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The impact of promotion on inventory forecasting for an Asian wholesale corporation

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THE IMPACT OF PROMOTION ON INVENTORY FORECASTING

FOR AN ASIAN WHOLESALE CORPORATION

by

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A thesis submitted in partial fulfillment
of the requirement for the

Doctor of Philosophy Degree in Hotel Administration
William F. Harrah College of Hotel Administration

Graduate College
University of Nevada, Las Vegas
August 2008

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

Dissertation Approval
The Graduate College
University of Nevada, Las Vegas

June 27 , 20 08

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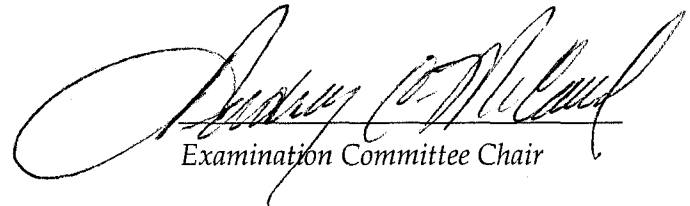
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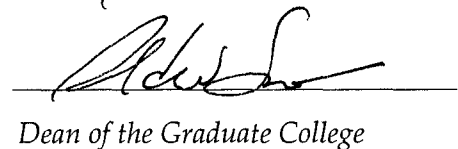
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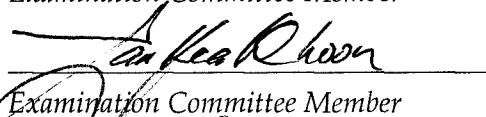
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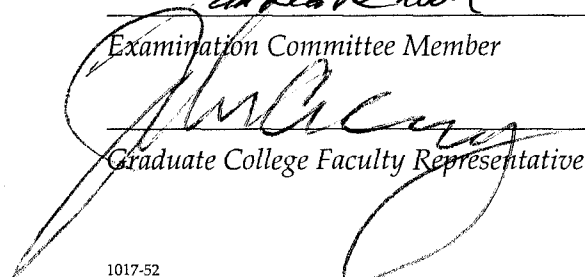
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ABSTRACT

The Impact of Promotion on Inventory Forecasting
for an Asian Wholesale Corporation

by

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Inventory control has been a challenge to wholesale firms since inventory can be

easily affected by numerous operational, social, cultural, and environmental factors.

Besides, marketing related factors create uncertainty as to the levels of the product

demands, and that uncertainty makes inventory forecasting much more difficult and

forces wholesalers to estimate the impacts of the potentially influential factors. Hence,

an understanding of the factors affecting inventory levels is the primary goal of this study.

Utilizing historical inventory data and other marketing related information

provided by an Asian wholesale corporation, the researcher estimated the effect of

promotion on product sales and replenishments with considerations of the wholesale

environment and cultural influences. Several theories were applied in this study in order

to explain demand fluctuation, and these theories acted as guidelines for the study. Nine

research hypotheses were tested in this study to investigate the effects of the marketing

related factors. Multivariate analyses, post-hoc univariate F tests, and multiple linear regressions were then performed to elicit reliable results.

Results of the study indicated that product attributes, such as brands, items, price, and package sizes, are the main factors affecting buyers' purchase decision. However, types of promotion were found to have no significant impact on either sales or orders in the same month when products were promoted. Lagged effects of promotion were observed two and three months after promotional events ended. In lag two, a significant difference was found in orders only, which indicated that a wholesale firm expected to have increased sales after implementing those promotion strategies. Sales of the new products introduced in the events did significantly increase in lag three. In the Asian culture, buyers are trying to avoid uncertainty. Hence, the response time to a new product by increasing purchasing volumes might be longer.

Promotion is the strategy used to stimulate sales. However, in this study, the effect of promotion was not significant enough to be used as an indicating factor of inventory prediction. Hence, future research might want to find out how a wholesaler can apply promotion strategies effectively to stimulate buyers' purchase intentions and increase sales, as well as profits.

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ACKNOWLEDGEMENT

First of all, I want to express my sincere appreciation to my chair, Dr. Audrey C. McCool, for her consistent mentoring, encouragement, and support through out my doctorial study at University of Nevada, Las Vegas. I would like to thank her for her mother-like advice, understanding, and guidance in the past four and half years.

Special appreciation goes to Dr. Keah-Choon Tan for his remarkable insights and suggestions in the completion of this dissertation. I would also like to acknowledge Dr. Billy Bai, Dr. Seyhmus Baloglu, and Dr. John Schibrowsky for their serving on my dissertation committee and providing valuable inputs for this study. It was my honor to work with my chair and all of the committee members.

Sincere thanks also go to Dr. Pearl Brewer and Dr. Gail Sammons for giving me opportunity to pursue my Ph.D. degree and to teach in the Hotel Management Department. I wish to thank them for their trust and encouragement throughout my study at UNLV.

Last but not least, my gratitude goes to my family for their understanding, encouragement, love and patience. Especially, my deepest appreciation goes to my parents, Jeffrey Fu-Shu Chien and Peggy Li-Hua Ho, who consistently support and trust me for the decisions I make.

CHAPTER 1

INTRODUCTION

Knowing the importance of supply chain management and utilizing the

knowledge would allow wholesalers to gain better control over their inventory flow.

(Lambert, Cooper, & Pagh, 1998; Stank, Davis, & Fugate, 2005). Having an effective

inventory management system has been found to advance the overall operations of

wholesalers in many ways. For example, improvement in inventory replenishment is

strongly associated with overall profit gain (Patton, 2005). Therefore, more and more

suppliers and wholesalers have implemented an inventory control system to maintain

proper amounts of products without investing the excess capital required to hold extra

items (Trusov, Bodapati, & Cooper, 2006).

In order to improve inventory control and predictions of the needed inventory

levels, information on factors such as product characteristics, marketing activities,

demand patterns, and order schedules is essential to effective inventory forecasting.

Successfully utilizing this information and the related historical inventory data has been

found to increase both inventory control and demand forecasting accuracy (Albright,

2005). Hence, in this study, the researcher will focus on inventory levels and other

influential factors affecting product demand and inventory flow.

Problem Statement

Numerous marketing studies have found that product demand and consumers' purchase intentions are influenced by social, cultural, environmental, and marketing related factors (Chopra & Meindl, 2001). These factors also directly or obliquely force changes in inventory. Wholesalers seek a balance between demand and supply in order to have the most efficient operations. However, organization and consumer purchase behaviors are not always the same, nor are they always steady. New products are frequently introduced into the marketplace, either by wholesalers themselves or by their competitors, and buyers commonly seek the best value for the price (Vokurka & Lummus, 1998). Hence, it is a challenge for wholesalers to continuously hold adequate amounts of product to satisfy the constantly changing demands of their buyers.

Inventory is one of the wholesaler's greatest assets. Wholesalers must be able to stock the right items in the right amounts at the right time. Failing to fulfill buyers' demands might lead to an overall profit loss: one third of consumers have stated that they would take their business elsewhere if their needs cannot be assured (Anderson Consulting, 1996). In contrast, holding excess inventory adversely affects inventory turnover and increases the risk of poor financial performance. Therefore, once inventory problems are observed, immediate attention must be given to these problems to minimize the damage. In order to get rid of unanticipated inventory, wholesalers often implement various pull and push marketing strategies to stimulate the flow of additional stock (Childs, 1997; Trusov et al., 2006).

Marketing strategies are generally applied in the business world in order to reach desired sales goals and generate significant profits for a company. However, sales

respond to inconsistent market demands that are frequently influenced by a wide range of factors. Of the numerous marketing relevant factors, promotion is one of the most critical influences affecting consumers' demands and sales patterns (Kuo & Xue, 1999). Wholesalers employ promotion broadly to increase brand and product awareness, stimulate demand, and encourage repeated purchase behavior. Through promotional activities, wholesalers are able to enhance the seller-buyer relationships that have been found to be influential in buyers' purchase decisions and repurchase intentions (Hewett, Money, & Sharma, 2002). Thus, if wholesalers can effectively operate promotion activities, such activities would positively impact their overall business performance (Mather, 1995). However, from an inventory management standpoint, marketing activities always create disturbance of demand, producing waves of inventory that increase the difficulty of inventory control (Arcelus & Srinivasan, 1998). The impact of promotions on inventory control must therefore be carefully estimated from the supply side.

From the demand side, buyers' perceptions of marketing activities must also be evaluated. In organizational purchases, buyers have significant power over the whole process of selling and buying. Therefore, buyers' demand and purchase behaviors and the factors influencing them need to be discussed. Price has always been a dominant factor affecting sales and consumer's purchase decisions (Chang & Wildt, 1996; Lee, 1995). During the promotion duration, consumers usually form a different reference price for a product (Martínez-Ruiz, Molla-Descals, Gomez-Borja, & Rojo-Alvarez, 2006). Hence, their purchase motivation might be changed, in which case their purchase behaviors would be influenced.

Product characteristics are another essential marketing element affecting buyers' perceptions of a product. Product characteristics that enhance consumers' perceived need for a particular product include brand, quality, and packaging. Buyers with dissimilar cultural backgrounds might perceive the relative importance of brand, quality, and packaging differently because cultural values form an active part of consumers' purchase decisions (Malai & Speece, 2005). In a collectivist culture, buyers' purchase decisions are always manipulated by formal and informal social groups. Thus, developing a social group led by an expert representing the supplier would allow a wholesaler to create and control product demand.

Several factors have been found to affect buyers' demands and purchase intentions. Those factors then indirectly influence the sales of products. Selling and purchasing are inseparable. In order to have successful inventory management, wholesalers need not only to determine how to increase the sales volume and gain better control over inventory, but also to understand the variables affecting buyers' purchase decisions.

Purpose of the Study

By utilizing historical inventory data and information related to marketing activities, the purpose of this study is to gain a better understanding of how marketing activities (advertising, demonstrations, holiday promotions, trade shows, etc.) and other associated factors impact the inventory levels on selected products in an Asian wholesale firm supporting a particular aspect of the foodservice industry. Marketing elements

(price, packaging, brand, etc.) are also considered in the study in order to assess the effects of those variables on products' inventory levels.

Research Questions and Research Hypotheses

Research problem statements explain the researcher's interests in conducting this study, and the purposes of the study provide the direction to this dissertation. According to these aspects, research questions were developed to fulfill the research purpose. Research questions of this study were divided into three main segments to evaluate the effects of marketing related factors on inventory management. Product characteristics, promotion related factors, and effectiveness of promotion are the main focus of this study. First, the researcher would like to examine the impacts of product characteristics, such as brands, item categories, price, and package, on products' sales and order volumes. The impact of promotion and its relevant factors on sales and orders will also be estimated with condensation of the lagged responses.

Research Hypotheses

The researcher developed a total of ten null hypotheses with regard to the research interests, listed below.

H1: The effect of the brands is not significant to the overall combined sales and order volumes.

H2: The effect of the price is not statistically significant on combined sales and orders.

H3: There are no statistically significant differences in sales and order volumes according to item categories.

H4: Package sizes do not have a significant effect on sales and order volumes.

H5: The timing of promotions by month does not have a significant impact on sales and order volumes.

H6: There are no significant differences among different types of promotions with regard to sales and order volumes.

H7: Nationality of promotion representatives does not significantly affect sales and orders.

H8: The number of promotional events has no significant impact on sales and orders.

H9: The number of times a product appears in each event does not have significant impact on product sales and orders.

H10: No significant lagged effects of sales and orders are observed according to different types of promotions.

Significance of the Study

This study will help wholesalers in the foodservice industry recognize and understand the factors affecting buyers' purchase intention, buying behaviors, and product demand. Wholesalers can utilize the information in this study to improve inventory controls by ordering or maintaining proper levels of inventory to satisfy buyers' needs and bring fair profits to their firms.

According to the concepts of the stochastic model, product demand can be predicted based on environmental, social, and marketing factors (Cheng & Sethi, 1999). Based on the optimization theory, minimizing operation related expenses and maximizing sales, profits, and the proportion of the market share are the most desirable outcomes for all wholesalers (Beveridge & Schechter, 1970). Hence, finding critical factors

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influencing the effectiveness of promotions in various circumstances would help

wholesalers have better control over the flow of inventory and make more effective

predictions of buyers' behaviors and purchase intentions. This information can help

marketing executives develop and implement the best promotional strategies for

maximizing sales volume and profits at the same time.

Definitions

The following is a list of key terms used in this study, with definitions consistent

with the study's focus. Please note that these terms are more relevant to wholesale

operations than to general business operations.

1. Supply Chain Management: The management activity involved in procurement,

transformation, and logistics; the connection among individual components, from raw

material to the end users, within the supply chain (Scott & Westbrook, 1991; New &

Payne, 1995; Council of Logistics Management, 2004). The primary goals of supply

chain management are to maximize potential profits and to gain better control over the

operational performance (van der Zee & van der Vorst, 2005).

2. Inventory: One of the most important assets for a wholesale firm, inventory can be

influenced by both internal and external marketing activities.

3. Inventory Management: The management activity which is constantly seeking a

balance between supply and demand. The goal of inventory management is to maintain

sufficient inventory to satisfy market demand while not holding excessive stocks or

incurring extra expenses in order to fix the overstock incidents (U.S. Small Business

Administration, 1980).

