trained to manage the perishables category, meat managers could forecast demand and manage versus cut meat, and c-r products are most cost effective than in-store processed meats)[19]

4.4.6 Binary Logistic Regressions Model 1: First Run Results

Running a binary logistic regression on the base model revealed that 15 of 22 explanatory variables in the model were statistically insignificant (see Table 37 below). While few variables were statistically significant, the base model had several promising results, including a significant Omnibus Test for the data fitting the model, seven significant coefficients (Wald chi square), and a significant Homer-Lemeshow (H-L) model chi square test. These results showed the underlying strength of the base model. Coupled with very good pseudo R^2 results, the Cox & Snell was 46 percent and the Nagelkerke was 68 percent.

[19] Logit 1 base model explanatory variables as listed in the questionnaire: q7, q9, q19, q39, q40, q41, q43, q46, q49, q50, q52, q53, q54, q55, q59, q60, q68, q70, q72, q73, q74, and q75.

Table 37: Logit 1 Model: Adopted Case-Ready Ground Beef

	All Stores		
Parameter	**Estimate**	**SE**	**Sig**
Verifies temps upon delivery (Q7)	-0.68	0.35	*
Delivery dates are written on each meat pkg (Q9)	0.89	0.32	***
C-R has grd beef lean/fat ratios cust. demand (Q19)	0.49	0.24	**
Shrink: Customer Theft (Q39)	-0.63	0.25	
Shrink: Defective pkg (Q40)	-0.42	0.32	
Shrink: Workmanship (Q41)	-0.33	0.32	
Shrink: Non-bloom (Q43) Ground Beef	0.10	0.20	
Shrink: Out of Date (Q46)	0.03	0.30	
Accounting for Pkg Not Sold at Full Retail (Q49)	0.30	0.29	
Satisfied with FIFO Procedures Walk-In (Q 50)	-0.28	0.70	
Satisfied storage of c-r meats in walk-in (Q52)	0.37	0.55	
Satisfied Meat Case Inventory Levels (Q53)	-0.31	051	
Satisfied Store Preps First-of-Month Sales (Q54)	-0.89	057	
Satisfied Store Preps for Meat Specials (Q55)	-0.36	0.31	
More Sales if Meat Products were Safer (Q59)	0.22	0.28	
C-R Meats Safer than In-Store Processed (Q60)	0.72	0.30	**
"Blooming" of C-R meats is a problem (Q68)	-0.74	0.30	**
C-R Meat Packages Use Attractive Trays (Q70)	0.85	0.33	**
Difficult to Find Qualified Meat Cutters (Q72)	-0.64	0.22	***
Meat Cutters Manage Perishables Category (Q73)	0.22	0.24	
With C-R Meat Mgrs. Forecast/Inventory (Q74)	-0.32	0.26	
C-R Products Are More Cost Effective (Q75)	0.22	0.30	
Intercept	2.95	3.23	
Omnibus Tests of Model Coefficients (Chi Square)	119.801	22df	***
Hosmer-Lemeshow Model Chi-Square[20]	12.33	8df	****
Pseudo R^2 for Base Model:			
Cox and Snell: 46% Nagelkerke: 68%			
Significant Codes:**p>.05 ***p<.01 **p<.05	*p<.10		
Number of Observations	193		

Given that many variables were not significant, a separate diagnostic test for multicollinearity was conducted which revealed many of the explanatory variables had multicollinearity problems.

A final statistical test is the "classification table" which was conducted for the first run of the base model (see Table 38). The test first includes only the intercept and

[20] NOTE: According to Menard (2002) a Hosmer-Lemeshow model chi-square statistic registering non-significant concludes the model adequately fits the data being analyzed.

another test is conducted that includes the explanatory variables. The second step of including the independent variables is performed to determine if the variables added explanatory power to the model (see Table 39). The classification table below is particularly useful; especially knowing that the logistic regression does not assume the relationships between the dependent and explanatory variables is linear. The technique for this statistic is testing for overall predictive success of the entire model, highlighting the percent correct and incorrect for a particular binary dependent variable model.

Table 39 shows the results of the classification table begin with the null model without explanatory variables, which did very well, at 74.5 percent. When the explanatory variables were added, the model added significantly to the predictive nature of the model. Menard (2002) suggests when the explanatory variables are added the overall percentage predicted should increase. As Table 38 and Table 39 suggest the overall accuracy of Model 1 for the first run indicates the model's ability to predict successfully is 91.1 percent, an excellent result, especially for a base model.

Table 38: Classification Table (ab) Model I First Run Without Explanatory Variables

			Adoption		
			Otherwise	Has Adopted C-R	Percentage Correct
Step 0	Adoption C-R Ground Beef	Otherwise	0	50	0%
		Has Adopted C-R	0	143	100.0%
	(a) Intercept only model. (b) The cut value is .50			Overall	74.5%

Table 39: Classification Table (a) Model I First Run With Explanatory Variables

		Adoption		
		Otherwise	Has Adopted C-R	Percentage Correct
Step 1	Otherwise	37	12	75.5%
	Has Adopted C-R	5	138	96.5%
(a) The cut value is .50			Overall	91.1%

4.4.7 Binary Logistic Regression Model 1: Second Run

At this stage of the binary logistic regression analysis Menard (2002) suggests eliminating variables and rerunning the model. Therefore, a second run for Model 1 was prepared by dropping seven variables with *p*-values greater than 35 percent which produced much better results and much cleaner multicollinearity diagnostics (see Table 40). The Omnibus Tests of Model Coefficients (Chi Square) and Homer-Lemeshow Model chi square test statistics were both significant. Of particular interest associated with this run were the nine significant explanatory variables revealed by the Wald chi square *p*-values and the continued consistent results of the pseudo R^2 figures. The pseudo R^2 results for this run includes a Cox & Snell R^2 was 46 percent and the Nagelkerke R^2 was 67 percent.

Table 40: Binary Logistic Regression Model 1 Second Run: Store Adopts Case-Ready Ground Beef

	All Stores		
Parameter	**Estimate**	**SE**	**Sig**
Verifies temps upon delivery (Q7)	-0.64	0.32	*
Delivery dates are written on each meat pkg (Q9)	0.86	0.32	***
C-R has grd beef lean/fat ratios cust. demand (Q19)	0.44	0.22	**
Shrink: Defective pkg (Q40)	-0.42	0.27	
Shrink: Workmanship (Q41)	-0.37	0.30	
Accounting for Pkg Not Sold at Full Retail (Q49)	0.53	0.25	**
Satisfied with FIFO Procedures Walk-In (Q 50)	-0.22	0.49	
Satisfied Store Preps First-of-Month Sales (Q54)	-1.086	0.54	**
Satisfied Store Preps for Meat Specials (Q55)	-0.43	0.32	
More Sales if Meat Products were Safer (Q59)	0.24	0.26	
C-R Meats Safer than In-Store Processed (Q60)	0.79	0.26	***
"Blooming" of C-R meats is a problem (Q68)	-0.67	0.27	**
C-R Meat Packages Use Attractive Trays (Q70)	0.92	0.30	***
Difficult to Find Qualified Meat Cutters (Q72)	-0.62	0.22	***
With C-R Meat Mgrs. Forecast/Inventory (Q74)	-0.17	0.22	
Intercept	3.88	2.83	
Omnibus Tests of Model Coefficients (Chi Square)	118.21	15df	***
Hosmer-Lemeshow Model Chi-Square	7.067	8df	****
Pseudo R^2 for Base Model: Cox and Snell: 46% Nagelkerke: 67%			
Significant Codes:**p>.05 ***p<.01 **p<.05 *p<.10**			
Number of Observations	193		

The classification table results for the second run of Model 1 were again excellent. Starting with the null model of only the intercept the results (see Table 41) for the overall percentage of the second run was 74.5 percent. After adding the explanatory variables in the second run the classification model's overall percentage increased to 90.7 percent (see Table 42). This is important towards implying the Logit 1 model's ability of further explaining the factors of adoption.

Table 41: Classification Table (ab) Logit Model I Second Run Without Explanatory Variables

			Adoption		
			Otherwise	Has Adopted C-R	Percentage Correct
Step 0	Adoption C-R Ground Beef	Otherwise	0	50	0%
		Has Adopted C-R	0	143	100.0%
	(a) Intercept only model. (b) The cut value is .50			Overall	74.5%

Table 42: Classification Table (a) Logit Model I Second Run With Explanatory Variables

			Adoption		
			Otherwise	Has Adopted C-R	Percentage Correct
Step 1	Adoption	Otherwise	39	11	78.0%
		Has Adopted C-R	7	136	95.1%
	(a) The cut value is .50			Overall	90.7%

4.4.8 Binary Logistic Regression Model 1: Final Run

Again, following Menard's (2002) procedure for conducting logistic regression analysis, the next step in analyzing Model 1 was to drop the highly insignificant variables and re-run Model 1 again. The results in dropping four explanatory variables for the final run of Model 1 continued the trend of producing excellent statistical results for the entire model.

The results for the final run of Model 1 can be viewed below in Table 43 beginning with the Omnibus chi square test producing highly significant *p*-values for the explanatory variables in the model to predict the binary dependent variable. Garson (2008) suggest a significant result here corresponds to the data "adequately" fitting the proposed model.

The Wald chi square statistics showed ten out of eleven explanatory variables with significant *p*-values. The only insignificant variable in the final run was related to

workmanship issues of case-ready meats as a source of shrink. The number of explanatory variables in the final model also meets the suggested ratio of observations to variables for logistic regression, should be a minimum of 10. For this model the ratio is 193 observations to 11 variables which give a 17.5 ratio.

The Homer-Lemeshow Model chi square test statistic (6.632) for the entire model is highly significant, a very positive and encouraging result for the entire model because this is the recommended statistic for judging the overall "fit" of the binary logistic regression model. The two pseudo R^2 results for the final model were very promising as well, with the Cox & Snell R^2 reporting at 45 percent and the Nagelkerke R^2 reported a significantly higher test statistic of 65 percent.

Table 43: Binary Logistic Regression Model 1 Final Run: Store Adopts Case-Ready Ground Beef

	All Stores		
Parameter	**Estimate**	**SE**	**Sig**
Verifies temps upon delivery (Q7)	-0.64	0.30	*
Delivery dates are written on each meat pkg (Q9)	0.80	0.29	***
C-R has grd beef lean/fat ratios cust. demand (Q19)	0.44	0.21	**
Shrink: Defective pkg (Q40)	-0.48	0.25	
Shrink: Workmanship (Q41)	-0.39	0.27	
Accounting for Pkg Not Sold at Full Retail (Q49)	0.43	0.23	**
Satisfied Store Preps First-of-Month Sales (Q54)	-1.41	0.45	**
C-R Meats Safer than In-Store Processed (Q60)	0.88	0.25	***
"Blooming" of C-R meats is a problem (Q68)	-0.66	0.24	**
C-R Meat Packages Use Attractive Trays (Q70)	0.76	0.26	***
Difficult to Find Qualified Meat Cutters (Q72)	-0.60	0.18	***
Omnibus Tests of Model Coefficients (Chi Square)	113.88	11df	***
Hosmer-Lemeshow Model Chi-Square	6.632	8df	****
Pseudo R^2 for Base Model:			
Cox and Snell: 45% Nagelkerke: 65%			
Significant Codes:**p>.05 ***p<.01 **p<.05	*p<.10		
Number of Observations	193		

The classification table results for the final run of Model 1 were again excellent. This is an important finding for Model 1, as these results help assess the performance of

the entire model, starting with the null model of only the intercept the results (see Table 44) for the overall percentage of the final run was 74.1 percent. After adding the explanatory variables the classification model's overall percentage jumped to 89.1 percent (see Table 45). This is important towards implying the Logit 1 model's ability of further explaining the factors of adoption.

Table 44: Classification Table (ab) Logit Model I Final Run Without Explanatory Variables, Intercept Only

			Adoption		
			Otherwise	Has Adopted C-R	Percentage Correct
Step 0	Adoption C-R Ground Beef	Otherwise	0	50	.0
		Has Adopted C-R	0	143	100.0
	(a) Intercept only model. (b) The cut value is .50			Overall	74.1%

Table 45: Classification Table (a) Logit Model I Final Run With Explanatory Variables

			Adoption		
			Otherwise	Has Adopted C-R	Percentage Correct
Step 1	Adoption	Otherwise	38	12	76.0%
		Has Adopted C-R	9	134	93.7%
	(a) The cut value is .50			Overall	89.1%

4.4.9 Model 1: Multicollinearity Diagnostics

Garson (2008) and Menard (2002) describe multicollinearity in logistic regression as one explanatory variable being a linear function of another explanatory variable. Effects of multicollinearity include lack of coefficients being statistically significant with the overall model showing significance and coefficients not having the predicted sign. When the coefficients have incorrect signs then the subsequent analysis and conclusions are jeopardized. Therefore, inspecting Model 1 for multicollinearity is of particular

interest towards confirming the reliability of the explanatory independent variables in the final model.