4. <u>Wholesaler</u>: A company that handles a number of products and sells products in bulk to retail or commercial business (Burstiner, 1994).

5. <u>Supply</u>: Describes "the flow of goods and services brought to the market place by producers in a given time period" (Souster, 1998). Supply can also be described as the selling process, which offers goods or service to meet demands.

6. <u>Demand</u>: The requirement of wanted products or service which consumers are willing and able to purchase. Demand is always affected by marketing activities and such activities make inventory control challenging and complicated.

7. <u>Organizational Buyer Behavior</u>: The professional behavior that buyers display by using strategic purchasing approaches in searching for, buying, and evaluating products (Schiffman & Kanuk, 2006; Wilson, 2000). Organizational buyer behavior and decisions are always affected by inputs of other organizational members (Webster & Wind, 1972). Other factors, including cultural, social, and economic variables, also have an impact on buyers' perceptions of products and their purchase motivation and intentions (Chaudhuri & Haldar, 2005; Patton, 1996; Siu & Kirby, 1999; Wensley, 1997).

8. <u>Culture</u>: Specific values shared by a society or a specific social group which act as social behavioral standards and customs.

9. <u>Collectivism</u>: One major Asian culture value introduced by Hofstede (1984) that explains the inter-relationship between consumers and social groups, which has been found to influence consumer's purchase behaviors in significant ways (Linton, 1945).

10. <u>Marketing</u>: A series of activities organized to provide the right product to the right customer at a reasonable price at the right time. It consists of four essential components: product, price, promotion, and place.

11. Product Attributes: Elements influencing buyers' perceptions of products. For example, consumers use brand and packaging to evaluate the quality of products and the value of a purchase.

12. Price: A leading factor affecting purchase behaviors and a significant indicator of the product's utility value (Burstiner, 1994; Chang and Wildt, 1996; Lee, 1995; Peterson & Wilson, 1985; Skouras, Avlonitis, & Indounas, 2005).

13. Promotion: Stimulates market demand, changes sales patterns, and affects buyers' purchase intentions (Imman & McAlister, 1993; McGoldrick, Betts, & Keeling, 2000).

14. Pull and Push Strategies: Two main concepts in strategic marketing. These strategies are applied in order to increase product or brand awareness and to stimulate buyers' purchase intentions (Agrawal, 1996). The reactions toward these two strategies are different. A push strategy tends to have a more immediate effect on sales; however, responses to sales, when applying a pull strategy, always have a lagged effect (Blattberg & Neslin, 1990; Little, 1979).

15. Lagged Effects: Also known as carry-over effects; refers to reactions to marketing activities which are not observed immediately; instead, the responses to the activities are always delayed and exhibited in subsequent order.

CHAPTER 2

LITERATURE REVIEW

Supply Chain Management

Supply chain management consists of the management activities involved in

procurement, transformation, and logistics (Council of Logistics Management, 2004).

The goal of supply chain management is to maximize value at less cost in order to satisfy

consumers, suppliers, and stockholders (van der Zee & van der Vorst, 2005). Hence,

effective supply chain management must be able to enhance the connection among

individual components, from raw material to the end users, within the supply chain and

improve the operating performance of all members in the supply chain by integrating

business activities in supply chain processes (Christopher, 1998; Hugos, 2006, p.5; New

& Payne, 1995; Scott & Westbrook, 1991). In addition, supply chain management is also

used as a philosophy of management (Tan, Lyman, &Wisner, 2002). For example,

Mentzer, DeWitt, Keebler, Min, Nix, Smith, and Zacharia, (2001, p.18) described supply

chain management as a strategic concept applying traditional operation strategies among

all members within the supply chain to enhance business performance in the long term.

Supply chain management oversees business activities, both internally and

externally, and establishes relationships not only with suppliers, but also with direct and

non-direct customers throughout the supply chain (Harland, 1996). The integration

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within the supply chain improves the control of product movement, information sharing among members in the supply chain, consumer service, and costs of operations (Lambert et al., 1998; New & Payne, 1995; Simchi-Levi, Kaminsky, & Simchi-Levi, 2000). Therefore, supply chain management is defined as "the integration and coordination of all these activities including suppliers, carriers, manufactures, distributors, third-party providers, and information carriers" (Vokurka & Lummus, 1998, p.41).

Effective supply chain management must be able to improve the operating performance of all members within the supply chain (Hugos, 2006, p.5). One major factor affecting the efficiency of supply chain management is the alliance relationships among members in supply chain networks (MacBeth, 2002; Wagner, MacBeth, & Boody, 2002). The network connection in the supply chain is interdependent, requiring that all members work together in order to better control the flow of products (Aitken, Childerhouse, Christopher, & Towill, 2005).

Information Sharing

A strong collaborative relationship among members in the supply chain could optimize chain-wide performance (Lee & Whang, 2000). According to some essential elements of supply chain management, information sharing within the entire distribution network is a crucial facet of supply chain performance. Information generally shared within the supply chain includes inventory policies, inventory levels, marketing strategies, forecast policies, demand forecasts, order status, production schedules, scheduling processes, and financial flows (Baumgaertel, Brueckner, Parunak, Vanderbok, & Wilke, 2003; Chandra, Kumar, & Smirnov, 2001; Lee & Whang, 1998; Verdicchio &

Colombetti, 2002). Information sharing among supply chain members integrates all sources across partners. Supply chain management activities, furthermore, can maintain better control over the flow of stocks (Stank et al., 2005).

However, if the information processed among chain members is not reliable, the bullwhip effect might occur in the supply chain (Yung & Yang, 1999). According to Lee, Padmanabhan, and Whang (1997, p.93), "the bullwhip effect occurs when the demand variabilities in the supply chain are amplified as they moved up the supply chain." For example, in the 1990s, Cisco Systems had difficulty keeping up with demand for its network infrastructure products. All levels in its supply chain buffered themselves by placing additional orders, causing Cisco to inflate its inventory. This buffering activity within the supply chain left Cisco holding $2 billion in excess inventory. The bullwhip effect has been found to affect a company's financial performance, and Cisco's experience illustrates the significant impact of the bullwhip effect in supply chain and inventory management (Rigoglioso, 2005). On the contrary, a successful information sharing system benefits business performance. For instance, Dell, Nokia and Procter & Gamble, members of the world's top supply chains, carry less inventory and have shorter cash-to-cash cycle times, and are therefore more profitable than companies that fail to implement an effective information sharing system. Statistics shows that "a 3 percent improvement in perfect order fulfillment translates to a 1 percent increase in profits" (Patton, 2005, p.1).

Inventory Management

To reduce or avoid the damages caused by the bullwhip effect, all members within a supply chain need to collaborate on planning, forecasting, and replenishment (Hugos, 2006). To have rewarding supply chain management, suppliers, manufacturers, retailers, and logistion providers must cooperatively instigate a Collaborative Planning, Forecasting, and Replenishment (CFPR) plan. Collaborative planning, forecasting, and replenishment is one of the strategies used to encourage both buyer and seller to collaborate by "correcting, adjusting and proposing prices and quantities to reach an agreement on a unique forecast" in order to improve business performance effectively (Caridi, Cigolini, & DeMarco, 2006, p.465).

Significant benefits of applying CPFR in the supply chain include better inventory control, less operating cost, decreased lost sales, and service enhancement (Aviv, 2001). In the long run, these benefits would improve the marketing position of each partner in the supply chain (Amaral & Turner, 2001). Moreover, joint planning, or business collaboration, is especially decisive when marketing activities are in place because those activities create uncertainty in the marketplace and increase the difficulty of inventory control (Taylor & Fearne, 2006).

Inventory Control

Inventory is one of the biggest investments and the largest asset in wholesale operations. Therefore, when product inventory levels are constantly changing due to market activities, holding adequate inventory to supply the market demands and minimize the costs of overstock is one of the main challenges of inventory control (U.S. Small Business Administration, 1980). In order to achieve supply chain optimization and

effectively replenish inventory, successful inventory management is critical. Historical data regarding product attributes, stock levels, sales, and marketing activities can serve as indicators for inventory management decisions (Trusov et al., 2006). Ventura Foods, for example, increased its stock forecast accuracy by 60% after using the inventory forecasting system by utilizing historical information (Albright, 2005). Hence, effective inventory management plays an important part in business success.

According to Trusov et al. (2006), inventory problems always require immediate attention. Failing to replenish stocks on a timely basis can lead to enormous potential losses of sales, profits, and customers, especially when market demands are at a peak. An estimated $7 to $12 billion loss occurs in the U.S. grocery retail industry every year due to replenishment problems (Anderson Consulting, 1996; Mudgil, 2005). In addition, according to Anderson Consulting (1996), in 34% of the insufficient stock incidents, consumers would go to competing stores instead of purchasing an alternative item. Stockout occurrences happen frequently, especially when products are promoted or advertised; therefore, forecasting consumer demands for specific items appropriately would help wholesale firms to maintain sufficient stocks and to generate reasonable and expected sales (Trusov et al., 2006).

It is challenging for a wholesaler to stock the correct type and quantity of inventory since inventory levels constantly change, customers' purchasing behaviors vary, and competitors frequently adjust the variety of products they offer (Vokurka & Lummus, 1998). Holding extra inventory is a risky and usually unprofitable tactic since excessive capital is invested, and additional storage space is needed for stocks (Trusov et al., 2006). In addition, unanticipated levels of inventory holding in a warehouse always force

wholesale firms to offer discounts in order to stimulate orders. Price promotion is one of the most common strategies by which wholesale firms vend extra stocks, a tactic that influences potential profits (Childs, 1997; Trusov at al., 2006). Although stimulating demand through marketing activities would bring more business to a wholesale firm and reduce holding costs, disturbances of demand arise as a result of such activities. Moreover, most disturbances make it more difficult for inventory management to control stock levels (Arcelus & Srinivasan, 1998).

Marketing and Inventory Management

Marketing strategies are often employed to stimulate sales; however, those activities disturb the demand for products and increase the difficulty of inventory control. To gain better inventory control, it is necessary to understand the impact of marketing activities on stock movements. Hence, the role of marketing in inventory management will be discussed first.

Marketing

Marketing, according to Kotler (1972, p.6), is "a set of human activities directed at facilitating and consumer-mating exchanges." Successful marketing should have a positive impact on sales by offering the right product to the right customer at the right time (U.S. Small Business Administration, 1980). On the other hand, a failure to apply proper marketing strategies would make lost sales more likely. Marketing is a crucial determinant of business performance. Effectively implementing marketing techniques would allow wholesalers to predict demand patterns, as well as reach desirable sale outcomes and profit levels (Mather, 1995). However, market demands are inconsistent

and are often affected by factors such as seasonality, competitors' strategies, and economics. Consequently, it is important to appropriately evaluate marketing activities before implementing selected activities.

In the past decades, the marketplace has changed dramatically, and consumer demands have become more and more unpredictable. Consumers have more power to select a product than ever before since there are many more varieties of similar merchandise available. Strategic marketing plans, widely applied by a company and its competitors, could easily manipulate consumers' demands, making demand control much more complicated (Vokurka & Lummus, 1998). It is worth noting that the complexity of inventory management would become exigent when the disturbance of demand is impacted during promotions or when the impact of promotions is either under-estimated or over-estimated (Mather, 1995). The desirable outcome for any marketing activity is to directly or non-directly increase sales and bring profits to a corporation. Therefore, evaluating marketing plans based on sales and marketing objectives together is essential. Such analysis would help a company to target and achieve an acceptable level of profitability (Vokurka & Lummus, 1998).

<div align="center">Pull and Push Strategies</div>

Successfully utilizing marketing resources is strategically imperative to business operations. A marketing strategy employing media advertising is called a pull strategy. Other strategies, such as trade promotions, are defined as push strategies (Agrawal, 1996; Shankar, 1997). Pull and push strategies are two different concepts, each with significant strengths in marketing operations. Specifically, pull strategies and push strategies influence consumers' purchasing behavior at different levels, and consumers' reaction

toward those strategies happens in dissimilar time frames (Agrawal, 1996). Both strategies are broadly applied in today's marketplace and have a combined effect on market performances (Olver & Farris, 1989).

Advertising is one of the techniques frequently used to promote merchandise or services. The most common ways to use this technique are via flyers, magazines, radio stations, television programs, direct mail, and catalogs. The main purposes of using advertising as a marketing tool are to position a brand, reinforce a brand image, enhance purchase intention, and attract new customers (Deighton, Henderson, & Neslin, 1994). Advertising is commonly used to stimulate consumers' demands for products and develop brand position in the marketplace. Hence, advertising is believed to have a positive effect on the development of brand loyalty, which helps to create repeat purchases (Neslin & Shoemaker, 1989; Davis, Inman, & McAlister, 1992). A study found, therefore, that brands with a loyal market spend more marketing budget on advertising than one with less brand loyalty (Agrawal, 1996). In addition, the effect of advertising on sales tends to be long-lasting. For instance, according to a study done by Abraham and Lodish (1990), advertising helped a store to generate more sales from approximately 50% of the products in a store. However, the increased sales response is always delayed, which is known as a lagged effect (Little, 1979).

On the other hand, since the main purposes of employing trade promotions are to encourage repeated purchase behavior and to increase purchase volume, promotions are believed to have more immediate effects on sales (Blattberg & Neslin, 1990; Rossiter & Percy, 1987). Although promotions have been commonly practiced to stimulate demand and improve distribution performance since the 1970s, only about 20% of promotional

products are profitable in the grocery industry (Orgel, 1996; Srinivasan, Pauwels, Hanssens, & Dekimpe, 2004). According to Hall and Hitch (1993), most companies that perform trade promotions are not seeking profit maximization; instead, they try to reach a satisfactory profit level through promotions.

Promotion plays a critical role in sales and inventory forecasting because it changes sales patterns and demands (Kuo & Xue, 1999). Price reduction is one of the most common methods used to stimulate demand and encourage brand switching. This approach is particularly useful for price-sensitive items or buyers (Arcelus & Srinivasan, 1998). In some Asian countries, buyers display bargain shopping behavior and strongly prefer products on sale. Buyers are always searching for the best quality products at the lowest price or cost within their budgets because they believe that when the price is lowered, their total purchase value will be increased (Bargain Hunters, 1997; Jin & Sternquist, 2003). Therefore, sales personnel need to communicate with buyers efficiently in order to understand their budget levels, and to introduce buyers to the products buyers perceive as value purchases. Consumers with different cultural backgrounds have different perceptions of trade promotions and demonstrate different reactions toward promotions (Dickson & Sawyer, 1990, p.51). Buyers, for example, always expect to receive a certain degree of price deduction based on the purchase quantity or the payment method. Hence, wholesale firms must recognize consumers' price expectation and understand how promotions affect their buying behavior. Consequently, wholesale firms could employ promotion techniques more successfully and maintain the right amounts of promoted products in stock to satisfy consumers' demands.

Purchasing Behavior

Marketing techniques and strategies have been utilized to motivate buyers' purchase interests, influence their buying behavior, and affect the decision-making process. Therefore, marketing theorists develop models that help operators understand both the process and the dominant factors of buyers' purchasing behavior and to make a positive impact on sales (Burstiner, 1994). In marketing exchange progression, selling and purchasing are two major interdependent concepts, which are employed to manipulate the buying process and outcomes. In addition, Wilson (2000) classified buyer behavior into two main categories: organizational purchasing and organizational selling. In organizational purchasing, buyers have more power to dominate the purchasing process. In organizational selling, on the other hand, buyers lose some control over their purchase and are usually manipulated by sales personnel or other marketing factors in the process of purchasing (Wilson, 2000). Hence, in order to achieve desirable sales objectives, wholesalers must recognize the influential factors affecting buyers' purchasing decisions and address those factors to enhance their marketing strategies and improve their business performance.

The three variables affecting the purchase decision, introduced by Howard and Sheth in 1969, are intention, motivation, and comprehension. Buyers' intentions have a direct effect on their purchasing behavior since consumers purchase products or services to fulfill their needs, wants, or desired outcomes. Purchasing motivation is another leading variable that affects purchasing behavior. According to Maslow's hierarchy of needs (1954), besides the basic life needs, consumers purchase merchandise to satisfy their psychological and social needs. A discussion of social impact on purchasing will be

presented later. Another variable influencing buyers' purchasing behavior is their understanding of the products. Newman and Staelin (1971) indicated that buyers with previous purchase experience spend less time on the decision-making process. Moreover, previous experience can help buyers to decide whether to choose a straight re-buy or a modified re-buy (Robinson, Paris, & Wind, 1967).

<center>Organizational Buyer Behavior</center>

Since the focus of this study is wholesale operations, organizational buyer behavior will be discussed in addition to individual consumer behavior. In organizational buyer behavior theory, buyers use strategic purchasing approaches with a specific behavioral pattern to perform routine purchases under attentive caution on organization limits and cultures (Wilson, 2000).

Organizational buying is not only behavioral but also professional. In the professional process, several roles within the organization (users, influencers, deciders, and gatekeepers) affect buyers' purchasing decisions (Webster & Wind, 1972). Buyers purchase products based on the demands of the users, which are the indicators for the purchase intention and motivation. In the purchasing decision-making procedure, influences from both formal and informal groups provide suggestive or influential information for buyers and are always indirectly involved in the buying process. Gatekeepers and deciders sometimes grant buyers the right to make purchase decisions and sometimes are influentially involved in the decision-making process. Their knowledge of and experiences with the products could be the main factors determining their involvement in purchasing (Moon & Tikoo, 2002). Previous purchasing experiences offer information that could affect post-purchase evaluations and influence

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re-purchase intentions. Moreover, Siegel-Jacobs and Yates (1996) indicate that information searching and information analysis are two valuable activities to secure deciders and gatekeepers' purchasing decisions.

Additionally, a variety of factors that affect buyers' behavior need to be discussed. Marketing theorists apply the concepts of sociology and social-psychology to underpin their behavioral research. Studies of purchasing behavior demonstrate how significant the influences of culture, subculture, reference groups, social class, economics, and environment are on a buyer's behavior (Burstiner, 1994; Chaudhuri & Haldar, 2005; Patton, 1996; Siu & Kirby, 1999; Wensley, 1997). An advanced understanding of the impacts of those influential factors would benefit wholesale firms as they shape their marketing practices, and would help these firms to profit from the selling process.

Culture and Buying Decision

Culture is "the collective mental programming of the people in an environment. Culture is not a characteristic of individuals; it encompasses a number of people who were conditioned by the same education and life experience" (Hofstede, 1991, p.5). In addition, culture has its own pattern of learning behavior that is shared among society members; in other words, culture creates social behavioral standards and customs, which the community learns as its beliefs and values (Linton, 1945; Schütte & Ciarlante, 1998; Yau, 1994). Wholesale firms must realize that culture is a communication system that releases information that can help marketers understand consumers' behavior and their perception of values (Herbig, 1998). Buyers' behavior and preferences are found to be

culturally different, and cultural values indeed have a momentous impact on purchasing behavior.

Consumers' needs and wants are often culturally based. For example, in order to successfully tackle the Japanese market, Coca-Cola introduced a range of culturally appealing products, such as green tea and coffee, to satisfy local tastes, and those products bring significant profits to the company (Kotabe & Jiang, 2006). Modifying components or product lines to satisfy local desires is necessary for most international companies (Herbig, 1998).

Buying Behavior in Asian Culture

Cultural values noticeably affect consumers' purchasing decisions and their buying behavior (Malai & Speece, 2005). In 1984, Hofstede introduced the dimensions of cultural values that permit market researchers to develop more appropriate marketing plans. Power distance and uncertainty avoidance are two dominant cultural dimensions. In Asian culture, advice and information from experts or individuals with more powerful positions within the society are highly appreciated and valued (Hofstede, 1984). Experts' opinions or perceptions of a particular product or service are always viewed as guidelines in buyers' purchasing process. Therefore, selecting the proper representatives for products is an extremely important marketing technique.

In order to reduce uncertainty and unexpected outcomes, previous purchasing experience could be an indicator of the re-buy motivation and would affect buyers' intention of purchasing after evaluating their prior experience (McGowan & Sternquist, 1998). Another main dimension, which differentiates Asian and Western culture, is individualism versus collectivism. Instead of being individualistic, Asians are more

interdepandent and collectivistic when seeking information on products. Asian buyer

behavior is more easily influenced by social-cultural factors such as family, social class,

and subculture. Moreover, according to the tri-component attitude model of consumers'

purchase behavior (Figure 1), perceptual-cognitive perceptions of the products or service

would affect their evaluations and action tendencies, influencing their purchase behavior.

Perceptual-Cognitive Component	Evaluation Component	Action-Tendency Component	
Awareness Beliefs Opinions Comprehension Perceptions Cognitions Brand image	Evaluations Feelings Emotions Affect Brand rating	Intention Tendency Preference Brand loyalty	Buying Behavior
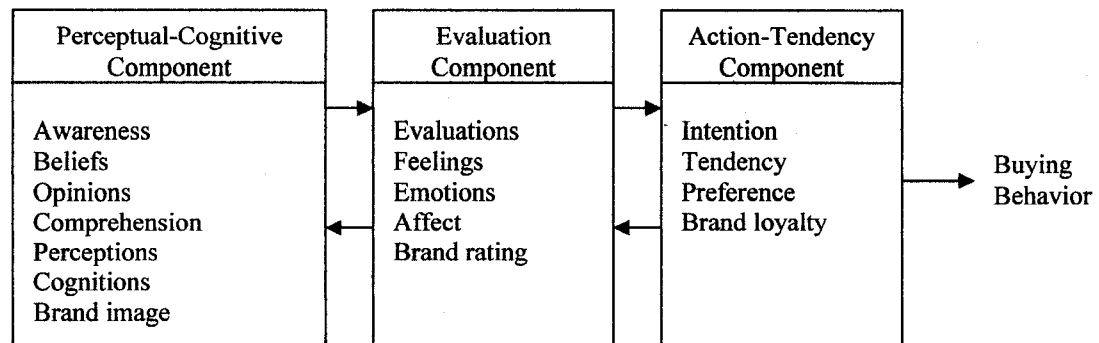
Figure 1. The Tri-Component Attitude Model

Sources: Schutte, H., & Ciarlante, D. (1998). *Consumer Behavior in Asia.* New York:

New York Univeristy Press. Schiffman, L. & Kanuk, L. (2006). *Consumer Behavior* (9th

ed.). Englewood Cliffs: Prentice Hall.

The Effect of Economic and Social Factors on Buying Behavior

The movement of the local economy also affects consumers' buying habits,

purchasing behavior, and price perception (Inkeles, 1983; Keh & Park, 1998). Price is

one of the critical elements affecting product evaluations. However, this determinant can

easily shift up and down according to marketing applications, market competition, the

local economy, and exchange rates for import items (Herbig, 1998). For example, in

1997, the economic recession in Asia changed consumers' perceptions of money value,

and several Asian markets were forced into price competition to attract and retain their customers (Jin & Sternquist, 2003; Shiller, Fumiko, & Tsutsui, 1996; McGowan & Sternquist, 1998). On the other hand, in some developing Asian countries, along with the development of the economy, consumers' purchase behavior has changed from traditional economies to consumerism, and consumers have been exposed to more product alternatives (Germeroth-Hodges, 1993; Ho, Ong, & Lee, 1997).

Local government policies can also stimulate economic development and influence local residents' consumption patterns. In China, Deng Xiaoping's policies produced a new social-economic class in the early 1980s. A "new rich" group was created that was allowed to be wealthy and have more personal possessions (Pecotich & Shultz, 1998, p.189). The purchasing power of this specific group is quite strong, and they proudly display their fortunes by spending unreservedly (Hooper, 1994, p.165). Another social-economic class that has benefited by the development of the economy is called "white collar." Their purchase habits are less traditional, and most of them prefer foreign brands since they link the origin of the product and product quality together (Marketing Guide Magazine, 1995; Chang & Chieng, 2006). In addition, China's only child policy has impacted consumers' buying habits. An estimated 50% of premium products in China were purchased for only children (Pecotich & Shultz, 1998, p.146; P.192). Therefore, official government policies can indeed impact consumers' purchasing behavior and adjust consumers' buying intentions.

According to Hofstede (1984), one of the Asian cultural values is the interdependence between an individual and his or her social group. In most Asian countries, an individual's social status is determined by the group to which he or she

belongs. Therefore, according to Kitayama and Markus (1994), to secure a standing in the desired social group, it is very important to purchase the products that are acceptable to that particular group (see Figure 2). The Japanese also believe that premium products can improve their personal social status and create a desirable social image (Eagly & Chaiken 1993; Mandrik 1996; Sallot 2002; Kotabe & Jiang, 2006).

Moreover, approximately 13 million consumers in China's major cities indicated their preference for foreign luxury goods. Most of these consumers are categorized as either the new rich or the white-collar class who crave brands, enjoy spending their wealth, and consider premium goods to be both personal achievements and statements of social status (Kotabe & Jiang, 2006). After the limited selection of products in the past few decades, consumers are now open to foreign goods and looking for alternatives (Yan, 1994). Consumers' purchasing behavior has shifted toward contemporary consumerism, including a craving for stylish products and well-known brands (Pecotich & Shultz,1998).