There is a quick diagnosis for checking for multicollinearity which can be found in the logistic regression results; look for any standard errors with values greater than or equal to 2.0. A more detailed and rigorous test for multicollinearity can also be completed in an OLS regression of the logistic regression model. In these multicollinearity diagnostics there are two statistics of import; the tolerance levels and the variance inflation factor. Menard (2002) states the existence of multicollinearity with explanatory variables when tolerance levels are less than or equal to 40 percent. The tolerance levels are the percentage of variance in an explanatory variable that is not explained by the other variables in the model. Variance inflation factor levels detecting multicollinearity in logistic regression are at levels exceeding 2.5. The variance inflation factor is a factor of the coefficient of interest multiplied during the logistic regression due to the levels of multicollinearity found within the logistic regression model.

The variance inflation factor is

$$VIF^{*} = \frac{1}{Tolerance}$$

*VIF is always greater than or equal to 1.

For the quick diagnosis of multicollinearity in Model 1 the logistic regression results revealed none of the explanatory variables in the SPSS output with high standard errors at or above the 2.0 threshold. The next step was to construct an OLS regression for Model 1 for the purpose of checking the accompanying diagnostic statistics for

multicollinearity. The diagnostics showed no signs of multicollinearity for any variables for either the tolerance level or variance inflation factor. A closer review of Table 46 shows all of the tolerance levels for Model 1 to be at or above the prescribed levels (they were all greater than 40 percent) for multicollinearity. The variance inflation factor for each coefficient showed excellent results as well. None of variance inflation factors were greater than 2.5. We can conclude multicollinearity is not a problem for Model 1 after confirming in logistic regression no inflated values of the standard errors, and in the OLS regression of Model 1 none of the tolerance levels or variance inflation factors were at levels detecting problems with multicollinearity.

Table 46: Multicollinearity Diagnostics for Logit Model 1a Ground Beef

	Collinearity Statistics*	
Logistic Regression Model 1	**Tolerance**	**VIF**
(Constant)		
Verifies temperature ranges Q7	0.85	1.18
Writes delivery dates Q9	0.85	1.18
Ground beef lean to fat ratios Q19	0.78	1.28
Shrink defective packaging Q40	0.76	1.32
Shrink workmanship issues Q41	0.73	1.38
How satisfied accounting of meat not sold at full retail Q49	0.79	1.27
How satisfied store is prepared for FOM Q54	0.73	1.36
C-R products safer than in-store processed Q60	0.72	1.38
Blooming c-r is a problem Q68	0.91	1.10
C-R products use attractive trays Q70	0.76	1.31
More difficult to find meat cutters Q72	0.91	1.10

[a] **Binary dependent variable: Adopted c-r ground beef products**

***Note: Tolerances ≤ 0.40 = Problems with multicollinearity VIF ≥ 2.50 = Problems with multicollinearity**

4.4.10 Assessment of Coefficients in Logit Model I: Predicted/Observed Signs of Coefficients

The previous section the analysis demonstrated that Model 1 did not have multicollinearity problems with the explanatory independent variables. This allows for a further review of those key variables associated with expanding the adoption rates of case-ready ground beef products. As shown earlier, the assessment of the explanatory variables will be limited to interpreting the signs of each coefficient and their associated significant levels (see Table 47).

Table 47 also displays the explanatory variable's hypothesis for the predicted sign for each coefficient in the final run of Model 1, and the subsequent results discovered in the analysis. Note again this research was relying on the predicted and observed coefficient sign as another level of interpretation for the relevant factors that help further the adoption levels case-ready meat programs. This section in particular addresses the signs of the coefficients and how they relate to the adoption of ground beef products.

Table 47: Binary Logistic Regression Model 1 Adoptions of Case-Ready Ground Beef Products: Interpreting the Sign and Direction of the Predictor Variables

Predictor Variable Hypothesis and Predicted Sign / Direction	Results
Q7. How satisfied are you with the way your store verifies that fresh meat deliveries from the Distribution Center (DC) are within acceptable temperature ranges?	
• 1=*Not at all* to 5=*Very Satisfied*	Passed
H_0: During the case study portion of the project it was discovered that temperatures of meat products were not being checked upon delivery. The sign was predicted to be negative.	
Q9. How satisfied are you with the way your store writes the delivery date on each fresh meat box received from the DC?	
• 1=*Not at all* to 5=*Very Satisfied*	
H_0: Research showed the shelf-life of c-r beef was maximized when the oldest product in the walk-in was the next product to go in the meat cases. The chances of this metric being fulfilled were predicated on the delivery date being written on each box. The sign was predicted to be positive.	Passed
Q19. Case-ready ground beef products are available in the lean – fat ratios my customers prefer?	
• 1=*Strongly Disagree* to 5=*Strongly Agree*	
H_0: Research efforts and interviews with processors hypothesized c-r products were being produced with the lean to fat ratios retailers preferred. When the lean to fat ratios are available in the ratios retailers demand, further adoption of case-ready meats is more likely. The sign was predicted to be positive.	Passed
Q40. Defective and damaged packaging is a source of shrink.	
• 1=*Big Concern* to 5=*Not a Concern*	
H_0: When defective packaging is a big concern for case-ready beef products, further adoption of case-ready meats is more likely. The sign was predicted to be negative.	Passed
Q41. Shrink: Workmanship issues	
• 1=*Big Concern* to 5=*Not a Concern*	Variable was not significant
H_0 : When workmanship issues are a big concern, further adoption of case-ready meats is more likely. The sign was predicted to be negative.	
Q49. How satisfied are you with the way your store records (or accounts for) every fresh meat package (product) not sold at full retail?	
• 1=*Not at all* to 5=*Very Satisfied*	FAILED
H_0: Research and interviews revealed most packages of meat not sold at full retail were products with expired "use by" dates (shelf life). Case-ready meats have decidedly longer shelf life and a negative sign would have encouraged further adoption of case-ready meats. The was predicted to be negative.	
Q54. How satisfied are you with the way your store prepares for the increased sales experienced during the first few days of each month?	
• 1=*Not at all* to 5=*Very Satisfied*	Passed
H_0: When managers are not satisfied with the way their store prepares for increased sales during the first few days of the month, further adoption of case-ready meats is more likely. The sign was predicted to be negative.	

Table 47 (cont'd)

Q60. Case-ready beef products are the *safer* than beef products processed in-stores?	
• 1=*Strongly Disagree* to 5=*Strongly Agree*	
H_0: If store managers think case-ready beef products are safer than in-store processed meats, further adoption of case-ready meats is more likely. The sign was predicted to be positive.	Passed
Q68. Case-ready meat products that require "blooming" cause operational problems.	
• 1=*Strongly Disagree* to 5=*Strongly Agree*	Passed
H_0: If managers strongly disagree with blooming causing operational issues, further adoption of case-ready meats is more likely. The sign was predicted to be negative.	
Q70. Case-ready beef products are packaged in attractive trays.	
• 1=*Strongly Disagree* to 5=*Strongly Agree*	Passed
H_0: If case-ready beef products are packaged in attractive trays, further adoption of case-ready meats is more likely. The sign was predicted to be positive.	
Q72. It has become increasingly more difficult to find qualified meat cutters for my store.	
• 1=*Strongly Disagree* to 5=*Strongly Agree*	FAILED*
H_0: If store managers agree it is more difficult to find qualified meat cutters, further adoption of case-ready meats is more likely. The sign should be positive.	
* Could be a selection bias problem for some respondents because they don't use meat cutters.	

The explanatory/predictor variable about case-ready ground beef products being available in the lean to fat ratios customers prefer passed the predicted and observed analysis. If store managers believe the availability of ground beef pack sizes they may be more likely to adopt case-ready meats. Price points and other supply and demand issues are based upon the lean to fat ratios of ground beef. Without the presence of the correct lean to fat ratios further adoption would be resisted.

The explanatory variable associated with the shrink category concerned with defective and damaged packaging passed the predicted and observed test with its negative sign. Prior to the questionnaire being developed earlier research endeavors suggested that case-ready packaging for ground beef offerings had undergone significant product changes to overcome prior problems with defective and damaged packaging. Therefore, as levels of this coefficient (defective and damaged packaging) decrease, adoption levels for case-ready ground beef are expected to increase.

The sign for the coefficient related to case-ready beef products being safer than product processed in stores was another very encouraging result for the project because a positive sign for this coefficient would encourage adoption. As the project began there was substantial debate concerning food safety. Processors were adamant about its safety and hopeful that managers viewed case-ready products as safer. This result from the store managers was also consistent with the literature review, as well.

The coefficient sign for the variable addressing case-ready products being packaged in attractive trays is an important finding. Case-ready products are packaged in completely different looking trays to accommodate the rigorous requirements associated with the new technologies and to achieve increased shelf life. The positive sign for this coefficient is consistent with the research findings and for further adoption of the case-ready programs.

4.4.11 Binary Logistics Regression Model 1: Managerial Implications

Table 47 synthesized the results for the predicted/observed coefficient signs and their interpretation for the predictor variables for Model 1. This table is also a useful tool for categorizing the significant explanatory variables or predictors into three broad categories related to the further adoption of case-ready ground beef programs. These broad categories are in fact the major headings for the research's six operational issues that were discussed earlier in chapter four. The three adoption categories include: supply chain metrics, product attributes for processors, retailers and consumers and management tools, specific for limited assortment retailers to help them improve their business model.

The first category, supply chain metrics, identifies the key factors discovered in the research that are conducive for ground beef to effectively and efficiently to move

through the supply chain. The importance of this category cannot be underestimated as supply chain metrics in the past have been instrumental in moving perishable products through a supply chain with maximum shelf life for both retailers and customers. Shelf life is important to retailers as it reduces several sources of shrink, improves sales for processors and profit and finally provides consumers more product options and improves satisfaction levels of the entire retail grocery store shopping experience. The retail grocery store shopping experience has been viewed by industry analyst as key towards improving gross store sales and increase customer loyalty. Below are the pertinent factors.

Supply Chain Metrics Discovered in Model 1

- Importance of monitoring temperatures of product delivered from the stores. This could also be inferred for DC receiving product from processors.
- Importance of writing the delivery date on each carton of fresh beef delivered to stores. Recognizing and implementing this important step is deemed critical towards maximizing inventory management and ensuring product as the maximum amount of time to be sold for full retail price (no markdowns or write-offs).
- Defective and damaged packaging from the perspective of supply chain metrics relates to the necessity of discovering where along the supply chain the damage was incurred and make the necessary changes to improve stops along the supply chain and mitigate future damaged products.

- Importance of monitoring and reconciling products not sold at full retail. This metric is related to properly and systematically quantifying product not getting through the supply chain. Proper accounting should be the catalyst for improving the supply chain.

The second adoption category is product attributes. Specific product attributes are deemed important for all participants in the supply chain. Product attributes are directly related to fulfilling demand. Further explication and understanding of product attributes is an important first step in current demand scenarios and the ability to help with future shifts of demand for case-ready ground beef products. Below are the pertinent factors.

Specific Product Attributes Demanded by All Supply Chain Participants

- Case-ready ground beef products are available with the lean-to-fat ratios my store and consumers demand. Retailers must have product in the "pack sizes" their customers demand. Whole muscle beef products cut and packaged in stores use this data/information to ensure their stores have the whole muscle pack sizes their customers demand, especially for whole muscle meats. Interviews of store managers revealed this important point.
- Shrink associated with workmanship issues in a case-ready scenario is an opportunity for managers to account for all products with "workmanship" issues before customers view/buy the product. This information needs to flow back downstream to processors to help them constantly improve their offerings by isolating the source of the workmanship issues.

- New packaging technologies and creative packaging efforts have transformed the way many food products are marketed.
- Case-ready beef products being viewed as safer than products produced in-stores is key attribute retailers and consumers demand. Currently when other fresh food products are deemed safer this fact has allowed food marketers to differentiate those products in the marketplace and are able to charge higher prices.
- Case-ready products are packaged in attractive trays. Current packaging research posits one way to differentiate products in the marketplace and in minds of consumers is through new and innovative packaging alternatives.

The last adoption categories are the management tools to help further adoption endeavors. Management tools as a category for further adoption of case-ready products is related to the product's ability to help management constantly improve their business model. An underlying truth about management in the retail arena is the repetitive nature of the tasks within the business model.

Management Tools

- Case-ready meat's ability to help managers maximize store sales during the first few days of each month. Limited assortment stores experience unusually high levels of store sales during the first few days of each month and products that can be seen as less labor and maximize sales will be positively viewed by decision makers.
- Case-ready meat's ability to mitigate the need for finding future supplies of meat cutters. Meat cutters have higher labor cost per unit as compared to other store personnel and the supplies of qualified meat cutters are going down.

4.4.12 Summary Conclusions for Model 1

The logistic regression Model 1 objective is to provide a better understand of the factors that will help further the adoption of case-ready ground beef programs. This is especially important when the research is trying to predict the presence and subsequent absence of explanatory variables pertinent to the further adoption of case-ready ground beef programs. This was accomplished by the model.

Grocery retailers, meat department managers, and meat processors are very knowledgeable about ground beef and whole muscle cuts. Coincidently, these two categories of proteins represent a significant portion of the entire meat category in sales and they drive important marketing and product mix decisions play a key role as retailers attempt to market the entire grocery store. Model 1 was employed to identify and assess those relevant factors.

The overall fit and quality of the entire model was acceptable as demonstrated by the highly significant Homer-Lemeshow goodness of fit test. The fit and quality of the entire model was also seen in the respectable pseudo R^2 results: Cox & Snell and the Nagelkerke R^2s. The classification table showed the combined model predicted correct and incorrect estimates at 89.1 percent of the time. As for the strength of the explanatory variables, the Wald chi square statistics revealed eleven out twelve explanatory independent variables were significant. These combined results shed light on the factors of adoption to be considered by retailers and processors interested in further adoption of case-ready ground beef programs.

4.4.13 Binary Logistic Regression Model 2 Adoption Case-Ready Whole Muscle Beef Products

After the reviewing the results of the Model 1, another logistic regression model was constructed to study case-ready whole muscle products. Without prior theory to guide which predictor variables to include in the base logistic regression models as was the case with Model 1, Model 2's base model was developed from the results and information gathered during visits to retail stores / Distribution Center, interviews with industry experts and the literature review. The second logistic regression model studies the factors that will help further adoption rates of the other important case-ready whole muscle products[21].

Model 2 includes several explanatory variables from the base model used in Model 1 and adapted the other necessary components related to expanding the adoption rates of whole muscle beef products. The dependent variable: adopted case-ready whole muscle beef products = f (verifies temp ranges of delivered meat, writes delivery dates on boxes, c-r whole muscle products come in the "cuts" customers want, c-r whole muscle products come in the pack sizes customers want, customer theft source of shrink, defective packaging source of shrink, workmanship issues source of shrink, non-bloom issues of whole muscle cuts source of shrink, out of date product source of shrink, satisfaction level of the accounting of meat not sold at full retail, satisfaction of FIFO of meat in walk-in storage rooms, satisfaction meats are stacked in walk-in, satisfaction store keeps meat case inventories, satisfaction store preps for first of the month sales, satisfaction store preps for specials, more sales if meat products were thought to be safer,

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[21] Whole muscle beef products have two broad categories: 1) roasts and 2) steaks.

c-r meats are safer than in-store processed meats, blooming of c-r meats is a problem, c-r products use attractive trays, difficult to find qualified meat cutters, meat cutters could be trained to manage the perishables category, meat managers could forecast demand and manage versus cut meat, and c-r products are most cost effective than in-store processed meats).

4.4.14 Binary Logistic Regression Model 2: First Run

The results of running the initial Model 2 in SPSS using binary logistic regression, the results showed 11 of 23 explanatory variables in the model were statistically insignificant and the Homer-Lemeshow (H-L) model chi square was not significant. A complere display of the results for this the first run on Model 2 can be viewed below in Table 48.

Table 48: Binary Logistic Regression Model 2 Base Model: Adoption Case-Ready Whole Muscle Beef Products

	All Stores		
Parameter	**Estimate**	**SE**	**Sig**
Verifies temps upon delivery (Q7)	0.18	0.32	
Delivery dates are written on each meat pkg (Q9)	1.52	0.39	***
C-R has the whole muscle cuts for my store (Q20)	0.56	0.39	
C-R has the whole muscle packs for my store (Q23)	0.57	0.35	*
Shrink: Customer Theft (Q39)	-0.24	0.26	
Shrink: Defective pkg (Q40)	0.91	0.37	**
Shrink: Workmanship (Q41)	-1.11	0.38	***
Shrink: Non-bloom whole muscle beef cuts (Q44)	0.88	0.29	***
Shrink: Out of Date (Q46)	-0.56	0.37	
Accounting for Pkg Not Sold at Full Retail (Q49)	0.07	0.35	
Satisfied with FIFO Procedures Walk-In (Q 50)	-0.59	0.73	
Satisfied storage of c-r meats in walk-in (Q52)	-0.12	0.60	
Satisfied Meat Case Inventory Levels (Q53)	-0.33	0.55	
Satisfied Store Preps First-of-Month Sales (Q54)	-1.29	0.63	**
Satisfied Store Preps for Meat Specials (Q55)	-0.63	0.35	*
More Sales if Meat Products were Safer (Q59)	-0.11	0.32	
C-R Meats Safer than In-Store Processed (Q60)	1.93	0.47	***
"Blooming" of C-R meats is a problem (Q68)	-1.01	0.42	**
C-R Meat Packages Use Attractive Trays (Q70)	1.10	0.41	***
Difficult to Find Qualified Meat Cutters (Q72)	-0.63	0.21	***
Meat Cutters Manage Perishables Category (Q73)	0.21	0.26	
With C-R Meat Mgrs. Forecast/Inventory (Q74)	-0.50	0.31	
C-R Products Are More Cost Effective (Q75)	0.80	0.33	**
Intercept	-5.37	2.37	**
Omnibus Tests of Model Coefficients (Chi Square)	117.33	23df	**
Hosmer-Lemeshow Model Chi-Square[22]	17.93	8df	****
Pseudo R^2 for Base Model:			
Cox and Snell: 60% Nagelkerke: 81%			
Significant Codes:**p>.05 ***p<.01 **p<.05**	***p<.10**		
Number of Observations	193		

The results for the first run on Model 2 were similar to the initial run on Model 1 for ground beef, where many explanatory variables were non-significant, but the overall base model showed signs of having underlying strength. Model 2 did have several interesting results; including a highly significant Omnibus Tests of Model Coefficients

[22] NOTE: According to Menard (2002) a Hosmer-Lemeshow model chi-square statistic registering non-significant concludes the model adequately fits the data being analyzed.

coupled with excellent pseudo R^2 results, the Cox & Snell R^2 was 60 percent and the Nagelkerke R^2 was 81 percent.

Another promising result highlighting the underlying strength of the base model can be found in the results of how well the Model 1 classified both dependent and explanatory (predictor) variables (Menard, 2002). Menard stresses the importance of realizing that "classification models impose the constraint that the model should classify as many cases into each category as are actually observed in each category. Further noting, the proportion of cases observed should be at least the same proportion as predicted. To the extent that a model fails to meet this criterion, it fails as a classification model" (Menard, 2002).

Table 49 shows the results of the classification table without predictors at 56 percent and Table 50 shows when the explanatory variables are included in Model 2, the model produces a respectable overall 92.2 percent. On the first run the model did extremely well.

Table 49: Classification Table (ab) Logit Model 2 First Run Without Predictors

			Adoption		
			Otherwise	Has Adopted C-R	Percentage Correct
Step 0	Adoption C-R Whole Muscle	Otherwise	0	85	0%
		Has Adopted C-R	0	108	100.0%
				Overall	56.0%

(a) Intercept only model.
(b) The cut value is .50

Table 50: Classification Table (a) Logit Model 2 First Run With Predictors

			Adoption		
			Otherwise	Has Adopted C-R	Percentage Correct
Step 1	Adoption C-R Whole Muscle	Otherwise	75	10	88.2%
		Has Adopted C-R	5	103	95.4%
				Overall	92.2%

(a) The cut value is .50

A separate diagnostic test for multicollinearity was conducted, revealing relatively few explanatory variables; however, it had multicollinearity problems. Only 3 explanatory variables showed signs of multicollinearity, which were not consistent with both the tolerance and the variance inflation factors: only one or the other. With these promising results, another run of Model 2 was conducted which is discussed in the next sections.

4.4.15 Binary Logistic Regression Model 2: Second Run

The second run of Model 2 began by dropping seven highly non-significant coefficients from the base model with *p*-values ranging from 0.30-0.85. The explanatory variables dropped include: Q7, Q49, Q50, Q52, Q53, Q59, and Q73.

The results of the second run are listed in Table 51 below and Model 2 was vastly improved over the first run. The second run had sixteen explanatory variables in the model. The table below shows there are twelve significant explanatory variables as determined by the Wald chi square test statistics.

The Omnibus Tests of Model Coefficients was again similar to the first run with a highly significant chi square test statistic. The encouraging result between the first and second runs of Model 2 is found in the Homer-Lemeshow Model chi square with the entire model chi square is now significant after dropping seven explanatory variables from the first run to this the second run. The now significant Homer-Lemeshow statistic demonstrates that Model 2 adequately fits the data set being analyzed.

The pseudo R^2 results in this the second run were similar to the first run with a Cox & Snell R^2 of 59 percent and the Nagelkerke R^2 being 79 percent, showing good results. In logistic regression the pseudo R^2 results are to be interpreted as showing the

relative strength of the model's association between the explanatory variables (predictors) and the binary dependent variable. These pseudo R^2 results in this second run show a relatively strong association between the explanatory and dependent variable.

Table 51: Binary Logistic Regression Model 2 Second Run Model: Adoption Case-Ready Whole Muscle Beef Products

	All Stores		
Parameter	**Estimate**	**SE**	**Sig**
Delivery dates are written on each meat pkg (Q9)	1.43	0.42	***
C-R has the whole muscle cuts for my store (Q20)	0.57	0.39	
C-R has the whole muscle packs for my store (Q23)	0.54	0.35	
Shrink: Customer Theft (Q39)	-0.20	0.23	
Shrink: Defective pkg (Q40)	0.81	0.34	**
Shrink: Workmanship (Q41)	-1.07	0.36	***
Shrink: Non-bloom whole muscle beef cuts (Q44)	0.86	0.27	***
Shrink: Out of Date (Q46)	-0.60	0.35	*
Satisfied Store Preps First-of-Month Sales (Q54)	-1.81	0.50	***
Satisfied Store Preps for Meat Specials (Q55)	-0.59	0.32	*
C-R Meats Safer than In-Store Processed (Q60)	1.87	0.39	***
"Blooming" of C-R meats is a problem (Q68)	-0.98	0.39	**
C-R Meat Packages Use Attractive Trays (Q70)	0.89	0.35	**
Difficult to Find Qualified Meat Cutters (Q72)	-0.59	0.18	***
With C-R Meat Mgrs. Forecast/Inventory (Q74)	-0.39	0.25	
C-R Products Are More Cost Effective (Q75)	0.71	0.30	**
Intercept	-5.04	2.08	***
Omnibus Tests of Model Coefficients (Chi Square)	172.94	16df	***
Hosmer-Lemeshow Model Chi-Square	9.52	8df	****
Pseudo R^2 for Base Model:			
Cox and Snell: 59% Nagelkerke: 79%			
Significant Codes:**p>.05 ***p<.01 **p<.05	*p<.10		
Number of Observations	193		

Tables 52 and 53 below show the results of the classification tables from the second run of the model. The classification table shows excellent results, with an overall percentage of 91.7 percent. More importantly these two tables showed the model improved from Step O with the baseline (constant only) logistic regression model of 56 percent. By adding the explanatory variables of Model 2 in Step 1of the second run revealed the explanatory variables of interest are interpreted as useful predictors of adoption of case-ready whole muscle beef programs.

Table 52: Classification Table (ab) Logit Model 2 Second Run Without Predictors

			Adoption		
			Otherwise	Has Adopted C-R	Percentage Correct
Step 0	Adoption C-R Whole Muscle	Otherwise	0	85	0%
		Has Adopted C-R	0	108	100.0%
	(a) Intercept only model. (b) The cut value is .50			Overall	56.0%

Table 53: Classification Table (a) Logit Model 2 Second Run With Predictors

			Adoption		
			Otherwise	Has Adopted C-R	Percentage Correct
Step 1	Adoption C-R Whole Muscle	Otherwise	75	10	88.2%
		Has Adopted C-R	6	102	94.4%
	(a) The cut value is .50			Overall	91.7%

Another diagnostic test for multicollinearity was conducted on the variables from the second run before running another model. It revealed only one explanatory variable showing borderline multicollinearity problems. The tolerance level was 41 percent and the variance inflation factor was 2.45. With these promising results, a final run of Model 2 was conducted which is discussed in the next sections.

4.4.16 Binary Logistic Regression Model 2: Final Run

The final run of Model 2 began by dropping three non-significant coefficients with *p*-values ranging from 0.12-0.39. The explanatory variables dropped include: Q20, Q39, and Q74.

The results of the final run for Model 2 are listed below in Table 54. The final run began with thirteen explanatory variables in the model and finished with eleven significant explanatory variables as determined by the Wald chi square test. The model

was improved from the second run, albeit slightly. One noticeable change in this model was it had only two non-significant explanatory variables. The first non-significant variable was related to shrink associated with product that was out of date; the other variable relates to the store's ability to prepare for fresh meat sold at special prices.

The Omnibus Tests of Model Coefficients was again similar to the last run with a highly significant chi square test statistic. The Homer-Lemeshow Model chi square, for the entire model was again significant after dropping the three explanatory variables postulating the final run of Model 2 adequately fits the data set being analyzed.

The pseudo R^2 results were slightly less than the previous run with a Cox & Snell R^2 of 58 percent and the Nagelkerke R^2 being 78 percent. R^2 statistics in logistic regression run noticeably lower than OLS regression, revealing the strength of these R^2 results. Final conclusions from these R^2 results are that there is a relatively strong association between the explanatory variables and the dependent variable.