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┌─────────────────────────────────────┐
│      Social-cultural environment    │
│  1. Formal and informal social groups│
│  2. Social class                    │
│  3. Culture and subculture          │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│        Psychological field          │
│  1. Motivation                      │◄──────────────┐
│  2. Perception                      │               │
│  3. Learning                        │               │
│  4. Attitudes                       │               │
└─────────────────────────────────────┘               │
                  │                                    │
                  ▼                          ┌──────────────────┐
┌─────────────────────────────────────┐     │                  │
│        Need recognition             │     │                  │
│                                     │◄────│    Experience    │
│        Purchase search              │     │                  │
│                                     │     └──────────────────┘
│      Evaluation of alternatives     │               ▲
└─────────────────────────────────────┘               │
                  │                                    │
                  ▼                                    │
┌─────────────────────────────────────┐               │
│        Purchase behavior            │               │
│  1. New task                        │───────────────┘
│  2. Repeat purchase                 │
└─────────────────────────────────────┘
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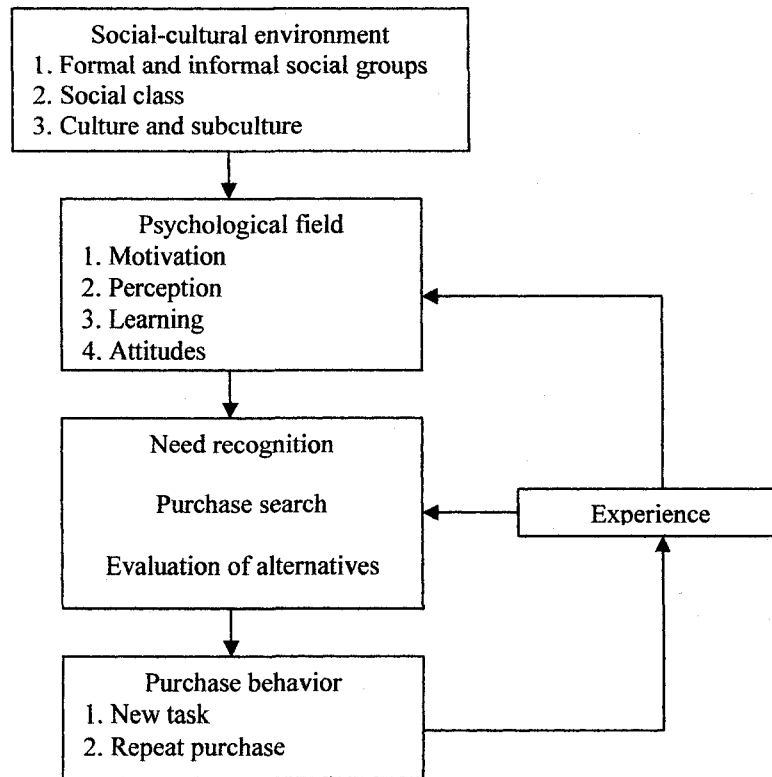
Figure 2. Social and Cultural Impact on Purchase Behavior

From: "Handbook of Cross-Cultural Marketing," by Herbig, P.A., 1998, Binghamton:

The International Business Press.

In addition, Asian culture has a more collective orientation, which impinges on

consumers' beliefs and behavior (Herbig, 1998). The formation of most Asians'

purchasing behavior and buying motivation was found to be manipulated by their

perceptual-cognitions of their social status (Howard & Sheth, 1969). Hence, marketing

researchers must be aware not only of their customers' needs but also of their social

desires. Such information would benefit companies working to promote their products

more effectively.

Marketing Elements

Marketing is strongly involved in the selling and purchasing process. From the supply side, marketing activities and decisions both directly and indirectly influence inventory levels. Inventory levels, conversely, affect suppliers' decisions relevant to marketing. Demands and buyers' purchasing behavior are also stimulated through marketing activities. Messages from products, promotions, or price tags act as pointers for buyers' purchasing intention and motivations. Those changing intentions and motivations produce the movement of inventory. Hence, the relationships of core marketing elements and purchasing behavior (see Figure 3) will be discussed as follows.

Product Attributes

In the traditional marketing mix, the four Ps: product, price, promotion, and place, are listed and addressed. However, in this study, another P, people, will be discussed, acknowledging that sales people's knowledge and their relationships with clients are both imperative to sales. First, the product is discussed. Product attributes such as brand, country of origin, packaging, and quality influence buyers' perceptions of the products. Brands are often perceived as guides of quality. Brands also have an undeniable effect on purchase intentions because brands identify product personalities, provide information about products, and structure product images (Burstiner, 1994; Dodds, Monroe, & Grewal 1991; Lowe & Corkindale, 1998).

Marketing efforts

Product
Promotion
Price
People (sales)
Channel of distribution

Needs and
Wants

Information

Evaluation of
Alternatives

Motivation
Perception
Learning
Attitudes

Experience
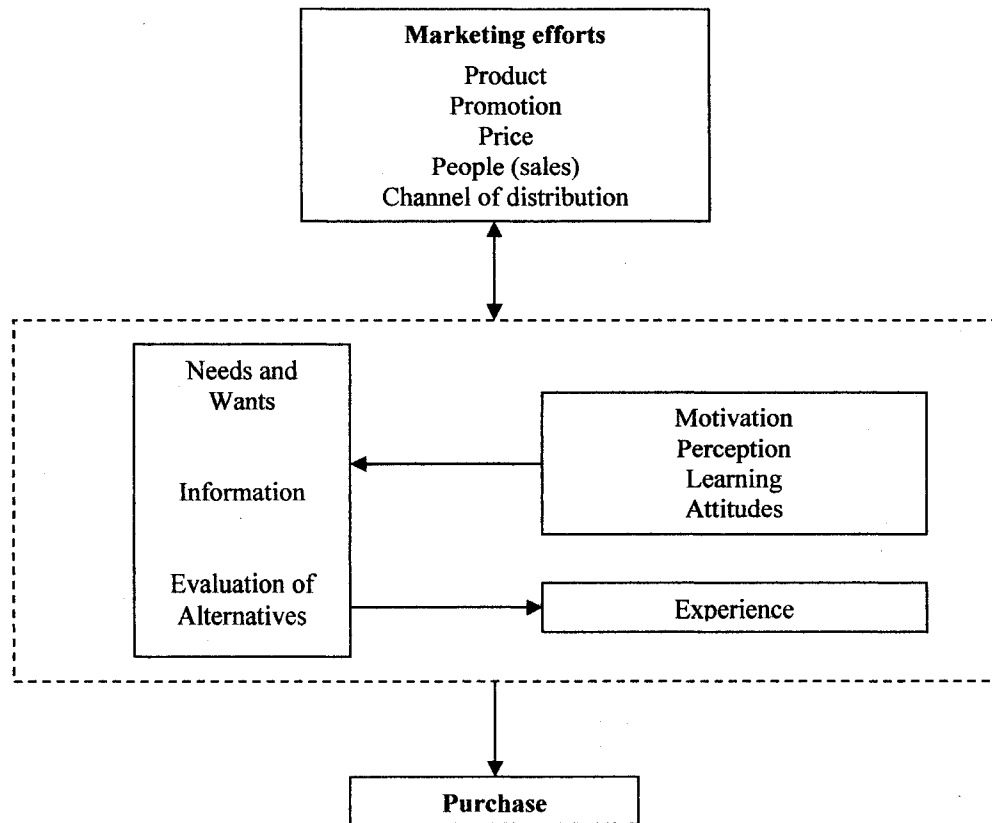
Purchase

Figure 3. A Framework of Marketing Elements and Purchase Decision Making

From: "Handbook of Cross-Cultural Marketing," by Herbig, P.A., 1998, Binghamton: The International Business Press.

Moreover, brands can be used as imperative displays of personal values and social images (Kim, Forsythe, Gu, & Moon, 2002). For example, in some Asian countries, Western brands have long been viewed as signs of a high social class. Therefore, the motivation for purchasing premium brands is subjective and based on social or cultural factors. Buyers usually evaluate the quality of products according to the product's country of origin, and then further develop either positive or negative first impressions of the products (Herbig, 1998). Buyers usually also associate certain stereotypes with

products and their origins, based on buyers' purchasing experience and the information generated from both formal and informal groups (Herbig, 1998). Therefore, a group factor cannot be ignored. Especially in a collectivist culture, buyers value the information shared within the group and tend to share their purchasing experiences. Hence, buyers tend to be more brand loyal if there is a support group behind them (Herbig, 1998).

Furthermore, brands provide product information that influences consumers' purchasing behavior (Pecotich & Shultz, 1998). Consumers who have limited experience with certain products might select the most reputable brands to ensure product quality (Yan, 1994). Foreign brands are preferred primarily because consumers perceive foreign brands as having good quality. That perception allows foreign brands to hold competitive advantages in the Asian markets (d'Astous, Ahmed, & Wang, 1995; Hooper, 1994; Pecotich & Shultz, 1998). Although foreign brands have marketing advantages in Asian markets, many international companies are applying local cultural heritage in their marketing promotional strategies and using local names for their products to establish their position within the markets (Schütte & Vanier, 1995; The Economist, 1994).

Packaging is another essential component that can assist consumers in evaluating a product (Polsa, 1998). Packaging plays a critical role in a product's success or failure (Herbig, 1998). To create a quality product image, Procter & Gamble put effort not only into product formulations but also into packaging (Kotabe & Jiang, 2006). Like brands, packaging acts as an information resource for consumers. Information on product packages is another decisive aspect that affects consumer decisions. Sufficient information on product packages gives consumers a feeling of security and allows them

to have more confidence in purchasing the items. This is especially true in Asia, where one of the focal cultural values is to maintain social harmony and avoid uncertainty (Yan, 1994).

Package size is another important factor in buyers' purchasing decisions. With the quantity discount belief emphasized by larger wholesale-retailers (such as Costco and Sam's Club), consumers expect that large package sizes have lower unit prices (Granger & Billson, 1972; Manning, Sprott, & Miyazaki, 1998; Nason & Della Bitta, 1983; Wansink, 1996). Moreover, in the early 1970s, consumer economics revealed that buying larger package sizes is a value purchasing behavior (Dorfman, 1975). Unit price information has been found to provide consumers with more comprehensive information for making purchase decisions (Monroe & LaPlaca, 1972; Russo, 1977). Hence, package sizes and unit prices are included in this study as influential factors on buyers' behavior.

In addition, consumers' perceptions of product quality are also involved in purchasing decisions. In China, until recently, limited merchandise selections were available for consumers. When consumers have more alternatives, their preferences lean toward higher profile products because consumers believe that those brands represent guaranteed quality (Eckhardt & Houston, 1998). According to a survey of Chinese local manufacturers, when product quality increases, companies benefit financially and increase the market share (Mai, 2003). In order to survive in the marketplace and generate reasonable profits, it is necessary not only to meet but also to exceed consumers' expectations; therefore, many wholesale firms have adopted a total quality approach to ensure the quality of their products and services (Kotabe & Jiang, 2006).

Price

Price has been used as a chief indicator of product quality (Peterson & Wilson, 1985; Skouras at al., 2005). Some buyers perceive price as a display of quality. The higher the price, the more likely they are to purchase the item because of their perceptions of product quality (Sternquist, Byun, & Jin, 2004). Japanese consumers, for example, believe that goods are expensive for a reason and view a low price as an indicator of lower quality. A Japanese saying, "yasu-karou, waru-karou (cheap price, cheap product)," demonstrates the relationship between their price and quality perceptions (McGowan & Sternquist, 1998, p.52). Wal-Mart is an example of a firm which did not achieve its desired profit level in Japan because of its corporate philosophy, "everyday low prices."

Furthermore, price is the main indicator of a product's utility value, a factor which both suppliers and buyers consider in the selling and purchasing process (Burstiner, 1994). Price has a significant impact on sales. Several pertinent factors are discussed in the following. First, product factors, including the product itself, similar alternatives, and the quality of the product, all affect not only product sales but also pricing strategies. Another significant factor is seasonality. Demand for a product shifts depending on both market circumstances and environmental factors, such as seasonality. Seasonality is influentially involved in pricing, especially for agricultural products. In the food wholesale industry, demands for specific items increase during particular seasons or holidays (Burstiner, 1994). In addition, for a wholesaler, the economic status of the country in which the firm is located and the countries where imported products are from can cause price changes. Numerous controllable and uncontrollable factors can lead to

price adjustments (Herbig, 1998, p.202). Hence, a wholesale firm needs to pay close attention to buyers' reactions in order to minimize the damage caused by price modifications.

In the purchase decision-making process, price is one of the critical elements influencing the buying decision (Chang & Wildt, 1996; Lee, 1995). Price perceptions develop according to how consumers interpret the costs of products or services; therefore, consumer perceptions of price vary according their social or cultural background (Lichtenstein, Ridgway, & Netemeyer 1993). For instance, Asian consumers have some distinguishing perceptions of products based on brand, quality, and price (Kotabe & Jiang, 2006). Chinese consumers, for example, are price-sensitive and enjoy bargaining while shopping (Pecotich & Shultz, 1998). In addition, a constant comparison-shopping technique is commonly used in Asian countries in order to hunt for the best quality products with the least cost. That philosophy corresponds to an old Chinese saying: "Never make a purchase until you have compared three shops" (Yan, 1994). However, if social status is the main concern of the purchaser, Chinese consumers will likely be less price-sensitive and more brand-conscious in order to create a favorable social image (Lowe & Corkindale, 1998). In brief, price sensitivity depends on the buyer's social class and his or her purchase motivation. Moreover, buyers seek the maximum value from each purchase, and then look for better quality products at a reasonable price (Hutton, 1995). Hence, making appropriate pricing decisions can be quite challenging for wholesale firms.

<center>Promotion</center>

Promotion techniques are employed to fulfill several operational objectives. Previous studies have demonstrated the effectiveness of promotional activities on sales (Fearne, Donaldson, & Norminton, 1999; Kendrick, 1998; Madan & Suri, 2001; McGoldrick et al., 2000). That explains why suppliers, wholesalers, and retailers extensively apply promotions to stimulate sales. Some companies have also employed promotions to increase sales volumes or as short-term profit-seeking strategies (Aw & Batra, 1998; Numazaki, 1997; Su, Fang, & Lin, 2004). However, Hall and Hitch's optimization model observed that most companies did not use promotions as an approach to maximize their profits; instead, they exercised trade promotions to compete in the market and make satisfactory profits with reasonable considerations of marketing costs (Hall & Hitch, 1993; Skouras et al., 2005).