Table 54: Binary Logistic Regression Model 2 Final Run Model: Adoption Case-Ready Whole Muscle Beef Products

	All Stores		
Parameter	**Estimate**	**SE**	**Sig**
Delivery dates are written on each meat pkg (Q9)	1.17	0.37	***
C-R has the whole muscle packs for my store (Q23)	0.92	0.26	***
Shrink: Defective pkg (Q40)	0.63	0.30	**
Shrink: Workmanship (Q41)	-1.09	0.34	***
Shrink: Non-bloom whole muscle beef cuts (Q44)	0.74	0.24	***
Shrink: Out of Date (Q46)	-0.45	0.31	
Satisfied Store Preps First-of-Month Sales (Q54)	-1.70	0.48	***
Satisfied Store Preps for Meat Specials (Q55)	-0.49	0.30	
C-R Meats Safer than In-Store Processed (Q60)	1.63	0.35	***
"Blooming" of C-R meats is a problem (Q68)	-0.84	0.34	**
C-R Meat Packages Use Attractive Trays (Q70)	0.73	0.31	**
Difficult to Find Qualified Meat Cutters (Q72)	-0.61	0.17	***
C-R Products Are More Cost Effective (Q75)	0.53	0.25	**
Intercept	-3.99	1.90	**
Omnibus Tests of Model Coefficients (Chi Square)	167.45	13df	***
Hosmer-Lemeshow Model Chi-Square	10.59	8df	****
Pseudo R^2 for the Final Run of Model 2: Cox and Snell: 58% Nagelkerke: 78%			
Significant Codes:**p>.05 ***p<.01 **p<.05**	***p<.10**		
Number of Observations	193		

Out of the 13 explanatory variables in Model 2, there were only two with non-significant *p*-values (see Table 54 above). The first failed variable was concerned with shrink associated with non-bloom issues in whole muscle beef cuts. Research and interviews with industry executives revealed that new processing and packaging technologies had been implemented to assuage past non-bloom issues with whole muscle beef cuts. Non-bloom issues the new technologies hoped to alleviate include: product that would not fully bloom prior to being placed into the meat cases (there would be parts of the product that would not turn "cherry red"), and the case-ready packages which were packed in corrugated boxes and master bags requiring different blooming regimes and times lacked a consistent method for blooming. The past reactions/viewpoints of the respondents coupled with the results of the literature review about the blooming problems

of these products caused the predicted sign to be negative. One plausible explanation is the research misinterpreted the predicted sign where a positive sign should have been predicted, meaning the new packaging and processing technologies had improved the blooming capabilities and "more" amounts of this variable would in reality increase the adoption of center of the plate protein.

The last variable with a failed predicted sign was concerned with the difficulty of finding qualified persons to cut and process fresh meat products in-stores. Prior research again documented the problems retailers were encountering in hiring qualified persons to cut meat. A positive sign would have reinforced the results of the research. A partial explanation for the negative sign centers on a selection bias problem for some respondents. A significant number of respondents do not use meat cutters to process their fresh meats, and which could have caused the sign to be negative. Negative amounts of this variable would cause adoption of the whole muscle meats to increase, is a plausible interpretation for the sign of this variable.

Tables 55 and Table 56 below show the results of the classification tables from the final run of Model 2. Similar to the other classification tables, results of this run showed an improvement from Step O with the baseline (constant only) logistic regression model of 56 percent to Step 1 where the explanatory variables were added. The classification table shows nearly identical results from the last run, with an overall percentage of 90.7 percent. This improvement between Step 0 and Step 1 reveals the explanatory variables of interest for Model 2 can be interpreted as useful predictors of adoption of case-ready whole muscle beef products. This is a significant and encouraging result for the project.

Table 55: Classification Table (ab) Logit Model 2 Adoption of Case-Ready Whole

			Adoption		
			Otherwise	Has Adopted C-R	Percentage Correct
Step 0	Adoption C-R Whole Muscle	Otherwise	0	85	.0%
		Has Adopted C-R	0	108	100.0%
	(a) Intercept only model. (b) The cut value is .50			Overall	56.0%

Table 56: Classification Table (a) Logit Model 2 Adoption of Case-Ready Whole Muscle Beef Products Final Run With Predictors

			Adoption		
			Otherwise	Has Adopted C-R	Percentage Correct
Step 1	Adoption C-R Whole Muscle	Otherwise	74	11	87.1%
		Has Adopted C-R	7	101	93.5%
	(a) The cut value is .50			Overall	90.7%

4.4.17 Binary Logistic Regression Model 2: Multicollinearity Diagnostics

The final run in logistic regression has many significant variables and a check for multicollinearity is prescribed. First, none of the standard errors of the coefficients in Table 57 are considered large enough (greater than 2.0) to signal problems with multicollinearity. Next, an OLS regression with the explanatory variables and the dependent variable for Model 2 was constructed to check for multicollinearity. The diagnostics showed no signs of multicollinearity for any variables for either the tolerance level or variance inflation factor and all of the tolerance levels for the model are at or above the prescribed levels (they were all greater than .40) for multicollinearity (see Table 57 below). The variance inflation factor for each coefficient showed excellent results as well. None of the variance inflation factors were greater than 2.5. Therefore, it

is concluded that multicollinearity is not a problem for Model 2 having confirmed the logistic regression output files none of coefficients possessed inflated values of the standard errors. And in a separate multicollinearity diagnostic test none of the tolerance levels or variance inflation factors were at levels detecting problems with multicollinearity.

Table 57: Multicollinearity Diagnostics for Logit Model 2a Whole Muscle Beef

	Collinearity Statistics*	
Logit Model 2	**Tolerance**	**VIF**
(Constant)		
Writes delivery dates Q9	0.85	1.18
Whole muscle pack sizes Q23	0.70	1.44
Shrink defective packaging Q40	0.65	1.53
Shrink workmanship issues Q41	0.65	1.53
Shrink non-bloom beef cuts Q44	0.82	1.22
Shrink out-of-date Q46	0.74	1.35
How satisfied store is prepared for FOM Q54	0.73	1.36
How satisfied store is prepared for specials Q55	0.74	1.35
C-R products safer than in-store processed Q60	0.69	1.45
Blooming c-r is a problem Q68	0.88	1.13
C-R products use attractive trays Q70	0.71	1.42
More difficult to find meat cutters Q72	0.84	1.20
C-R products more cost effective Q75	0.65	1.54

[a] Binary dependent variable: Adopted c-r whole muscle beef products

***Note: Tolerances ≤ .40 = Problems with Multicollinearity VIF ≥ 2.50 = Problems with Multicollinearity**

4.4.18 Binary Logistic Regression Model 2: Predicted/Observed Signs of Coefficients

As in Model 1, a summary of the signs for the explanatory variables for Model 2 is in order. A plausible check for the robustness of binary logistic regression models and the explanatory power of the variables can be accomplished by analyzing the signs of each explanatory variable. This analysis is limited to comparing the predicted sign for each explanatory variable with the actual results of the binary logistic regression in Model 2. The interpretation of the sign for each variable will be restricted to the coefficients that are statistical significant as determined in the SPSS results of the Wald chi square statistical test for each coefficient. See Table 58 (below) where each explanatory variable, predicted sign direction and the actual results are reported.

As the Table 58 below shows, the remaining nine variables have coefficient signs that are consistent with prior analysis and with observations discovered during the field research. These variables combined with the two variables that have plausible explanations of their signs confirm the "robustness" of this entire model, which further identifies those factors retailers and processors could employ towards gaining greater adoption rates of fresh case-ready whole muscle meat programs.

Table 58: Binary Logistic Regression Model 2 Adoption of Case-Ready Whole Muscle Beef Products: Interpreting the Sign and Direction of the Explanatory Variables

Explanatory Variable/Hypothesis/Predicted Sign Direction	Results
Q9. How satisfied are you with the way your store writes the delivery date on each fresh meat box received from the DC?	
• 1=*Not at all* to 5=*Very Satisfied*	
H_0: Research showed the shelf-life of c-r beef was maximized when the oldest product in the walk-in was the next product to go in the meat cases. The chances of this metric being fulfilled were predicated on the delivery date was written on the boxes. The sign was predicted to be positive which would encourage further adoption of c-r beef products.	Passed
Q23. Case-ready whole muscle beef products are available in the pack sizes my customers prefer?	
• 1=*Strongly Disagree* to 5=*Strongly Agree*	
H_0: Research efforts and interviews with processors hypothesized c-r products were being produced with the pack sizes retailers preferred. When these whole muscle products are available in the pack sizes retailers demand for their customers, further adoption of case-ready meat products is more likely. The sign was predicted to be positive.	Passed
Q40. Shrink: Associated with defective and damaged packaging.	
• 1=*Big Concern* to 5=*Not a Concern*	
H_0: Current designs for case-ready whole muscle meat products have changed because defective packaging used to be a problem for these types of meat products. Processors took that information and developed new packaging for these products and believed the packaging problems were no longer a problem. The sign was predicted to be positive.	Passed
Q41. Shrink: Associated with workmanship issues.	
• 1=*Big Concern* to 5=*Not a Concern*	
H_0: When workmanship issues are a big concern, adopting case-ready is more likely. The sign was predicted to be negative.	Passed
Q44. Shrink: Associated with non-bloom issues in whole muscle beef cuts.	
• 1=*Big Concern* to 5=*Not a Concern*	
H_0: When non-bloom issues related to shrink are a big concern, adopting case-ready is more likely. The sign was predicted to be negative.	FAILED
Q46. Shrink: Associated with out of date product	Variable was not significant
• 1=*Big Concern* to 5=*Not a Concern*	
H_0: When out of date product issues related to shrink are a big concern, adopting case-ready is more likely. The sign was predicted to be negative.	
Q54. How satisfied are you with the way your store prepares for the increased sales experienced during the first few days of each month?	
• 1=*Not at all* to 5=*Very Satisfied*	Passed
H_0: When preparing for increased sales during the first few days of the month are a problem for managers and they are not satisfied with those efforts, adopting case-ready is more likely. The sign was predicted to be negative.	
Q55. How satisfied are you with the way your store prepares for the increased sales experienced during the first days of the month associated with special fresh meat promotions?	Variable was not significant
• 1=*Not at all* to 5=*Very Satisfied*	
H_0: When preparing fresh meat promotions for increased sales during the first few days of the month are a problem for managers and they are not satisfied with those efforts, adopting case-ready is more likely. The sign was predicted to be negative.	

Table 58 (cont'd)

Q60. Case-ready beef products are *safer* than beef products processed in-stores? • 1=*Strongly Disagree* to 5=*Strongly Agree* H_0: If store managers think case-ready beef products are safer than in-store processed meats they are more likely to adopt case-ready. The sign was predicted to be positive.	Passed
Q68. Case-ready meat products that require "blooming" cause operational problems. • 1=*Strongly Disagree* to 5=*Strongly Agree* H_0: If managers strongly disagree with blooming causing operational issues adopting case-ready is more likely. The sign was predicted to be negative.	Passed
Q70. Case-ready beef products are packaged in attractive trays. • 1=*Strongly Disagree* to 5=*Strongly Agree* H_0: If case-ready beef products are packaged in attractive trays more likely to adopt. The sign was predicted to be positive.	Passed
Q72. It has become increasingly more difficult to find qualified meat cutters for my store. • 1=*Strongly Disagree* to 5=*Strongly Agree* H_0: If store managers agree it is more difficult to find qualified meat cutters they would be more likely to adopt case-ready meats. The sign was predicted to be positive.	Failed*
Q75. Case-ready beef products compared to "in-store" processed beef products are more cost effective. • 1=*Strongly Disagree* to 5=*Strongly Agree* H_0: Research and interviews discovered the prices charged for c-r products ceteris paribus were significantly higher than meat processed in-stores and the transaction costs and other intangibles mitigated the higher costs. The project was hopeful the sign would be positive.	Passed

* Could be a selection bias problem for some respondents, because they don't use meat cutters.

4.4.19 Binary Logistic Regression Model 2: Managerial Implications

From the Table 58, which highlights the signs and interpretations for the predictor variables in Model 2, it is possible to categorize the significant explanatory variables or predictors into three broad categories that yielded managerial implications for whole muscle beef products. These categories were in fact the major headings for the research's six operational issues that were discussed earlier: The three adoption categories include: 1) supply chain metrics, 2) product attributes demanded by- processors, retailers and consumers and 3) management tools, specific for Limited Assortment Retailers to help them improve their business model.

Supply Chain Metrics (Model 2)

- Importance of marking the delivery date on each carton of fresh beef delivered to stores. Recognizing and implementing this important step is deemed critical towards improving inventory management. It ensures products have maximum amount of time to be sold for full retail price (avoiding markdowns or write-offs).
- Defective and damaged packaging from the perspective of supply chain metrics relates to the necessity of discovering where along the supply chain the damage was incurred and make the necessary changes to improve stops along the supply chain and mitigate future damaged products.
- "Blooming" case-ready meat products is a problem. Metrics designed by processors and retailers are not internalized and institutionalized. Blooming case-ready meat products takes time and planning. If these metrics are not followed product will not get through the supply chain efficiently.

Specific Product Attributes Demanded by All Actors (Model 2)

- Case-ready whole muscle beef products are available in the complete range of pack sizes. Retailers strive to disiplay "pack sizes" that are in demand by their customers. Production and sales of whole muscle beef products that are cut and packaged in stores provides data/information to ensure their stores have the whole muscle pack sizes that optimize sales. Interviews of store managers revealed this important point.

- Shrink associated with workmanship issues in case-ready programs are an opportunity for managers to account for all products with "workmanship" issues before customers view/buy the product. This information needs to get back to processors to help them continually improve their offerings by isolating the source of the workmanship problems. Packaging has been viewed by as marketing tool to help retailers.
- Case-ready beef products are viewed by store managers as being safer than products produced in-stores; and it is clear that safety is an important feature to both retailers and consumers. Currently when other fresh food products are deemed safer this fact has allowed food marketers to differentiate those products in the marketplace and are able to charge higher prices.
- Case-ready products are packaged in attractive trays. Current packaging research posits one way to differentiate products in the marketplace and in minds of consumers is through new and innovative packaging alternatives.

Management Tools (Model 2)

- Case-ready meat programs enable managers to maximize store sales during the first few days of each month at which time shoppers have greater income for food shopping. Limited assortment stores experience unusually high levels of store sales during the first few days of each month Products that can be seen as less labor intensive will be positively viewed by decision makers. (Similar to Model 1)

- Case-ready meat programs mitigate the need for searching for skilled meat cutters. Meat cutters have higher labor cost per unit as compared to other store personnel; moreover, the availability of qualified meat cutters is declining (similar to Model 1)
- Case-ready meat programs are viewed as more "cost effective" as compared to fresh meats processed in-stores. This predictor was not significant in Model 1; once all costs, including transaction costs are included could make case-ready meat an attractive alternative. Albeit for whole muscle meat products only, not ground beef. This is consistent with research/industry interviews on how the production of ground beef at a central point benefits by utilizing meat trim that at store-level would be regarded as waste/ considered shrink.

CHAPTER 5– SUMMARY AND CONCLUSIONS

5.1 Study Objectives

The objective of this research is to determine those operational issues that may affect fresh meat processors' and retailers' decisions whether or not to integrate case-ready program into their product lines. To develop a better understanding of the operational concerns six research questions were developed the research process by means of: interviewing key industry experts during a one day research seminar held at Michigan State University, directly observing case-ready products as they moved through the supply chain; and by conducting in-depth interviews with retail store managers and distribution center managers from Save-A-Lot (SAL) grocery store chain with over 1,150 stores throughout the U.S.

The six main research questions are:

RQ_1 What are the differences between corporate and licensed stores in their perceptions of the operational concerns associated with *case-ready products*?

RQ_2 What differences exist between corporate and licensed[23] stores in their perception of the operational concerns associated with *food safety*?;

RQ_3 What are the differences between corporate and licensed stores in their perceptions of the operational concerns associated with *workmanship*?;

RQ_4 What are the differences between corporate and licensed stores in their perceptions of the operational concerns associated with *shrink*?;

RQ_5 What are the differences between corporate and licensed stores in their perceptions of the operational concerns associated with *packaging*?;

RQ_6 What are the differences between corporate and licensed stores in their perceptions of the operational concerns associated with *handling*?

[23] Licensed stores are similar to franchise stores.

5.1.1 Purpose of Study

Decision-makers in the fresh beef industry have for years contemplated and attempted various strategies for increasing adoption of case-ready technology and this research project seeks to assist the industry in those endeavors.

Sub-Objectives of the Project

- Of interest to this research project are the reasons why red meats case-ready programs have not been accepted as readily by the retail grocery store industry as has been the case with the poultry industry. Case-ready broilers (chicken) programs have enjoyed steady growth and industry acceptance over the past thirty five years. Centralizing the cutting and packaging of broilers has encouraged many new product innovations in the form of a broad line of convenience products. Case-ready broiler programs have benefited retailers and consumers in several ways including: providing consumers with safer products, efficient stocking, and highly functional packaging. Both retailers and consumers have overwhelmingly accepted these developments.
- In contrast, the beef industry is eager to accelerate the change to what many in the industry think someday will be the acceptance of case-ready beef and would like to better understand how to achieve the same kind of results that have accrued to the far more progressive poultry industry.
- The question this research addresses is why, despite the many apparent advantages of case ready beef products to retailers and consumers retailers have been relatively slow to adopt case-ready programs. Yet, for many years red meat industry leaders have expressed their belief that eventually the logic of adopting

this technology will take place; especially now that Walmart (the world's largest retailer) has recently adopted case-ready programs. This issue is critically important given the important share of store sales of red meats. Because the trade and academic literature does not provide answers to this central question, there is substantial need for this project. It is expected that Limited Assortment Store retailers, processors and packaging companies are likely to benefit from this research project.

5.1.2 Data Sources and Methodology

The project began with a one-day seminar at Michigan State University with meat industry experts and academicians to discuss the need for and appropriate approach to researching the topic. Next, a case study was conducted to collect information and artifacts about the current case-ready meat program in use at Save-A-Lot company (a Limited Assortment Store) and to document the case-ready meat supply chain. Another goal of the case study was to develop a relevant survey questionnaire based upon corroborated documented operational issues observed in the process. Documentation of the supply chain was accomplished by developing a process map of case-ready products at each point in the supply chain.

Documenting the supply chain employed direct observation of the entire case-ready process. Included were a meat processor, three Distribution Centers, and 12 SAL retail grocery stores. Several hypotheses about certain operational issues were dispelled during this phase. Initially, it had been assumed case-ready products arrived at Distribution Centers from the meat processor in a degraded state, which worsened as it was shipped and handled to the stores. To the contrary, it was observed that product

arrived at Distribution Centers as specified in the ordering system to the meat processors. Another misperception that was dispelled was that standard operating procedures at the Distribution Centers were not being followed, subsequently jeopardizing product quality as it entered the retailer's cold chain. It was observed that state-of-the art facilities, procedures and metrics were present at the Distribution Centers resulting in maximized shelf life of all perishable products, including case-ready products.

To further understand the supply chain of case-ready products, a process map was constructed to document each stop along the supply chain beginning with product arriving from the meat processor and ending when the products are displayed for sale in retailers' display cases. It should be noted the process map begins with the product being ordered from individual retailers. Documenting the process map was instrumental in identifying the key operational issues.

The next phase of the research was to undertake a comprehensive literature review of case-ready products from several perspectives, including the existing case-ready models in use, packaging alternatives and food safety issues associated with all fresh meats. A review of the Accounting and Strategic Management literature was conducted relative to topics of outsourcing and/or "make-or-buy" management decisions. A complete review of the Transaction Cost Economics literature was performed, paying particular attention to the economic perspectives of outsourcing decisions. These literature reviews resulted in better understanding of the supply chain and the operational issues, as well as outsourcing decisions of functions considered core to a firm.

The questionnaire was developed based upon the research questions and propositions that centered on the following operational issues: workmanship, shrink, handling, case-ready product, packaging, and food safety.

The questionnaire also included several questions related to fresh meat sales and costs. One of the cost related questions was asked respondents about their "perceptions" of costs associated with adopting a case-ready strategy. Another question sought retailers' perceptions of retail price differences between case-ready products and in-store packaged meats. During the data analysis phase it was apparent most of the respondents did not provide useful data in response to these questions. Follow up interviews with SAL managers revealed most respondents believed the information required to accurately answer these questions was proprietary, which discouraged responses.

5.1.3 General Conclusions Drawn from the Questionnaire

Questionnaires were administered to 110 corporate stores and 110 licensed stores. Of the 220 questionnaires, 193 were returned. Corporate stores returned 109 and licensed stores returned 84, yielding an overall 87.7 percent response rate. Senior management encouraged store managers to respond to the survey, which accounts for this high response rate. The analysis of the firm-level data began with cross-tabulations of the Likert scale and ranking scale questions, as well as a qualitative evaluation of several open-ended questions. The data was also analyzed using multiple regression and binary logistic regression.

5.1.4 Major Findings from the Cross Tabulations Analysis

Food Safety Propositions: The first research proposition relative to food safety showed 65.8 percent of respondents from both store types agreed or strongly agreed case-

ready meats were the safest alternative compared with in-store processed meats. This result is impressive given the large number of respondents' stores that do not sell case-ready meats. The results concerning the second food safety proposition illustrated there was no difference between store types that a foodborne illness would be catastrophic to sales. Moreover, both store types agreed or strongly agreed with the statement. One of the food safety research propositions hypothesized that if customers recognized that the fresh meat they were purchasing was the "safest" available, their customers would respond by purchasing more from that store. Respondents agreed or strongly agreed their customers would indeed purchase more fresh meats if they believed those products were the safest. This is an important finding in support of adopting case-ready programs in as much as case-ready products are processed and packaged under food safety protocols and HACCP regulations.

Workmanship Propositions: Several of the workmanship research propositions pertained to the appearance of fresh meat products. Nearly sixty-two percent of all store managers believed fresh meat prepared in-stores were superior in appearance to case-ready products. The case study and literature review revealed case-ready packaging firms were convinced the low head space packaging (oxygen/low atmosphere packaging technology) closely resembled in-store processed meat products, which enhances the favorable "workmanship" impression of case-ready products.

Respondents were asked which alternative (case-ready or in-store processed) was more consistent in workmanship. Nearly sixty-one responded there was no difference between alternatives. The consistency of acceptable workmanship is an important

finding for case-ready meat processors that are concerned with its perceived lack of positive product appearance.

Shrink Propositions: Shrink was defined for respondents as any dollar amount received that was less than full-expected retail price for meat products. Nearly fifty percent of all respondents reported that case-ready programs were superior in managing shrink. Several follow up questions were asked about specific sources of shrink, including: customer and employee theft, defective packaging, workmanship issues, non-bloom issues, and out-of-date product. All of these questions scored as a concern for both store formats. The two biggest concerns for both store types were customer theft and when case-ready ground beef products did not "bloom" to the traditional red color.

Another shrink-related proposition was concerned with respondent's satisfaction with how store records accounted for fresh meat packages not sold at full retail price. Both store formats responded being satisfied. However, these findings were inconsistent with the literature review, meat executive interviews, the one-day seminar, and Dr. Levin's Activity Based Costing analysis of case-ready products.

Packaging Propositions: The packaging propositions were developed around three key observations. The first concerned case-ready products that require "blooming" before they are ready to be stocked in the meat cases. The results of blooming question from corporate store respondents documents that 46.8 percent disagreed or strongly disagreed "blooming" case-ready products cause operational problems. This point is well taken, because corporate store managers are familiar with this task and are in the position of accurately commenting on this issue. For the licensed stores 54.8 percent disagreed or

strongly disagreed blooming was a problem. These findings are supportive of case-ready advocates.

The second proposition focused on the attractiveness of case-ready packaging. Corporate stores responded with 65.1 percent agreed or strongly agreed the packaging was attractive compared with the licensed stores responded with 39.3 percent agreed or strongly agreed. For licensed stores the percentages were larger when they were questioned about the low headspace packages which closely resemble in-store processed meats. This is another finding supportive of case-ready proponents.

Finally, a research proposition inquired of store managers' opinions regarding case-ready packaging alternative of high oxygen, high headspace relative to being a detriment to fresh meat sales. The corporate stores responded with 32.1 percent agreed or strongly agreed with that statement, while the licensed stores were decidedly different, with only 13.3 percent of respondents believing the high oxygen packaging for ground beef was not detriment to sales. As expected, the low-oxygen low headspace for ground beef and whole muscle cuts packaging alternative was preferred to high oxygen alternative. This finding portends more products being packaged in a low oxygen/low headspace tray and film.

Handling Proposition: It should be noted that handling relates to the human interaction/treatment of meat products. This proposition elicited both the tangible and intangible aspects of handling. Case-ready products have been promoted as the best means of maintaining fresh meat product inventory levels meat display cases throughout all hours of store operation. The chi square test statistic was not significant, revealing no difference between store types in keeping meat cases serviced once meat cutters leave the

store (typically 4:00 PM) which is the acknowledged most challenging time to keep fresh meat cases stocked. According to SAL management, the time from 4 PM until 7 PM generally is the busiest time in most Limited Assortment Stores, and a time to maximize store revenue by keeping the meat cases fully stocked.

Profitability Proposition: The first case-ready product research propositions were interested in the profitability of both alternatives. Just over 43 percent indicated they believe that processing in-stores was more profitable than case-ready programs, while 45.9 percent believed the case-ready program alternative was more profitable. Licensed stores overwhelmingly believe (75 percent) in-store processed meats were more profitable; and only 17.9 percent responded that case-ready programs are more profitable. This is consistent with the interviews of industry executives/management and store managers who reported the low profitability image of case-ready programs are the principal reason for slow adoption.