Another purpose of promotional activities is to increase brand awareness, either by attracting new buyers or by enhancing existing buyers' brand loyalty (Burstiner, 1994). According to the U.S. Small Business Administration (1980), messages sent out through promotions help buyers establish their product expectations. Companies must cautiously select the proper channels to deliver information to their targeted markets successfully. In addition, promotions must be able to assist companies continuously distribute consistent brand images or improve brand images through various marketing activities (Herbig, 1998). Promotions are employed to keep a company competitive in the market while retaining and attracting more buyers.

In order to expand the consumer base, three types of consumer needs must be recognized: functional, social, and experiential (Park, Jaworski, & MacInnis, 1986).

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Creating effective promotion strategies would help wholesale firms achieve marketing goals while meeting consumers' needs and expectations. Knowledge of consumers' purchase intentions would help wholesale firms tackle the markets efficiently. In addition, marketers can use various tactics to influence consumers' purchase decisions and their consumption behavior.

Price promotion is one of the most powerful and frequently used tools to stimulate sales activities (Imman & McAlister, 1993; Chen, Monroe, & Lou, 1998; Martínez-Ruiz et al., 2006). "Price promotions should enhance a product's acquisition value as well as its transaction value if the selling price is below consumers' internal reference prices and if the price reductions do not negatively affect consumers' reference prices" (Chen et al., 1998, p.357). Especially for short-term promotions, price discount has been shown to have a significant impact on sales (Blattberg, Briesch, & Fox, 1995; Bell, Chiang, & Padamanabhan, 1999).

According to Martínez-Ruiz et al. (2006), consumers' responses to promoted products are dissimilar, based on product categories (storable or perishable) and the price levels. The study found that high-priced storable products have the most significant sales patterns during promotions. The demand for high-priced storable products increases notably on the first day of the promotion period (Martínez-Ruiz et al., 2006). Hence, . when the price promotional approach is applied, product characteristics must be considered in order to better control demand and sales patterns. Numerous factors, such as the cultural and social environment, product attributes, and distribution methods, influence buyers' reactions toward promotions and their purchase behavior (Schütte & Ciarlante, 1998). In addition, during the price promotion period, consumers' price

reference points can be influenced and changed. The change in price performance points affects consumers' perceptions of price and value, and those perceptions have a direct impact on consumers' purchase behavior. Therefore, for the Asian wholesale food market, when any promotional activities take place, cultural aspects must be considered because individuals perceive price and promotional activities differently. In addition to product functions, symbolic values and benefits are also principal factors affecting consumers' purchase decisions (Kotabe & Jiang, 2006; Zhou & Hui, 2003). A successful example is Häagen-Dazs Japan Inc., which used its concept of a "lifestyle-enhancement product" to help the company generate favorable profits (Kotabe & Jiang, 2006). Thus, to successfully reach the promotion objectives, marketers must carefully deliver promotional messages and ensure that those messages will enhance buyers' purchasing motivation and their perception of the products.

People

Another element that determines the success of marketing is people. In this study, people refers to sales personnel. According to Skouras et al. (2005), a seller's characteristics and the seller-buyer relationship are more important than a product's price in the business-to-business segment. The relationships between buyers and sellers have been significantly involved in the repurchase intention (Hewett et al., 2002). Moreover, sellers are expected to develop quality long-term relationships with buyers because strong relationships have been related to sales increases (Anderson & Narus, 1990; Cannon & Perreault, 1999; Doney & Cannon; 1997; Morgan & Hunt, 1994; Peterson, 1995; Webster, 1992; Weitz & Bradford, 1999). Jap, Manolis, and Weitz's study in 1999 found that the quality of the buyer-seller relationships was associated with the acceptance time

of new products. Buyers who have excellent relationships with sellers tend to accept new products easily, and they are likely to place orders for new products in a shorter time phase (Jap et al., 1999).

Additionally, in order to stimulate consumers' purchase intentions, the sales personnel need to provide sufficient information to change buyers' perceptions of the product and decrease uncertainty or risks for buyers (Chang & Wildt, 1996). Therefore, wholesale firms would benefit from supporting their sales personnel by providing them with adequate resources to pass powerful information on to buyers. In the Asian culture, buyers rely on commercials or other types of advertisements more than Western buyers do because they hope to avoid all unnecessary risks in the purchasing process; thus, information collection is indispensable (Su et al., 2004).

Theoretical Backgrounds of the Study

In the following section, the theoretical background of this study will be discussed. In order to understand the impact of promotions on inventory management, the stochastic inventory model will be used to demonstrate the connections between environmental, social, and marketing factors and product demand. In chaos theory, the uncertainties created by various marketing and environmental factors are conferred, and the more accurate prediction method of product demand is introduced. Demand is affected by all major marketing elements. Among those elements, price is the one considered the dominant factor affecting buyers' purchasing decisions. Hence, in this study, several theories associated with price and buyers' perceptions will be addressed. In addition, the theory of reasoned action is discussed in order to gain further understanding of buyers'

behavior in the purchasing process. The optimization theory is provided to sellers to enhance the selling outcomes.

Stochastic Inventory Model

The stochastic model is a non-stationary model that describes the demand for products using simulation-forecasting methods (Cheng & Sethi, 1999). Research has found that demand is strongly associated with influential environmental, social, and marketing factors (Chopra & Meindl, 2001). For example, when price decreases during a promotion, demand for the product is expected to increase (Hugos, 2006). The stochastic model predicts product demand based on environmental, social, and marketing factors in order to achieve optimal inventory controls, make appropriate marketing decisions, and maximize the profits of all organizations involved in the supply chain network (Cheng & Sethi, 1999).

Numerous stochastic models have been developed to help supply chain members take better control of their business performance. Lariviere and Proteus (1999) developed a multi-period model by utilizing sales related information in order to make the most advantageous inventory decisions. They assumed that "the true underlying demand is exponentially distributed and that the retailers' prior beliefs about the unknown parameter of this distribution can be expressed by means of a gamma distribution" (Heese, 2004, p.86). In addition, Alphern and Snower (1998) include uncertainty as a variable to forecast the price-related demand in their model, which allows organizations to be aware of demand uncertainties and to reduce or have better control of those unpredictable variables.

Additionally, Cheng and Sethi embrace promotional activities that might affect the demand uncertainties in their stochastic model. In the model, the relationship between demand and promotional activities is observed by using stochastic ordering relations (Cheng & Sethi, 1999). They assume that demand will be affected by the significance of the demand. For example, the change in demand may be more significant when the product is in higher demand by consumers. Other assumptions are that promotional activities would stimulate the demand in a non-stationary way and lead the demand of product in a stochastically larger demand (Cheng & Sethi, 1999). The model also allows suppliers, wholesales, and retailers to have a better understanding of promotional impact on demand and to make more accurate demand forecasts.

<div align="center">Chaos Theory</div>

As mentioned previously, numerous factors, including price, purchase experiences, social perceptions, and promotion, can influence demand predictions. To comprehend the complications of inventory management, chaos theory can be applied to explain the disorder and complexity of inventory controls (Stapleton, Hanna, & Ross, 2006). Moreover, the central principles of the theory also help wholesale firms realize the challenges of inventory controls and forecasting (Stapleton et al., 2006) because chaos theory explains why unexpected outcomes are observed in a system. The theory might also broaden practitioners' views and help them make more thoughtful business decisions (Bonabeau & Meyer, 2001).

A chaotic supply chain is due to complex interaction among all the members in the network. A variety of issues, including collaboration, planning, forecasting, and information sharing, contribute to unpredictability within a supply chain and can lead to a

bullwhip effect, causing significant financial loss to involved organizations (Senge, 1990). Chaos theory assumes that things are complicated, but not totally random. Therefore, it can be a challenge to forecast demand exactly because of the many influential attributes affecting consumers' purchase intentions (de Treville, Shapiro, & Hameri, 2004).

One of the major strengths of using chaos theory to explain uncertainty is that it can detect small deviations between forecasted and actual demand (Zhang, 2004; Stapleton et al., 2006). Those deviations might potentially lead to momentous chaos if they are ignored (Zhang, 2004). In order to diminish such deviations, information related to uncertainties is crucial, and such information would further impact the supply chain performance (Stapleton et al., 2006). For example, Wilding (1998) utilized chaos theory to understand supply chain fluctuations. He found that the use of resource planning systems decreased the opportunity for unpredictable outcomes (Wilding, 1998). However, chaos theory did not completely evaluate the alliance relationship between buyers and sellers. The alliance relationship within the supply chain is vital for collaboration and information sharing among network members. Without those collaboration, unwanted consequences might be created within the network (Stapleton et al., 2006).

<u>Price Theories</u>

Among influential factors, price is considered the main determinant of purchase behavior, which creates waves of inventory levels. Here, the researcher will explain several important marketing theories interrelated with price. First, the reference price theory (Monroe, 1990) explains how consumers establish a reference price for a product based on several influential factors. Consumers evaluate prices comparatively and use

one price against other prices to evaluate price fairness (Kumar, Karande, & Reinartz, 1998). There are two types of reference price, internal and external price (Monroe, 1990; Mayhew & Winer, 1992; Mazumdar & Papatla, 2000). According to previous studies, the internal reference price is the number that consumers have in their minds based on their past purchasing experiences and the expected price of products (Monroe, 1990; Mayhew & Winer, 1992; Rajendran & Tellis, 1994). The external reference price is influenced by price information and diverse prices in the market, including the discounted price and the regular price (Mayhew & Winer, 1992).

Consumers' price perceptions and purchase intentions have been found to be affected by comparing the promotional price to the regular price (Rajendran & Tellis, 1994; Kumar et al., 1998; Kopalle & Mullikin; 2003). Consumers respond to the number on the price tag differently based on their reference price. Moreover, a reference price can affect consumers' purchase intentions (Kalyanaram & Winer, 1995; Monroe, 1990). For example, if the reference price of a particular product is higher than the actual price observed in the market, consumers would get the sense that they are saving money, and their purchase behavior might be affected (Yadav & Monroe, 1993). Numerous studies have found that marketing executives can manipulate the point of the reference price in consumers' minds by managing the factors that have a direct impact on consumers' price perceptions, which then affects their purchase intentions and behaviors (Thaler, 1985; Monroe, 1990).

The second price theory that would influence buyers' perceptions of price is the prospect theory (Kahneman & Tversky, 1979), which illustrates how consumers make purchase decisions based on the difference between their reference price and the actual

price (Kahneman & Tversky, 1979). Instead of perceiving a product in terms of a fixed price, consumers develop a sense either of loss or of gain by comparing the observed price to a reference price in their minds (Kahneman & Tversky, 1979). Such a comparison can have a great impact on their purchasing decisions. Today, consumers continuously seek value. When consumers sense a loss based on the prospect theory, the perceived value of the purchase decreases. In contrast, consumers perceive a higher value for a product because of a gain from the purchase (Kahneman & Tversky, 1979). Once consumers' perceptions of product value are changed, their purchase intentions will be affected.

Theory of Reasoned Action

Buyers' purchasing behavior changes constantly based on a variety of factors. Being able to recognize the causes behind each action and understand buyers' purchasing intentions would enable sellers to implement proper marketing strategies to effectively satisfy buyers' needs. The theory of reasoned actions (Fishbein & Ajzen, 1975) has been effectively applied to understand and predict an individual's behavioral intention in different situations (Ajzen & Fishbein, 1980; Robertson, Zielinski, & Ward, 1984; Sheppard, Hartwick, & Warshaw, 1988; Shim, Morris, & Morgan 1989). The theory of reasoned action is based on the observation that consumers utilize available information and evaluate the consequence of each decision in rational ways (Ajzen & Fishbein, 1980).

According to Fishbein and Ajzen (1975), the two dominant factors influencing a buyer's purchase intention and behavior are attitude toward the behavior and the subjective norm (see Figure 4; Volk, 2001). In marketing related research, Shim et al. (1989) explained attitude toward the behavior as the buyers' preferences toward certain

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types of behaviors or actions, which encourage them to have advanced considerations and structure their intention in purchasing. Subjective norms, meanwhile, are the social pressures guiding an individual's behavior.
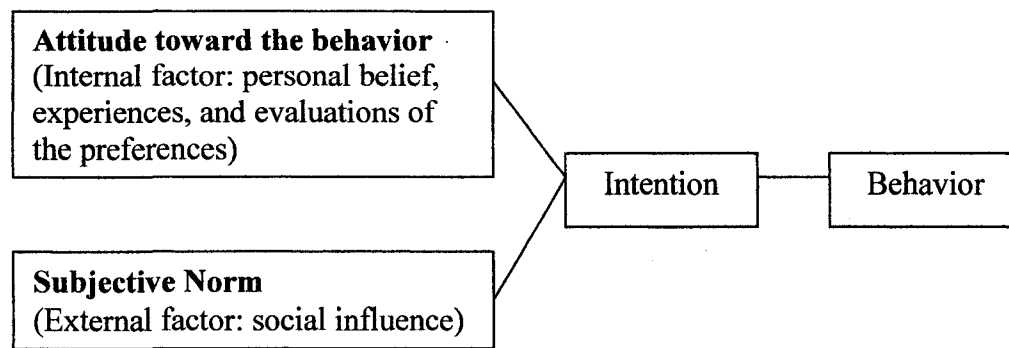
Figure 4. The Theory of Reasoned Action

Source: Volk F. (2001). E-Commerce, the consumer decision process and the theory of reasoned action. *Usability News, 3*(2), Retrieved March 5th, 2008 from http://psychology.wichita.edu/surl/ usabilitynews/3S/Internet_attitude.htm.