Fresh Meat Preference Proposition: The proposition relating to fresh meat preferences were based upon several factors: color, servings per package and package price. Managers of both store formats chose package price as the as being most important to shoppers. Another question asked store managers to rate how sensitive their customers would be to prices for several products. Ground beef was the most sensitive to price, for both formats. Another set of propositions was interested in acquiring information about specific case-ready attributes, including: product appearance, shelf-life and item (SKU) variety. Surprisingly, 47.7 percent of corporate store managers, all of which are operation with case-ready programs, believe in-store processed meats

possessed better appearance. Managers of licensed stores agreed (80.2 percent). This result suggests further investigation to determine the basis of this finding.

Shelf Life Proposition: The proposition relative to shelf life is an important issue and linked directly to sales and shrink for retailers across formats. Nearly 65 percent of respondents believe case-ready programs are superior. SKU varieties are linked directly to the amount of product offerings a retailer can offer; and 52.9% percent of respondents from both kinds of retailers believe that in-store processed meats offer more variety. However, 25.9 percent of respondents believe there was no difference. One explanation of this result is that both formats are Limited Assortment Stores which as a matter of policy limits product assortment in all product categories.

Several product questions were designed around these important product attributes: the lean-fat ratios, pack size, preferred cuts, and the availability of ground beef products having sufficient lean-fat alternatives. Both store types agreed and strongly agreed ground beef was available in the appropriate lean-to-fat ratios. Another proposition questioned whether beef cuts being sold were those their customers preferred. In corporate stores, 68.3 percent of respondents answered from the median to strongly disagree; while the licensed stores responded at 66.4 percent from the median down to strongly disagree. These sharp differences corroborate meat processors' views that more beef cuts are required. Not only are more types needed, but in pack sizes that conform to Limited Assortment Stores' customers. It was also discovered that there is suitable availability of case-ready ground beef in the desired pack sizes for store customers in both store types. Meat processors commented during the interview process that case-

ready ground beef programs provide retailers choices of several pack sizes and lean-to-fat ratios

Workmanship Proposition: A key workmanship research proposition focused on the additional skill sets meat department personnel would be required to have once adopting a case-ready strategy. The cross tab showed 67.9 percent of all respondents agreed or strongly agreed meat cutters could feasibly be trained to manage the entire perishables category. The exact same results were recorded for the question concerning shifting meat department personnel from meat cutting to category forecasting and inventory management (67.9 percent of respondents agreed or strongly agreed). This is considered an important finding as it pertains to managing the perishables department (meats and produce).

An open ended question was posed concerning what case-ready products customers would purchase which are not currently being offered. In the 16 respondents the following products were cited in order: Premium steaks, extra lean ground beef products, and premium-quality pork and beef roasts.

5.1.5 Multiple Regression

Six regression models were developed, one for each operational issue (except the case-ready meats operational issue) and one model exploring a combination of the operational issues. Both the dependent and independent variables are based on Likert scale questions.

The multiple regressions models had decidedly mixed results. Only the food safety and workmanship models produced results containing both significant independent variables and decent R^2 scores. Another strategy was employed at that point to employ a

dependent variable based upon the economics or cost effectiveness of case-ready products, matched with a combination of independent variables constructed from all operational issues. Indeed, all of the variables of interest were significant, except the dummy variable for store type. Each of the final independent variables in the hybrid model was directly related with the dependent variable, "case-ready products being the more cost effective meat alternative."

A difficulty in the project was quantifying these research propositions using multiple regressions on their individual contributions with five separate dependent variables. Two out of five regression models produced significant results for their respected research propositions. With the overall results being mixed, the project built a hybrid regression model which was constructed from all six categories of research propositions. All of the coefficients in the hybrid model were significant with correct coefficient signs.

The variables of interest for the hybrid model include: case-ready products have the ground beef pack sizes stores demand, satisfaction levels with shrink inventory issues, satisfaction with meat case inventory levels, case-ready products are the safest, case-ready meats use attractive trays and the cost of worker's compensation is becoming cost prohibitive.

Three important conclusions can be drawn from the hybrid model: all of the six operational issues were represented as independent variables in the model, all of the independent variables were highly significant, and the independent variables included in the hybrid model were all topics of concern in the case study. The results for this regression are positive for developing better understanding of the operational factors that

help to explain why case-ready programs are effective, which should encourage an increase in adoption rates of case-ready programs.

5.1.6 Binary Logistic Regression Model 1

Because a better understanding of the binary choice to adopt case-ready programs is a goal of this research project, it was decided to use a logistic regression technique to identify the behavioral choice or an event classification. This method is appropriate when the relationships between variables and possible complexity are unknown. These binary choices relate to decisions made about product selections or non-selections of case-ready programs.

The primary purpose of the binary logistic regression analysis was to better understand why fresh case-ready products have experienced slow adoption. This analysis was designed to help identify the qualitative traits or explanatory variables that may affect a retail grocer's propensity to adopt the fresh case-ready programs.

There are two primary proteins that make up the majority of the products sold in retail grocery stores; ground beef and whole muscle cuts, which were the basis for two binary logistic regression models. Model 1 focused on adoption of case-ready ground beef and Model 2 on whole muscle meat products. Both models were examined using hypotheses about the qualitative traits or characteristics that affect adoption decisions.

To help assess the performance of Model 1, a percent correct prediction statistic was tabulated which can be found within the Classification Table, and is deemed the "practical" results from running the logistic regression model. The classification table statistic revealed the null model of only the intercept yielded 74.1 percent. After adding the explanatory variables, the classification model's overall percentage increased to 89.1

percent, which is indicative of the Logit 1 model's ability of further explaining the factors of case-ready programs adoption decisions.

Further analysis of the significant explanatory variables or predictors for Model 1 were put into three broad categories related to the decision process of adopting case-ready ground beef programs. These broad categories are the major headings for the research's six operational issues that were discussed in chapter four. The three adoption categories relevant to Limited Assortment Store retailers in helping them improve their business model include: supply chain metrics; product attributes for processors, retailers and consumers; and management tools.

The first category, supply chain metrics, identifies the key factors discovered in the research that are conducive for ground beef to effectively and efficiently move through the supply chain and ultimately into retailers' display cases. The importance of this category cannot be overstated as supply chain metrics in the past have been instrumental in distributing perishable products through a supply chain while achieving maximum shelf life for both retailers and customers. Increased shelf life is an important attribute for retailers, which mitigates several other sources of shrink, improves sales for processors and profit. Moreover, it provides consumers more product options and improves satisfaction levels of the entire retail grocery store shopping experience resulting in greater profitability. Below are the pertinent factors.

Supply Chain Metrics Discovered in Model 1

- Importance of monitoring temperatures of product delivered from the stores. This could also be inferred for DC receiving product from processors.
- Importance of writing the delivery date on each carton of fresh beef delivered to stores. Recognizing and implementing this important step is deemed critical towards maximizing inventory management and ensuring product has the maximum amount of time to be sold for full retail price (no markdowns or write-offs).
- Defective and damaged packaging from the perspective of supply chain metrics relates to the necessity of discovering where along the supply chain the damage was incurred and make the necessary changes to improve stops along the supply chain and mitigate future damaged products.
- Importance of monitoring and reconciling products not sold at full retail. This metric is related to properly and systematically quantifying product not getting through the supply chain. Proper accounting should be the catalyst for improving the supply chain.

The second adoption category is product attributes which are important for all participants in the supply chain: processors, retailers and consumers. Product attributes are directly related to fulfilling shopper demand. A more complete understanding of product attributes is an important step in constructing demand scenarios and the ability to help with future shifts of demand for case-ready ground beef products. Below are the pertinent factors.

Specific Product Attributes Demanded by all Participants in the Supply Chain

- Case-ready ground beef products are available with the required lean-to-fat ratios. Retailers must have product in the "pack sizes" their customers demand. Whole muscle beef products cut and packaged in stores use this data/information to ensure their stores have the whole muscle pack sizes their customers demand. Especially for whole muscle meats. Interviews of store managers revealed this important point.
- Shrink associated with workmanship issues in a case-ready scenario is an opportunity for managers to account for all products with "workmanship" issues before customers view/buy the product. This information needs to get back to processors to help them constantly improve their offerings by isolating the source of the workmanship issues. Packaging has been viewed by as marketing tool to help retailers.
- Case-ready products being viewed as safer than products produced in-stores is key attribute retailers and consumers both require. Currently when other fresh food products are deemed safer this fact has allowed food marketers to differentiate those products in the marketplace and are able to charge higher prices.
- Case-ready products are packaged in attractive trays. Current packaging research posits one way to differentiate products in the marketplace and in minds of consumers is through new and innovative packaging alternatives.

The last adoption categories are the management tools that help further adoption rates. This category is related to the product's ability to help management continuously improve their business model. An underlying fact about many management tasks in the Limited Assortment Store business is the repetitive nature of many of the tasks.

Management Tools

- Case-ready's ability to help managers maximize store sales during the first few days of each month. Limited assortment stores experience unusually high levels of store sales during the first few days of each month and products that can be seen as less labor and maximize sales will be positively viewed by decision makers.
- Case-ready's ability to mitigate the need for finding future supplies of meat cutters. Meat cutters have higher labor cost per unit as compared to other store personnel and the supplies of qualified meat cutters are going down.

5.1.7 Binary Logistic Regression Model 2

The second binary logistic regression model was interested in the factors that will help further adoption rates of case-ready whole muscle meat products. There were 13 explanatory variables in Model 2, and only two of these variables had non-significant *p*-values. The failed variables were related to shrink associated with product being out of date and satisfaction levels of how the store preps for meat specials.

The results of the percent correct predicted (classification tables) displayed a 56 percent in Step 0 when only the dependent variable is included. When the explanatory variables were added to the classification table in Step 1 the results increased to 90.7 percent. The improvement between Step 0 and Step 1 reveals the explanatory variables of interest for Model 2 can be interpreted as useful predictors of adoption of case-ready whole muscle beef products. This is a very significant and encouraging result for the project.

The use of binary logistic regression again makes it possible to categorize the significant explanatory variables or predictors into three broad categories that yielded managerial implications for whole muscle beef products. Similar to Model 1 the results of Model 2 had three broad categories which were in fact the major headings for the research's six operational issues. The three adoption categories include: 1) supply chain metrics, 2) product attributes demanded by- processors, retailers and consumers and 3) management tools, specific for limited assortment retailers to help them improve their business model. Here are the results of that analysis:

Supply Chain Metrics (Model 2)

- Importance of writing the delivery date on each carton of fresh beef delivered to stores. Recognizing and implementing this important step is deemed critical towards maximizing inventory management and ensuring product as the maximum amount of time to be sold for full retail price (no markdowns or write-offs).
- Defective and damaged packaging from the perspective of supply chain metrics relates to the necessity of discovering where along the supply chain the damage was incurred and make the necessary changes to improve stops along the supply chain and mitigate future damaged products.
- "Blooming" case-ready products are a problem. Metrics designed by processors and retailers are not internalized and institutionalized. Blooming case-ready products takes time and planning. If these metrics are not followed product will not get through the supply chain efficiently.

Specific Product Attributes Demanded by All Actors (Model 2)

- Case-ready whole muscle beef products are available in the pack sizes stores and consumers demand. Retailers must have product in the "pack sizes" their customers demand. Whole muscle beef products cut and packaged in stores use this data/information to ensure their stores have the whole muscle pack sizes their customers demand, especially for whole muscle meats. Interviews of store managers revealed this important point.
- Shrink associated with workmanship issues in a case-ready scenario is an opportunity for managers to account for all products with "workmanship" issues before customers view/buy the product. This information needs to get back to processors to help them constantly improve their offerings by isolating the source of the workmanship issues. Packaging has been viewed by as marketing tool to help retailers.
- Case-ready products being viewed as safer than products produced in-stores is key attribute retailers and consumers demand. Currently when other fresh food products are deemed safer this fact has allowed food marketers to differentiate those products in the marketplace and are able to charge higher prices.
- Case-ready products are packaged in attractive trays. Current packaging research posits one way to differentiate products in the marketplace and in minds of consumers is through new and innovative packaging alternatives.

Management Tools (Model 2)

- Case-ready's ability to help managers maximize store sales during the first few days of each month. Limited assortment stores experience unusually high levels of store sales during the first few days of each month and products that can be seen as less labor and maximize sales will be positively viewed by decision makers. (Similar to Model 1)
- Case-ready's ability to mitigate the need for finding future supplies of meat cutters. Meat cutters have higher labor cost per unit as compared to other store personnel and the supplies of qualified meat cutters are going down. (Similar to Model 1)
- Case-ready's ability to be viewed as more "cost effective" as compared to fresh meats processed in-stores. This predictor was not significant in Model 1; once all costs, including transaction costs are included could make case-ready an attractive alternative. Albeit for whole muscle meat products only, not ground beef. This is consistent with research/industry interviews on how the production of ground beef can absorb or use more products deemed to be waste (considered shrink) into the finished product.