Ajzen, I., & Fishbein, M. (1980). U*nderstanding Attitudes and Predicting Social Behavior.* Englewood Cliffs: Prentice Hall.

According to Ajzen and Fishbein (1980), the theory of reasoned action consists of three essential components: cognitive, affective, and conative. The cognitive component of purchase behavior is that consumers evaluate the consequences of the purchase using available information. For example, buyers have different perceptions of various types of promotions according to their personal beliefs, and their beliefs are directly involved in their intention development, forming either a positive or negative purchase intention (Volk, 2001). Buyers' emotional reactions are the affective component of the action.

How they feel can affect their perception of products or certain types of purchasing behaviors (Dempsey, 1999). For example, if consumers believe that a specific behavior (using coupons) will bring pleasant outcomes (having a valuable purchase), their behaviors will change (collecting more coupons) in order to attain the desirable outcomes. The last component is the conative component, which illustrates that buyers' behaviors are influenced by external and marketing factors (Dempsey, 1999). When promotional information is available, consumers might perceive the product value in a different way, changing their buying behavior and purchase intentions. There is a reason behind each behavior. Hence, understanding factors affecting each purchase intention would help marketing executives to better understanding and predict buyers' behaviors, leading to better control over the flow of inventory.

Optimization Theory

Once they recognize the reasons behind buyers' actions, wholesalers need to acknowledge those influences in strategies that will benefit both the seller and the buyers. The optimization theory was first introduced as linear programming by George Dantzig in the 1940s (Elster, 1993). That explains how wholesale firms can use systematic management to maximize values and minimize unnecessary costs. Optimization focuses on generating findings from numerous situations in order to achieve the best outcomes in a given circumstance (Beveridge & Schechter, 1970). The collection process is known as a system, the main concept of the optimization theory. According to Kushner (1962, p.57), "a system is a collection of entities or things which receive certain inputs and is constrained to act concertedly upon them to produce certain outputs with the objective of maximizing some function of the inputs and outputs." In supply chain and wholesale

operations, the optimization theory is typically employed to minimize inventory costs, to maximize yields and to increase the market share (Beveridge & Schechter, 1970). Hence, the focus of applied optimization theory is on realizing both financial and system improvement.

To apply the optimization theory in this study, Greber's (1996) six steps are listed below with explanations of the application for this study.

1. Discover a need: Determine the need to control the inventory flows during promotions and the need for effective marketing techniques to boost sales volume.

2. Recognize a problem: Many direct and indirect factors influence the inventory controls, especially when promotions are going on.

3. Recommend a solution: Predict the impacts of inventory movements in different types of promotions.

4. Find elements for the solution: Evaluate the influence of each factor on inventory movements.

5. Present a solution: Analyze the sales or inventory movement with consideration of those influential factors.

6. Optimize the solution: Apply the findings and use in inventory management, for example, by selecting the most effective promotion approach to stimulate sales and maximize profit.

The optimization theory has been exercised to improve business management in many fields. In the wholesale industry, if the optimization system is controlled and utilized properly, the results could facilitate wholesale firms' implementation of

appropriate marketing approaches in order to improve operations and to minimize the cost of problems (Pierre, 1986).

Summary

Based on the literature review and the discussion of relevant theories, several factors were identified as influencing buyers' purchasing behaviors. Among those factors, several elements were found to have either a direct or an indirect effect on sales volume. Table 1 is a summary of factors used in this study as evaluating variables for the promotion influences on inventory. The affecting elements are listed with their impacts on demand, sales, and inventory. The influential factors of buyers' purchase intentions and behaviors are also discussed.

Table 1

The Effects of Marketing Elements on Buyer's Behaviors and Purchase Intentions

ELEMENTS	ATTRIBUTES	INFLUENCES	SOURCES
Product	Brand	Provides product information Assists buyers in displaying their social images	Burstiner, 1994; Dodds et al., 1991; Lowe & Corkindale, 1998; Kim, et al., 2002; Herbig, 1998; Pecotich & Shultz,1998
	Package Size	Identifies the purchase value Affects buyers' perceptions of unit prices	Granger and Billson, 1972; Manning et al., 1998; Nason and Della Bitta, 1983; Wansink, 1996
	Experience	Spends less time in the information collection stage and the decision process Motivates re-buy behaviors	Newman & Staelin, 1971; Moon & Tikoo, 2002; McGowan & Sternquist, 1998
	Quality	Is an indicator of product values	Yan, 1994

Table 1 (Continued)

ELEMENTS	ATTRIBUTES	INFLUENCES	SOURCES
Price		Indicates product quality Influences buying decision	Peterson & Wilson, 1985; Skouras et al., 2005; Sternquist et al., 2004; McGowan & Sternquist, 1998
	Unit Price	Provides buyers information for making decisions	Monroe and LaPlaca, 1972; Russo, 1977
Promotion		Increases the complexity of inventory control Perceives promotion message differently (buyers)	Mather, 1995; Kuo, & Xue, 1999; Dickson & Sawyer, 1990; Blattberg & Neslin, 1990; Rossiter & Percy, 1987
	Advertising (Pull)	Reinforces brand images and buyers' purchase intention Increases repeated purchase Attracts new customers Has long-lasting, but delayed sales response	Neslin & Shoemaker, 1989; Davis et al., 1992; Abraham & Lodish,1990; Little, 1979; Blattberg & Neslin, 1990

Table 1 (Continued)

ELEMENTS	ATTRIBUTES	INFLUENCES	SOURCES
	Trade (Push)	Increases sales volume Seeks desirable profits	Aw & Batra, 1998; Numazaki, 1997; Su et al., 2004; Hall & Hitch, 1993; Skoura at al., 2005
People	Sales Representative	Develops a strong relationship with buyers and decreases buyers' purchase decision time Acts as the main source of information Decreases uncertainties	Hewett et al., 2002; Jap et al., 1999; Chang & Wildt, 1996
	Social Group	Influences buyers' perceptions toward products Impacts their purchase decision	Chaudhuri & Haldar, 2005; Siu & Kirby, 1999; Wensley, 1997
Others	Holiday	Changes demand and different purchase motivation	Howard & Sheth, 1969
	Seasonality	Influences demand and supplies, especially for food items	Burstiner, 1994

CHAPTER 3

METHODOLOGY

Introduction

This chapter reviews the research questions, followed by a discussion of the data

source and research methodology. After a review of methodologies and the selection of

the proper research method for this dissertation, the conceptual frameworks and

hypotheses will be developed based on the literature review and the research questions.

Next, the proposed statistical techniques will be discussed. In addition, assumptions for

the selected data analysis technique are discussed in this chapter.

Research Questions

The original research questions that stimulated the interest in this study are listed

for review. The questions on which this study is focused are as follow:

1. Do promotions influence sales volume?

2. Are order volumes affected by marketing strategies?

3. What kind of promotion influences sales volume most significantly?

4. What type of promotional activity has the most significant impact on order

volume?

5. Do product attributes, such as brand and package size, influence the effectiveness of promotions?

6. Does the number of promotion occasions in a month affect sales?

7. Do repeated appearances of promoted products increase sales significantly?

8. How long does it take different types of promotions to lead to a response in sales?

9. Are there any lagged effects detected in order volumes when there is a promotion event going on?

To begin to answer these questions, theories related to operations, decision making, and purchasing behavior have been reviewed in Chapter Two. Those theories and the related literature review have served as the foundation of this study and as a guide for the research design. The purpose of this study's design is to elicit relevant information that might advance the forecasting of sales and order volume in order to avoid problems with stock-outs and over-stocks.

Data Source

Secondary data are broadly adopted by business researchers to forecast and appraise market potential (Zikmund, 2002). In order to answer the above-listed research questions, internal property data, including sales volumes, order volumes, and information related to promotions, were generated from the internal inventory systems of a specialty food wholesale firm in Asia. To achieve particular research objectives, researchers may need to gather information from more than one data set to have adequate data for a study. In this study, data were generated from two internal inventory systems, both of which monitored sales and order records. In addition, recorded documents

regarding promotions were collected for the study. The inventory records for five years (January 2002 to December 2006), including sales and order volumes, were gathered to allow the researcher to build a model that might help wholesale firms more accurately forecast appropriate inventory levels for promoted products.

Secondary Data

Secondary data, "gathered and recorded by someone else prior to and for purposes other than the current needs of the researcher" (Zikmund, 2002, p. 136), was used in this study to help fulfill the study objectives. Selecting the proper source is imperative when using considerable secondary data as a research method. Figure 5 provides a guideline that researchers might use to verify whether a data source is applicable to a study. Secondary data is usually historical data used to predict the future trend through analysis of the available information. According to Zikmund (2002), this research method has many advantages, including the valuable information gained from secondary data, the lower costs incurred and the time saved relative to the data collection procedure. However, several drawbacks of secondary data should also be considered when selecting the data source. A number of issues in secondary data, including outdated information, different measurements, and data accuracy verifications, require attentive evaluations. Consequently, the format of secondary data sometimes does need to be converted to meet the objective of the study (Zikmund, 2002). To verify data accuracy, data screening is necessary to identify potential outliers and anomalous data. Researchers can then take steps to minimize the negative impact of inaccurate data.
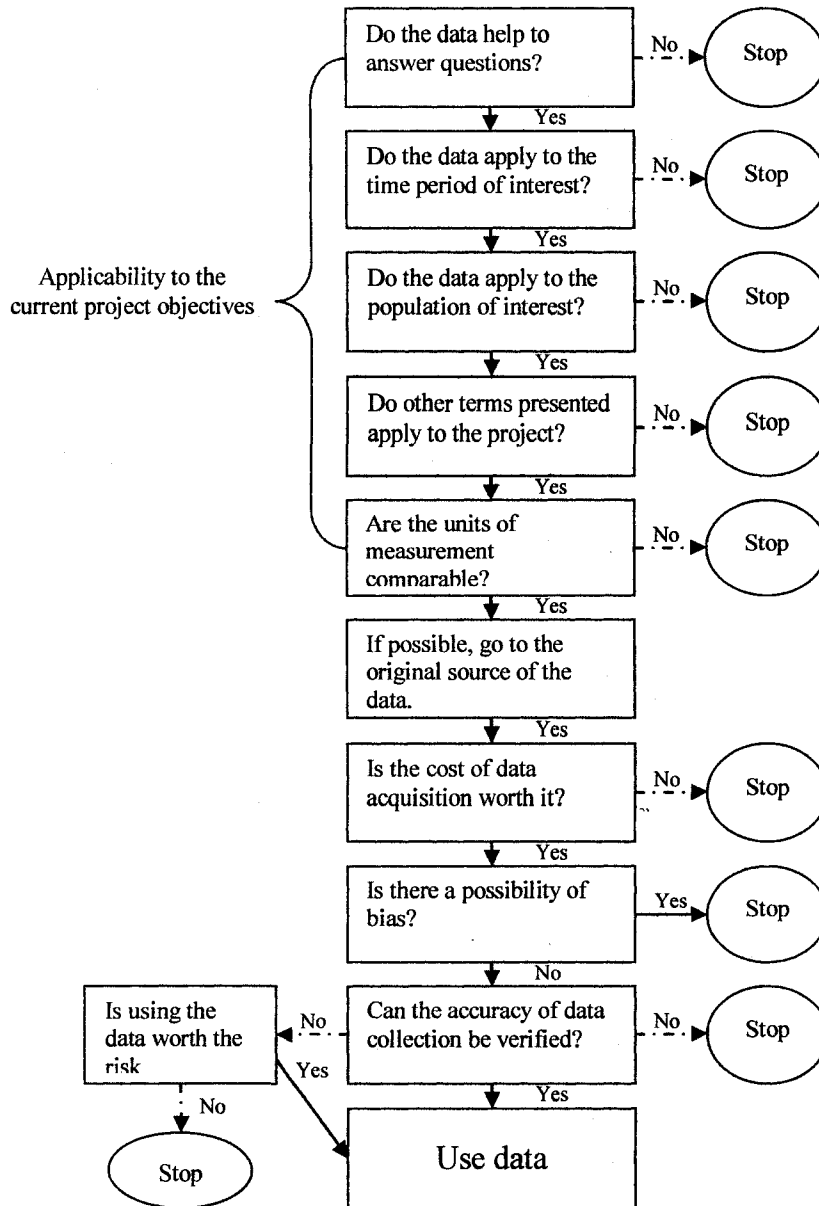
Figure 5. A Framework for Evaluating the Usefulness of Secondary Data

Note: From "Business Research Methods(7th Ed)", by W. G. Zikmund, 2002, Mason, OH: Thomson, p.139.