5.2 Observations

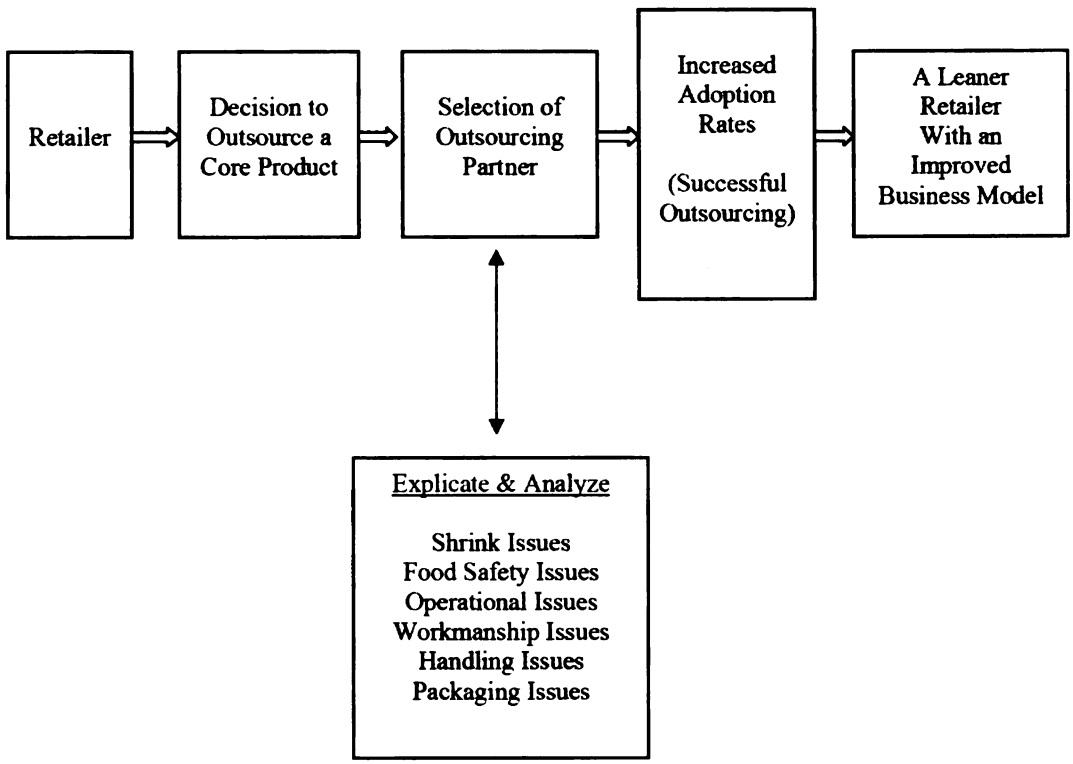
A significant portion of this research project was concerned with the issues/factors related to increasing the adoption rates of case-ready products. From the retailer's perspective the decision to adopt a case-ready strategy is one that would require them to outsource a core item of its operations. Given the literature is resolved in suggesting firms outsource only those functions that are considered non-core to the firm, this research project dealt with a contrary situation in as much as retail meat operations

clearly is core to its business model. However, this has presented the research with the opportunity to break new ground.

One of the goals of outsourcing any business function is to achieve a more efficient and profitable company by allowing it to focus on what the firm does best: presuming the functions are core competencies.

Friedman (2004) challenges outsourcing relationships to take on this new context, one that is organized horizontally. Horizontal collaborations are decidedly different from the traditional vertical relationship in outsourcing in the sense that they foster an atmosphere where strategic alliances are sought. Figure 2 below is a conceptual model for outsourcing core products. The key loop in the model is found in the selection of the outsourcing partner. The selection is based upon the firm first explicating or identifying the issues through a systematic process and then analyzing the key operational issues associated with the core product or service. The explicating and analyzing loop are the basis for starting the collaborative relationship with the outsourcing partner. When there is a true collaboration in a "flat world", outsourcing partners are encouraged to work together in sharing information whereby both firms constantly improve their respective businesses. Outsourcing meat operations to processors and adopting case-ready programs using this model could facilitate Limited Assortment Store retailers to become more efficient and effective, thus improving its business model.

Figure 2: Conceptual Model for Outsourcing a Core Product



5.2.1 Walmart's Conversion to a Case-Ready Program

To date only Walmart, the world's largest retailer has committed to outsourcing a 100 percent of their fresh meat offerings. With this unprecedented dedication and commitment to a case-ready strategy Walmart no longer processes and packages fresh meats at store locations. One plausible explanation of this strategy would be Walmart views outsourcing, not from the lens of fresh meat products being core or non-core to their business model, but whether the decision to outsource improves their overall business model.

All retailers, whether they have adopted a case-ready strategy or process their fresh meats in-stores face several demand factors associated with fresh meat products they include: consumers' tastes and preferences[24] for good tasting fresh meat products, safe fresh meat products, the governmental/environmental issues surrounding the processing and packaging of fresh meat products are uncertain and a failure to comply with current and future dictums could be daunting and costly, new processing and packaging technologies associated with safe production of meats are expensive to replicate for corporations that have thousands of retail locations and finally, the legal liability[25] associated with a food safety violation or tainted fresh meat product. Paradoxically, these demand factors were all similar to the ones the poultry industry faced when they considered the adoption of case-ready programs and they are all still relevant.

In its current form case-ready programs could concede that in-store processing of fresh meats has a better control for supplying consumer's demand for good tasting products, because they have direct control of the inputs and hence control the output. The same rationale goes for pack size, lean-to-fat ratios for ground beef products, and cuts of whole muscle products.

Concerning a safe supply of fresh meat products, both in-store and case-ready offer a safe supply. The critical factor is control; both alternatives offer controls and or metrics in an effort to produce a 100 percent supply of safe meat for sale. Case-ready products are processed under HAACP certified "clean rooms." Case-ready has a

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[24] Also within tastes and preferences is quality, pack size, lean-to-fat ratio (ground beef), desired cuts (whole muscle meat products).

[25] Legal liability has two perspectives: monetary damages and loss of brand equity.

competitive advantage in meat processing/packaging and the literature confirms this point.

Current governmental and environmental regulations are strict and have penalties for non-compliance. Both alternatives process and comply under the current regulations. These regulations as with all regulations can be changed at a moment's notice, and non-compliance is not an alternative. A key point about future regulations is what will be the cost of complying with new regulations. Given the stringent amount of regulations and the uncertain future of these regulations, the project acknowledges a case-ready program has the advantage.

The legal liability associated with processing fresh meats has two components monetary and brand equity. The monetary component of a legal liability is self defining and well documented. The loss of brand equity associated with processing/packaging fresh meats must also be considered, the legal liability in most cases damages the entire brand. In the retail grocery store business the loss of brand equity or confidence in the brand could be more expensive than monetary damages. In some instances, the entire business model may take a significant amount of time to regain market share and consumer confidence. In extreme cases, the entire business model could fail to recover. The project gives case-ready programs the advantage.

Reviewing the above demand factors is a partial explanation for Walmart's commitment to a 100 percent case-ready program. The point about consumer's taste and preferences for quality products is conceded to in-store processing. It should be noted the project documented in literature and analysis within the questionnaire that the supply of qualified meat department personnel is dwindling and the wages paid for qualified meat

journeymen are on the rise, driving cost of maintaining meat cutters employed in the retail setting to prohibitive levels. In total, the risks associated with in-store processing could prove to be too for costly retailers in the future.

5.3 Implications and Concluding Remarks

5.3.1 Managerial Implications

The managerial implications are based upon the economic realities Limited Assortment Store retailers would face if there is a foodborne illness outbreak caused by a retailer's processing and packaging units having failed to follow prescribed food safety metrics and protocols. Many companies implicated in food safety situations have lost or seriously damaged their businesses. To the extent it can be determined that case-ready programs offer safer processing methods; retailers should give greater consideration to adopting case-ready programs.

A serious consideration in retailers deciding on whether to outsource meat operations relates to control of the factors of quality and specifications relating to packaging, etc. Central processing of meat packages enable standards to be established to a degree that decentralized processing in stores is not possible. The tradeoff is that individual stores have less flexibility in differentiating its meat offerings.

Analysis of the research propositions revealed for case-ready products to be viable strategy processors must offer retailers the cuts, portions and requisite quality the need. As case-ready demand increases production allocations will shift accordingly. Because of these market place realities case-ready cuts and portion demands are slowly being fulfilled, hampering adoption rates.

During the case study quality issues associated with the current offering of case-ready meat products available for Limited Assortment Stores to purchase did not arise. However, interviews with the CEO of a private firm that controls 18 SAL licensed stores did have concerns about the grades of beef available in the future. This would be especially pertinent when the economy tightens, because more customers of Limited Assortment stores will demand a higher grade and quality of beef. During the interview only select grades of case-ready beef were available, in the future, processors were planning to offer higher grades of beef products.

Case-ready programs should be considered from two perspectives: price and cost. The study discovered that SAL senior management and several retail managers (those currently not selling case-ready products) have the impression the cost of case-ready products would be higher than meat products processed in-stores, with consequent higher prices to shoppers. Asked if case-ready products as compared to in-store processed products were more "cost effective", only 23 percent of licensed stores agreed or strongly agreed case-ready products were more cost effective; and 54 percent of managers of corporate stores agreed or strongly agreed with that statement. Managers of licensed stores, especially, (which cut and package meat in stores) were not convinced of the cost effectiveness of case-ready programs. If greater adoption of case-ready programs is to be realized, it will be important that a complete cost benefit analysis be conducted taking into account such factors as shrink, product availability in meat cases, labor factors among other factors identified in this research.

5.3.2 Relationships with Customers

From the perspective of retailers that process meats in-stores there is another concern of adopting a case-ready meat strategy. Currently, their butchers/meat cutters have a direct relationship with customers which respond to customers' questions about meat products, meal preparation and concerns with quality / freshness. Many meat department personnel offer cooking advice and other product suggestions. These employees play an important role as the "face" of the meat department. One suggestion offered by meat processors to maintain the personal relationship with shoppers in a case-ready setting would be to train meat department personnel to manage all perishables (meat and produce). The principal responsibilities would be inventory control, product orderings, forecasting. However, they would be able to play the important customer relations role. This role could include advice about complementary products throughout the store, assisting in launching new products. These new positions are envisioned to help market and grow the two perishable categories, categories where retailers garner higher profit margins and drive the profitability of the entire store.

Case-ready programs offer retailers and processors a necessary stimulus to be creative and proactive in improve each other's business models. Outsourcing the core function of meat operations may contradict the conventional wisdom: however, this research reveals there are compelling factors that may support retailers adopting case-ready programs.

5.3.3 Point of Sale Information Coordination

Retailers collect an extensive amount of data from the point of sale (cash register data), which is useful to retailers and processors in developing models to project demand.

Point of sale data could provide meat processors with valuable data about product sales including: velocity of sales, amounts, portions, grades, and quality. Coupled with demographic information, processors could improve their demand models significantly while expanding their economies of scale in production and providing the Limited Assortment Store retailer with more of the products their customers prefer.

5.4 Suggestions for Future Research

Further research efforts could include expanding the sample to include all retail grocery store formats including Super Stores, Conventional grocery stores, and other Limited Assortment Store grocery retailers. New research into case-ready products would benefit from access to sales and cost data of case-ready products, new product offerings, pack sizes, grade, quality, velocity/timing of sales and the possibility of Direct Store Delivery (DSD) of case-ready.

These suggestions should further the use and understanding of outsourcing core functions through information sharing and metrics for each supply chain partner.

APPENDIX A. SUPPLY CHAIN PROCESS MAP AND SURVEY

Steps	Critical Activities Along the Case-Ready Cold Chain	Flow	Time	Cold-Chain "Vulnerability" Index	Operational Issues
1.	SAL buyers order product	O		0	Lead times (7-10 days)
2.	Product shipped from processor	→		10	
3.	Tractor/Trailer arrives at DC	D		7-8	
4.	Unloaded onto pallets	O		5	Handling issues problems of unloading cases of CRFM product and cold chain issues.
5.	Staged on DC loading dock	O		5	Handling issues, time spent on the dock, especially when temperature of dock can be an issue.
6.	Pallets moved to storage slot	O		1	
7.	Product inventoried / slotted / stored	Δ		0	FIFO, inventory problems
8.	Product inventoried/ordered at the store level	O		0	Turn-around times for receiving new order
9.	Corporate SAL orders product	O		0	Turn-around times for receiving new order
10.	Store transmits order	O		0	Turn-around times for receiving new order
11.	DC picks/builds store order from inventory	O		1	
12.	Order is staged on dock	O/D		5	
13.	Product is loaded on to truck (with other food items)	O		3	Handling issues
14.	Order arrives at store	→		7	Temperature and handling issues
15.	Order is moved from truck to dock	O		5	
16.	Order is checked in	O		5	
17.	Product is moved to cold storage	O		1	Handling, especially how long it may take to get into storage.