Evaluation of the Source of Secondary Data

To identify whether the data source was applicable to this study, an evaluation procedure based on the previous illustration (see Figure 5) was performed to ensure the reliability of the data source. First, researchers must estimate the effectiveness of the data by asking how relevant the selected secondary data is to the study. Since the purpose of this study was to investigate the impact of promotions on the sales and order volumes (inventory levels) in a food wholesale firm, the source of the secondary data, including sales, orders, and promotion data, are the focal points of the research interest, which are also crucial for the development of the study. Moreover, most studies utilizing secondary data attempt to predict future trends in the business world; therefore, the source of the data must be timely (Zikmund, 2002). Five-year inventory data and other promotion related information were gathered to identify the promotion influences. The data provided time sensitive information with sufficient information for further analyses, which would enable the food wholesale industry to gain control over inventory, especially when promotions are ongoing.

As mentioned previously, varying units of measurement are a drawback of secondary data. Hence, measuring units must be converted to ensure the consistency of measurements. The data provided by a wholesale firm for this study were all recorded in kilograms. The consistency of the unit was confirmed once again with the source provider. After making certain that there were no violations of the previous steps, the researcher could assume the applicability of the data source to the study.

In addition, the original data was provided at no financial cost. Having no cost for the data is one of the noteworthy advantages of secondary data compared to other

research methods. With regard to bias issues, secondary data are less likely to include self-reported biases because the data used in this study were transferred directly from the daily sales and order systems. However, it is difficult for researchers to verify the accuracy of the secondary data since researchers generally have no direct access to the propriety data systems, which are encrypted. After careful consideration of the various features of the data source and direct communication with the data provider, however, the risks of using data from this specific source seemed minimal. In conclusion, the use of the data is proper and valuable for this subject matter.

Conceptual Framework and Research Hypotheses

The primary purpose of this study was to recognize the effects of marketing related factors, such as brand, price, package, and promotions, on sales and order volumes. A particular research focus for this study was to investigate the impact of promotions on inventory. By utilizing data regarding both sales and order volumes provided by an Asian wholesale firm, inventory movement could be observed. Sales and order volumes were then used to assess the significance of each relevant factor. In addition, since promotions have been implemented by wholesalers to stimulate the flow of inventory, the researcher attempted to investigate whether there are carryover or lagged effects on sales and if sales respond to dissimilar types of promotions differently with regard to time. Two main conceptual frameworks were developed and presented in Figure 6 and 7 in order to fulfill the purposes of this study.
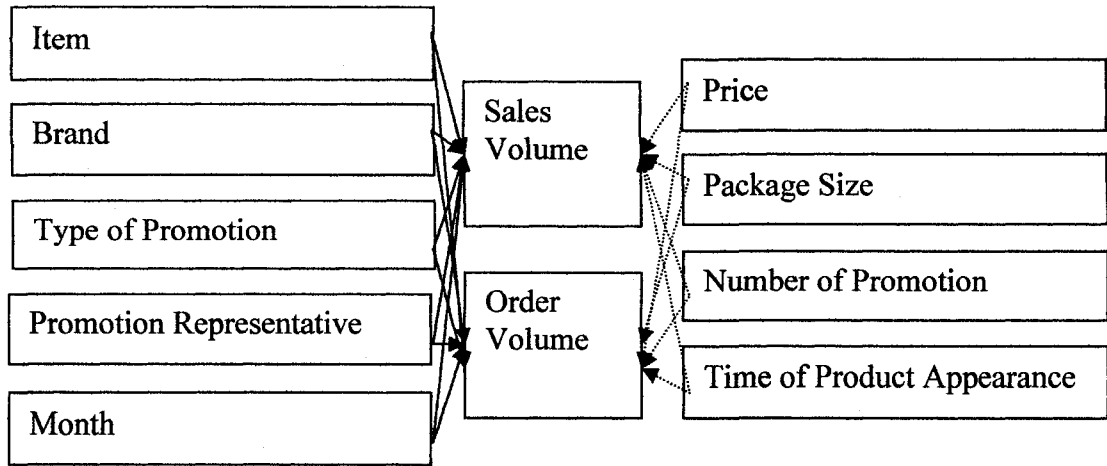
Figure 6. The Conceptual Model of the Influential Factors on Sales and Order Volumes.
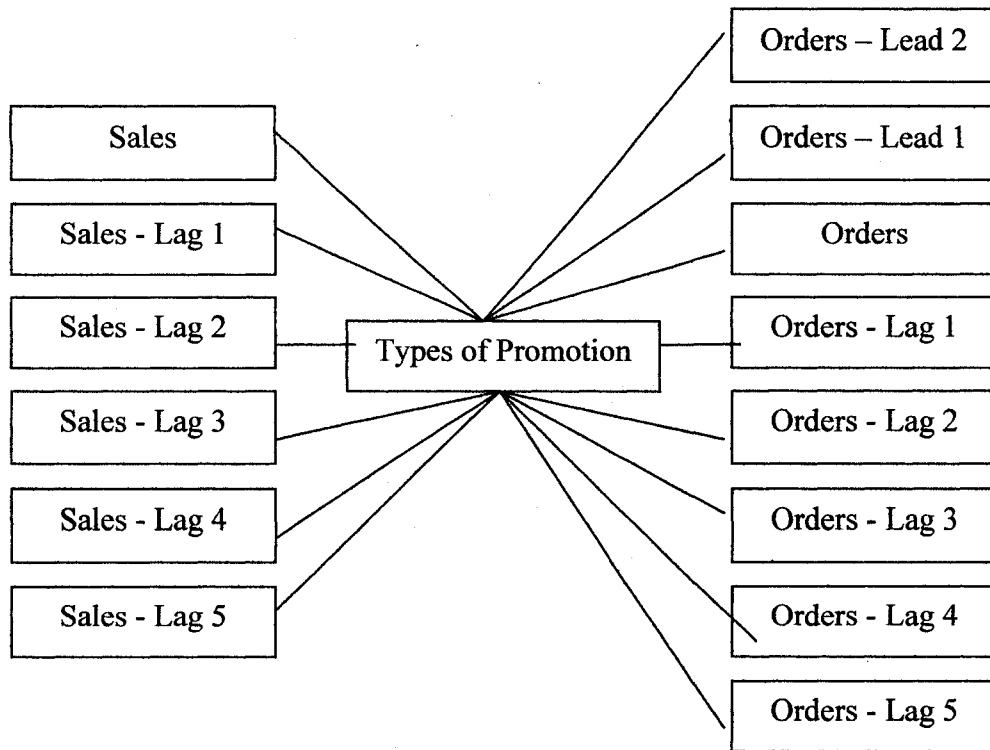
Figure 7. The Framework of Lagged Effects of Types of Promotion on Product Inventory

Variation (Sales and Orders).

Variables

For wholesale firms, it is important to understand what marketing factors have significant effects on inventory management. To that end, variables, including marketing elements and marketing strategies, are utilized as predictors for the sales and order volume of an Asian wholesale firm. Product, brand, package size, and price are considered as basic, but important, marketing elements that have been found to have an impact on buyers' purchasing decisions (Burstiner, 1994; U.S. Small Business Administration, 1980). Other factors, such as promotions, holidays, and seasonality, also affect product sales (Blattberg & Neslin, 1990; Kuo & Xue, 1999; Rossiter & Percy, 1987). Hence, the researcher will utilize historical inventory data, and marketing information provided by an Asian wholesale firm to investigate the significance of these factors on product inventory flows.

Two dependent variables, sales and order volumes, were examined in this study. Because the researcher wished to investigate factors affecting the movements of sales and orders, a number of independent variables related to marketing activities were included. Variables such as item, brand, and month were used to examine the effects of product characteristics on sales and orders. Other factors that were found to influence sales and order volumes were also included in the study. For example, price and package size, other leading indicators of consumers' purchasing behavior, were used to evaluate their impacts on sales or order predictions. In addition, promotions and relevant factors, such as nationality of promotion representatives and the number of product appearances in each promotion, were also included in statistical tests to investigate the impact of promotion on sales and orders. Promotion has been broadly and effectively applied to

stimulate product sales in a retail environment. In this study, the researcher would like to examine the effect of promotion in organization buying, rather than retail purchasing. Five types of promotions commonly used by Asian wholesalers, including demonstration (face-to-face promotion), holiday promotion, advertising, publicity/trade shows, and new product introduction, were used in this study.

In addition, the researcher hoped to test whether sales outcomes of foreign promotion representatives would significantly exceed the outcomes of local experts since Asian wholesalers believe that inviting foreign professionals to promote the products would be the most effective way to stimulate sales. Repeated appearances were found to decrease product uncertainty and increase product awareness. Since Asian cultural values support avoiding uncertainty, wholesalers often try to enhance product familiarity in order to ensure buyers' confidence in their purchases and bring in positive results on sales and promotion outcomes. In this study, the researcher tested the effects of product appearances and the number of events with which a product was introduced in a month on sales and orders. These promotion related factors (i.e. promotion representative, time of product appearances, number of events) believed to have an impact on the effectiveness of promotions, were used to examine their effects on sales and order volumes as well. The month in which a promotion was held is another variable that was used to observe the flow of inventory in this study, as month could be used as an indicator to explain the impacts of seasonality and holidays on product inventory movement.

Research Hypotheses

In review of the research question, the research hypotheses are presented in the null hypothesis format as follows.

Hypothesis Set I: Product Attributes

H1: The effect of the brands is not significant to the overall combined sales and order volumes.

H2: The effect of the price on the combined sales and orders is not statistically significant.

H3: There are no statistically significant differences in sales and order volumes according to item categories.

H4: Package sizes do not have a significant effect on sales and order volumes.

Hypothesis Set II: Promotion and Related Factors

H5: The month of promotion does not have a significant impact on sales and order volumes.

H6: There are no significant differences among different types of promotions with regard to sales and order volumes.

H7: Nationality of promotion representatives does not significantly affect sales and orders.

H8: The number of promotional events has no significant impact on sales and orders.

H9: The number of times a product appears in each event does not have a significant impact on product sales and orders.

H10: No significant lagged effects of sales and orders are observed according to different types of promotions.

Data Analysis Techniques and Assumptions

The Statistical Package for the Social Science (SPSS for Windows) 15.0 was used

to analyze the data. The statistical analysis techniques demonstrated in this research

include (1) descriptive statistics, (2) multivariate analyses, including multivariate analysis

of variance (MANOVA) and multivariate analysis of covariance (MANCOVA), (3)

follow-up univariate analyses, and (4) lagged effect examinations. The application of

these statistical tests will be explained, and their assumptions will be discussed in the

subsequent sections.

Descriptive Statistics

According to Levine, Berneson, & Stephan (1999), descriptive statistics are

broadly used as a method of presenting, categorizing, and summarizing data in order to

provide easy understanding of the information, displayed in formats such as text, tables,

figures, and graphics (Anderson, Sweeney, & Williams, 1998). From the descriptive

statistics, information such as the mean, median, and standard deviation can be extracted

from the data and presented to the readers. In addition, descriptive statistics play a

significant role in the pre-screening process of the data analysis. Researchers use

descriptive statistics procedures to check assumptions. This process helps researchers to

make proper choices regarding the data analysis techniques to be used and helps ensure

the reliability and validity of the results.

Multivariate Analyses

In this study, multivariate analysis of covariance (MANCOVA) was selected to

test hypotheses. Moreover, to acquire a deeper understanding of the effects of the

marketing related factors, MANOVA with post hoc function and multiple linear

regressions were also applied to elicit more detailed information. The reasons for employing these statistical techniques were as follows: (1) Two correlated continuous dependent variables (sales and orders) were the interests of this study. (2) Independent variables, including item, brand, and type of promotion, were categorical variables, which were expected to have an impact on the dependent variables. (3) Numerous continuous variables included in this study were used as covariates, which were believed to have effects on the dependent variables as well. Table 2 illustrates why these statistical techniques were chosen for this study. In addition, variables included in the study are presented in Table 3 with further descriptions.

Table 2

Statistical Technique Selection

Technique	Dependent Variable(s)	Independent Variable(s)	Covariate(s)
MANCOVA	Continuous	Categorical	Continuous
MANOVA	Continuous	Categorical	None
Regression	Continuous	Continuous and Categorical (coded as Dummy Variables)	None

Table 3

Description of Variable

	Variable	Description
Dependent variable	Sales	A continuous variable: it illustrates the sales of the products measured in kilograms.
	Orders	A continuous variable: it presents the order volume of the selected products in kilograms.
Independent variable	Brand	A categorical variable: seven major brands are included in the study to evaluate the impact of brands on sales and order volumes.
	Item	A categorical variable: all selected product items are categorized into five main categories.
	Distributor	A categorical variable: items included in the study are from four different distributors.
	Promotion	A categorical variable: six different types of promotion are used to evaluate the impact of promotions on sales and order volumes.
	Representative	A categorical variable: three main categories are implemented to test the effects of promotion representative.
	Month	A categorical variable: months are utilized to observe the effects of months, holidays, and seasonality impacts on product sales and orders.