Steps	Critical Activities Along the Case-Ready Cold Chain	Flow	Time	Cold-Chain "Vulnerability" Index	Operational Issues
18.	Product stored in walk-in cooler	Δ		1	FIFO, inventory issues.
19.	Product bloomed/weighed/priced	O		1	Qualified personnel, shrink, broken seal etc.
20.	Meat cases are stocked	O		2	Workmanship issues, inventory issues FIFO
21.	SAL shoppers select	S		0	Family pack issues
22.	Shoppers check out	S		0	Temperature issues
23	Shoppers drive home	S		7	Temperature issues
24.	Stored until use	Δ		5	
25.	Meal preparation	S		0	

Category	Symbol	Description
Operations	O	Changes, creates or adds something.
Transportation	→	Moves product from one place to another.
Delay	D	Occurs when product is held up awaiting further action.
Storage	Δ	Occurs when product is put away until a later time.
Shopper	S	Shopper activities.

The Cold Chain "Vulnerability" Index is based upon the product's vulnerability factors exposed while moving through the cold chain including time, temperature and handling that may lead to product degradation. This index attributes a number value to potential risks. The ranking is from to 1-10, 10 being the greatest risk or potential for degradation.

Michigan State University
Case-Ready Meat Research Project Survey

Store Profile Questions

1. Please check the box that describes your store.
   [ ] Save-A-Lot Corporate Store [ ] Save-A-Lot Licensed Store

2. Does your store sell the following case-ready products?

Ground Beef	[ ] Yes	[ ] No
Whole Muscle Beef (Beef Cuts)	[ ] Yes	[ ] No
Pork Whole Muscle Cuts or Grinds	[ ] Yes	[ ] No

3. Does your store grind **beef** and/or **pork** products? [ ] Yes [ ] No

4. When is it difficult to maintain adequately stocked meat cases? Check **all** that apply.
   [ ] 9 a.m. – 10 a.m.
   [ ] 10 a.m. – 1 p.m.
   [ ] 1 p.m. – 4 p.m.
   [ ] 4 p.m. – 7 p.m.
   [ ] 7 p.m. – close

5. How would your customers rank these attributes of fresh beef and pork products?
Rank by preference, use each preference only once.
1=First Preference 2=Second Preference 3=Third Preference

   [ ] Color
   [ ] Servings per package
   [ ] Package price

6. Rank these fresh meat products according to how **sensitive** your customers are to the **prices** charged per pound.
1=Most Sensitive 2=Moderately Sensitive 3=Least Sensitive
   [ ] Fresh Whole Muscle Beef (Beef Cuts)
   [ ] Fresh Ground Beef
   [ ] Fresh Pork Cuts and Grinds

7. How satisfied are you with the way your store verifies that fresh meat deliveries from the Distribution Center (DC) are within acceptable temperature ranges?
1 2 3 4 5
Not at all **Very satisfied**

8. How satisfied are you with the way your store transfers fresh meat products from the receiving area to the walk-in coolers?	1 **Not at all**	2	3	4	5 **Very satisfied**
9. How satisfied are you with the way your store writes the delivery date on each fresh meat box received from the DC?	1 **Not at all**	2	3	4	5 **Very satisfied**

Case-Ready Questions

Compare fresh meat processed in-stores with case-ready meat products. Check the box of the product that you believe is superior for each Key Success Factor listed. Leave blank if you believe the products are similar.

Key Success Factors	Fresh Meat Processed In-Stores	Case-Ready
10. **Product appearance** (trim, color and quality)	[ ]	[ ]
11. **Shrink management** (Shrink is defined as any dollar amount that is less than full-expected retail price for and all fresh meat products.)	[ ]	[ ]
12. **Profitability**	[ ]	[ ]
13. **Shelf-life**	[ ]	[ ]
14. **Food safety** (processed under the safest possible conditions including sanitation and temperature control)	[ ]	[ ]
15. **Out of stocks**	[ ]	[ ]
16. **Product consistency**	[ ]	[ ]
17. **SKU varieties**	[ ]	[ ]

These questions are for store managers that previously sold case-ready fresh meat products and switched to processing fresh meat in-stores.

34. When you started selling case-ready meats your **sales** went up or down by what percentage? ..... _____%

35. Fresh meat **costs** associated with case-ready meats went up by what percentage: ..... _____%

36. Case-ready meat products that were offered for sale had the same price as meats processed in the store. .....Yes _____ No _____

37. When you switched to case-ready meats did your customers prefer meat products processed in the store? Yes _____ No _____

If your answer is yes, what reasons did they express to you?

_____

_____

_____

_____

_____

_____

_____

_____

_____

38. What were your perceptions of overall costs associated with switching to case-ready meats? _____

_____

_____

_____

_____

_____

_____

_____

_____

Using the scale listed to the right, circle a number on each line to indicate how much you agree or disagree with each statement about case-ready meats.

19. Case-ready **ground beef** products are available in the lean – fat ratios my customers prefer.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**
20. Case-ready **whole muscle beef (beef cuts)** products are available in the "cuts" my customers prefer.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**
21. Case-ready **pork** products are available in the "**cuts**" my customers prefer.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**
22. Case-ready **ground beef** products are available in the **pack** sizes my customers prefer.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**
23. Case-ready **whole muscle beef (beef cuts)** products are available in the **pack** sizes my customers prefer.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**
24. Case-ready **pork** products are available in the **pack** sizes my customers prefer.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**
25. Case-ready **ground beef** (not chubs) with a 75/25 lean – fat ratio have a "cherry red" color.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**
26. Case-ready **ground beef** (not chubs) with a 85/15 lean – fat ratio have a "cherry red" color.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**
27. Case-ready **ground beef** (not chubs) with a 90 / 10 lean – fat ratio have a "cherry red" color.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**

28. If you are selling case-ready beef and pork, is it a more ***employee-friendly*** program compared to processing fresh meat in-store?

[ ] Yes [ ] No

30. If you are selling case-ready beef and pork, is it a more ***manager-friendly*** program compared to processing fresh meat in-store?

[ ] Yes [ ] No

If yes, why is case-ready more ***manager friendly***:_____

_____

_____

31. What case-ready products do you think your customers would purchase that you are not currently offering or is not available?

_____

_____

_____

_____

_____

32. This question is for managers that currently do not carry case-ready meat products.

What are the main reasons your store continues to process fresh meat products on-site?

_____

_____

_____

_____

_____

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_____

_____

33. Currently, if you do not sell case-ready meats, under what conditions would you be persuaded to switch to a case-ready meat program?

_____

_____

_____

_____

_____

Questions About Shrink

*Shrink is defined as any dollar amount that is less than the full-expected retail price for any and **all** fresh meat products.*

Listed below are several sources of shrink associated with fresh meat products. For each sources of shrink, assign the appropriate number that describes the magnitude of the concern at your store.

39. Customer theft	1 **Big Concern**	2	3	4	5 **Not a Concern**
40. Defective and damaged packaging	1 **Big Concern**	2	3	4	5 **Not a Concern**
41. Workmanship issues	1 **Big Concern**	2	3	4	5 **Not a Concern**
42. Incorrect inventory issues	1 **Big Concern**	2	3	4	5 **Not a Concern**
43. Non-bloom issues associated with case- ready ground beef	1 **Big Concern**	2	3	4	5 **Not a Concern**
44. Non-bloom issues associated with case-ready beef cuts	1 **Big Concern**	2	3	4	5 **Not a Concern**
45. Employee theft	1 **Big Concern**	2	3	4	5 **Not a Concern**
46. Out of date product	1 **Big Concern**	2	3	4	5 **Not a Concern**

47. *Rank what you believe are the three most important sources of fresh meat shrink for your store.*

1=Highest Source 2=Second Highest 3=Third Highest

[ ] Customer theft
[ ] Defective and damaged packaging
[ ] Workmanship issues
[ ] Incorrect inventory issues
[ ] Non-bloom issues associated with case-ready ground beef
[ ] Non-bloom issues associated with case-ready beef cuts
[ ] Employee theft
[ ] Out of date product

48. Are there other sources of shrink?

_____

_____

_____

49. How satisfied are you with the way your store records (or accounts for) every fresh meat package (product) **not sold at full retail**?	1 Not at all	2	3	4	5 Very satisfied
50. How satisfied are you with the way your store stocks fresh meat cases to ensure that **First-In-First-Out (FIFO)** methods are followed?	1 Not at all	2	3	4	5 Very satisfied
51. How satisfied are you with the way your store maintains adequate **inventory levels** of fresh beef and pork products stored in the walk-in coolers?	1 Not at all	2	3	4	5 Very satisfied
52. How satisfied are you with the way your store manages fresh beef and pork **inventory** to ensure the oldest product in the walk-in cooler is stacked in a way it is the next product to be picked for restocking the fresh meat cases?	1 Not at all	2	3	4	5 Very satisfied
53. How satisfied are you with the way your store maintains **adequate fresh meat case levels** of fresh beef and pork products?	1 Not at all	2	3	4	5 Very satisfied
54. How satisfied are you with the way your store **prepares** for the increased sales experienced during the first days of the month?	1 Not at all	2	3	4	5 Very satisfied
55. How satisfied are you with the way your store **prepares** for increased sales experienced associated with special fresh meat promotions	1 Not at all	2	3	4	5 Very satisfied

Food Safety and Packaging Questions

56. *Currently, there are two popular case-ready packaging alternatives. The first is High-Oxygen and the second is Low-Oxygen. Note: High-Oxygen packaging has high "head-space" to accommodate more oxygen gas, Low-Oxygen has low-head space and resembles traditional packaging associated with meats processed in-stores. Which alternative do you believe would be more successful? Check the appropriate box.*

[ ] High-Oxygen / High Head Space ***[ ] Low-Oxygen / Low Head Space***

Using the scale listed to the right of the food safety and packaging issues, circle a number on each line to indicate how much you agree or disagree with each statement.

57. A food borne illness outbreak associated with fresh meat purchased at my store would be catastrophic to **overall store sales**.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**
58. A food borne illness outbreak associated with fresh meat purchased at my store would be catastrophic to **meat sales only**.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**
59. My customers would respond by purchasing more fresh beef and pork products if they believed those products were the **safest** available.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**
60. Case-ready beef and pork products are "**safer**" than beef and pork products processed in-store.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**
61. Case-ready meat products are the **safest** meats available.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**
62. Low-Oxygen / Low Head Space packaging of case-ready ground beef **is not** a detriment to sales.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**
63. High-Oxygen / High Head Space packaging of case-ready ground beef **is not** a detriment to sales.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**
64. Low-Oxygen / Low Head Space packaging of case-ready beef cuts **is not** a detriment to sales.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**
65. High-Oxygen / High Head Space packaging of case-ready beef cuts **is not** a detriment to sales.	1 **Strongly Disagree**	2	3	4	5 **Strongly Agree**

66. Low-Oxygen / Low Head Space packaging of case-ready pork cuts & grinds **is not** a detriment to sales.	1 Strongly Disagree	2	3	4	5 Strongly Agree
67. High-Oxygen / High Head Space packaging of case-ready pork cuts & grinds **is not** a detriment to sales.	1 Strongly Disagree	2	3	4	5 Strongly Agree
68. Case-ready meat products that require "**blooming**" cause operational problems.	1 Strongly Disagree	2	3	4	5 Strongly Agree
69. My customers know the **difference** between case-ready packaging and in-store packaging.	1 Strongly Disagree	2	3	4	5 Strongly Agree
70. Case-ready beef and pork products are packaged in **attractive trays**.	1 Strongly Disagree	2	3	4	5 Strongly Agree

71. What **packaging** improvements can you suggest for the fresh meat program currently in place at your store?

_____

_____

Operations Questions

Using the scale listed to the right of the operational issues, circle a number on each line to indicate how much you agree or disagree with each statement.

72. It has become increasingly more difficult to find **qualified** meat cutters for my store	1 Strongly Disagree	2	3	4	5 Strongly Agree
73. A traditional meat department manager and / or meat cutter could be **trained** to manage all perishables not just meats.	1 Strongly Disagree	2	3	4	5 Strongly Agree
74. Implementing a case-ready meat program will **shift** meat management from production activities to forecasting and inventory management of fresh meats.	1 Strongly Disagree	2	3	4	5 Strongly Agree
75. Case-ready beef and pork products compared to "in-store" produced meat products are more **cost effective**.	1 Strongly Disagree	2	3	4	5 Strongly Agree
76. **Cost** of workers compensation for employees that cut meat is becoming prohibitive.	1 Strongly Disagree	2	3	4	5 Strongly Agree

77. It has become increasingly more difficult to find **qualified** meat cutters.

1	2	3	4	5
Strongly Disagree				**Strongly Agree**

78. When confronted with an out-of-stock fresh meat product, what percentages of your customers do not buy a substitute fresh meat product from your store (i.e., choose to shop elsewhere for the fresh meat product or not to purchase at all)? _____%.

79. If your customers do not purchase fresh beef and pork at your store, where do they most likely make those purchases?

_____

_____

80. How would you suggest information about your store's needs concerning case-ready meat products be communicated to the DC and the case-ready meat processor?

_____

_____

_____

_____

_____

_____

81. If you switched to a case-ready meat program, what beneficial use could you make with the space previously used to cut meat?

_____

_____

Thank you very much for your time and expertise. Please place the questionnaire back into the envelope, seal the closure and return to your District Manager.

Dr. John Allen, Professor Emeritus Food Marketing

George Young, Graduate Research Assistant

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