Table 3 (Continued)

	Variable	Description
Covariates	Price	A continuous variable: price of a product per kilogram
	Package Size	A continuous variable: the weight of a container or package in kilogram
	Events	A continuous variable: the number of promotion events in a month
	Times	A continuous variable: number of times the promoted product appeared in each event

Multivariate Analysis of Covariance

Multivariate analysis of covariance (MANCOVA), an extension of univariate analysis of covariance, can be described as "MANOVA of the regression residuals, or variance in the dependent variables not explained by the covariates" (Hair, et al., 1998, p.346). The main purpose of MANCOVA is to test whether there are statistically significant differences among groups of independent variables by comparing vectors of adjusted means (Tabachnick & Fidell, 2001). Besides categorical independent variables, continuous control variables known as covariates are also included in MANCOVA (Weinfurt, 1995). Effective covariates always have strong correlations with dependent variables in order to minimize the error variance (Hair, et al., 1998). However, the associations between covariates and independent variables are expected to be weak because a covariate might explain the same variance as an independent variable. In

addition, the effects of covariates or independent variables may not be reliable because of the colinearity issue (Weinfurt, 1995).

One of the advantages of using multivariate analyses is that the intercorrelations among dependent variables are taken into consideration. These intercorrelations cannot be addressed by univariate techniques, such as ANOVA or a series of multiple regression, because that would go against the assumption of the univariate analyses that there are no intercorrelations among the dependent variables (Bray & Maxwell, 1985; Haase & Ellis, 1987; Hair, et al., 1998). For this study, the MANOVA is the best method since one of the research interests is inventory levels (a combination of sales and order volumes). Another advantage of employing MANOVA is that it controls for the inflation of Type I (α) and Type II error (β) because Type I and Type II error rates increase when multiple dependent variables are examined separately. In addition, the escalation of the Type II error rate can affect the power of the analysis (Cohen, 1977). Power is the probability of rejecting the null hypothesis when it is false, and a type II error rate is the probability of failing to reject the null hypothesis when it is false (Bray & Maxwell, 1985). Therefore, when a type II error rate increases, the power of the analysis declines (Haase & Ellis, 1987). Hence, choosing a proper statistical method is necessary to ensure the power of the analysis and validity of the study.

Multivariate Analysis of Variance

Multivariate analysis of variance (MANOVA), an extension of univariate analysis of variance (ANOVA), is broadly employed to examine mean differences in two or more dependent variables simultaneously (Bray & Maxwell, 1985; Haase & Ellis, 1987; Hair, Anderson, Tatham, & Black, 1998). Just like ANOVA and other multivariate analyses,

MANOVA is performed in the context of the linear model (Bray & Maxwell, 1982). According to Haase and Ellis (1987), the purpose of applying MANOVA as a statistical technique is to find a linear combination of the dependent variables that share maximum variance with any multivariate effect. In this study, for example, an analysis of the linear combination of dependent variables (sales and order volumes) is interpreted as an analysis of the inventory fluctuation (a combined dependent variable).

MANOVA was performed separately in this study because in SPSS, post hoc comparisons of categorical independent variables could not be performed with continuous covariates in the model. To draw out more detailed results, MANOVA with the post-hoc foundation was examined in order to evaluate the significant differences in an individual independent variable.

Multivariate Statistics

Four multivariate test statistics are presented in the multivariate analysis. At this point, the researcher was required to make an appropriate decision in order to adopt the most suitable test from these four statistics, including Wilk's Lambda (Λ), Pillai's Trace (V), Hotelling's Trace (T), and Roy's greatest characteristics root criterion (θ) (Bray & Maxwell, 1985; Muller & Peterson, 1984; Olson, 1976). Hasse and Ellis (1987) pointed out that a test selection must be based on two criteria, power and robustness. Of these four, Roy's test is considered the most powerful test in a concentrated combination of dependent variables. However, when assumption violations are observed, the Type I error increases dramatically, which can lead to a negative analysis result (Haase & Ellis, 1987). On the other hand, Pillai's test keeps its robustness even when violations of the assumptions occur (Bray & Maxwell, 1985; Haase & Ellis, 1987; Olson, 1976).

Follow-Up Analysis

When a statistically significant difference was found on the linear combination of

the dependent variables, post-hoc univariate F tests were performed to investigate the

differences among groups of independent variables. Post-hoc univariate F tests illustrate

the contribution of each dependent variable to the multivariate statistical significance.

Thus the effect of each independent variable will also be presented for dependent

variables separately. Post-hoc univariate F tests are most commonly used to interpret

group differences (Cramer & Bock, 1966). Once a significant main effect is found in a

dependent variable, post hoc multiple comparison tests can be implemented to evaluate

the group differences in the independent variables. Based on the result of the

homogeneity of variance assumption for individual dependent variables, Tukey pairwise

multiple comparison test is performed to investigate group differences because of its

conservative nature and the large number of groups is this study (Garson, 2008).

However, if the assumption of homogeneity of variance is violated, Dunnett's T is then

applied to test the differences among groups when the alpha significant level is strictly

maintained in 0.05 (Garson, 2008).

Multiple Linear Regressions

Multiple linear regressions were used in this study to analyze the effects of

continuous covariate variables on sales and order volumes. In this study, four covariates

were included to estimate the effects of product attributes and promotion. Therefore, to

have an advanced understanding of its impact on sales or order volumes alone, multiple

linear regressions were used without consideration of the intercorrelation between

dependent variables.

Assumptions

In this section, assumptions for multivariate analysis techniques and covariates will be discussed. Evaluation processes to check these assumptions will also be explained. In addition, the issues related to assumption violations will also be addressed as follows.

Independence

Independence is a critical assumption that requires that each observation of the dependent variables is statistically independent, which means that there are no correlations among observations (Bray & Maxwell, 1985). Non-independence is always observed in sequence data, which is referred to as time ordered data, in that residuals are always correlated over time (Tabachnick & Fidell, 2001). Violation of the independence assumption affects the validity of the analyses. No specific tests, however, can be performed to test the existence of observation dependence. Hair, et al. (1998) suggested combining observations within the groups and analyzing the groups' averaged values instead of testing cell values separately in order to minimize the impacts of this assumption violation.

Outliers

Both multivariate and univariate analyses are especially sensitive to outliers because the inflated Type I error might exist, affecting on the significance of the study (Tabachnick & Fidell, 2001; Hair, et al., 1998). Once outliers are found in the data set, the researcher should verify the accuracy of the data entry to avoid administration bias. If outliers are clustered in a specific variable, variable deletion is a possible solution. Additionally, if outliers are not from the intended populations, the researcher must decide

whether the observed outliers should be retained, eliminated or transformed (Tabachnick & Fidell, 2001).

Normality

Multivariate normality is a distributional assumption, which assumes that dependent variables have a multivariate normal distribution with each group, and a joint effect, or a linear combination, of two dependent variables is also normally distributed (Bray & Maxwell, 1985; Hair, et al., 1998). If they are not normally distributed, the significance indicator (p-value) is no longer reliable. However, the impact of this assumption violation has been found to have little influence when there are large sample sizes in variables (Hair, et al., 1998). In multivariate analyses, the violation of normality always affects the significance of the Box test. Hence, when the means of the various dependent variables are not normally distributed, the homogeneity of variance assumption is likely to be violated as well (Hair, et al., 1998).

Homogeneity of variance-covariance matrices

Several Monte Carlo studies have been conducted to test the robustness of multivariate statistics when the violations of multivariate normality and equality of covariance matrices are observed (Ito, 1980; Mardia, 1971; Olson, 1974). Statistics tests of the homogeneity assumption are available for both multivariate and univariate analyses. Box's M test is employed to test the equality of covariance matrices in multivariate tests, and Levene's tests are always employed in the follow-up post-hoc univariate F tests to investigate the homogeneity of variance for each dependent variable.

Homogeneity of Regression

Before including any covariates into the analysis, selections of the covariates must be carefully examined. The homogeneity of regression assumption assumes that the regression between the covariate and each dependent variable are statistically equal in all groups, which implies no interaction effects between covariates and independent variables (Weinfurt, 1995; Tabachnick & Fidell, 2001). If a violation of the assumption is observed, both covariates and independent variables need to be evaluated to estimate their roles and importance in the study. Otherwise, the research might need to apply another analytic technique besides MANCOVA.

Reliability of Covariate

The reliability of covariates ensures the power of the overall F-test for mean differences since covariates adjust the mean of dependent variables and reduce the overall variance (Hair, et al., 1998). However, including unreliable covariates in the study could increase the possibility of Type I or Type II errors because the vector group means might be either over or under adjusted (Tabachnick & Fidell, 2001). Selecting covariates that have significant correlation with dependent variables ($r > 0.8$) ensures the reliability of covariates (Weinfurt, 1995; Tabachnick & Fidell, 2001). Once the reliability of the covariate is questionable, the researcher may consider removing the covariate.

Linearity and Multicollinearity

Another assumption for both multivariate and univariate analysis is that the correlation between two dependent variables must be the same in all groups (Bray & Maxwell, 1985). The violation of this assumption might reduce the power of the statistical tests. The multicollinearity issue among independent variables also needs to be

evaluated and discussed. Redundant variables might affect test significance and analysis results. A rule of thumb for evaluating whether the correlation of independent variables is too high, which may result in the collinearity issue, is based on the correlation values (r). If a correlation value is larger than 0.8, it indicates that a violation of the multicollinearity assumption may occur that may influence the analysis results (Tabachnick & Fidell, 2001). To decide which variables should be included or excluded, researchers need to review the theoretical background of the study.

Procedures for Significance Tests

According to the purpose of the study and proposed research questions, variables and proper statistical techniques were selected to test the hypotheses and answer the questions posed by the study. Two dependent variables, sales and order volumes, were included to investigate inventory movements. Additionally, numerous independent variables, such as types of promotion, month, and items, were used as predictors for sales and orders. Price, packages, and product appearances in promotion were utilized as controllers to sales and order movement.

Once statistical techniques were chosen and variables selected, assumption checks were made to ensure the validity of the study. Assumptions related to the multivariate analysis were stated previously. Before performing any tests, assumptions must be checked. If violations of the assumption are observed, appropriate corrective actions, such as transformation or case deletion, might need to be done to guarantee the quality of data.

Next, according to the assumption tests, most proper multivariate statistics for the tests, Wilk's Lambda, Pillai's Trace, Hotelling's Trace, or Roy's greatest characteristics

root criterion, must be selected to estimate the significance of group differences. In MANCOVA, the main effects of the independent variables addressed the group difference of vector means of the combined dependent variables. The effects of the covariates were also estimated. In addition, when several independent variables are included in multivariate tests, the interaction effects among independent variables then become the interests of the study. In order to find the proper combination of independent variables for the study, multivariate analyses for each dependent variable were examined in order to select the variables that contribute most to the group differences (Bray & Maxwell, 1985). In multivariate analyses, if the interaction effects are not observed among independent variables, the main effects are discussed. If interaction effects have significant effects on the combined dependent variables, the post-hoc univaraite F tests and multiple linear regressions are implemented to evaluate which variables are significant for the group separation.

Once statistical significance was found in the multivariate test, the follow-up analyses, including post-hoc univariate F tests and regressions, were performed to assess the impact of the independent variable on each dependent variable. If a statistically significant difference was observed, the pairwise multiple comparisons would be implemented to demonstrate the differences among groups.

Summary

In conclusion, it is vital to select the appropriate methodology for the study. Once research questions are identified, the researcher must collect valuable data in order to elicit meaningful information. Additionally, utilizing proper statistical techniques to

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evaluate data is a key to providing valid results. Hence, understanding the advantages and disadvantages of potential techniques will help the researcher choose the best techniques. Moreover, realizing the impacts of assumption violations should also direct the researcher to perform and choose proper statistical tests in order to generate valid results.

CHAPTER 4

RESULTS

This chapter begins with the descriptive statistic of variables and the explanations

of variable selections. Next, assumption checks of the selected statistical analyses are

performed and discussed. The results of the analyses are then presented in three sections,

(1) multivariate analyses, including MANCOVA and MANOVA, (2) post-hoc univariate

F tests, and (3) multiple linear regressions.

Descriptive Statistics

Product sales and order records of five sequential years were provided by an

Asian specialty food wholesale firm. A total of 2520 cases were generated from the

original dataset and included in this study for data analyses. After the data screening

procedure and assumption checks, 2154 out of the 2520 cases were useable for statistical

analyses. Sales and order records from forty-two selected items were generated from

seven different brands and categorized into five major categories, including chocolate,

fruit products, flavors, jelly, and nuts, in order to estimate the effects of product

categories and brands on inventory. Descriptive summaries of brands and item categories

and transformed results are presented in Tables 4 and 5 followed by discussions.

Table 4

Summary of Brands

Brand	N	%
Brand 1	1357	63.0
Brand 2	531	24.7
Brand 3	59	2.7
Brand 4	61	2.8
Brand 5	46	2.1
Brand 6	35	1.6
Brand 7	65	3.0
Total	2154	100.0

Table 5

Summary of Item Categories

Item Category	N	%
Chocolate	497	23.1
Fruit Products	702	32.6
Flavors	379	17.6
Jelly	240	11.1
Nuts	336	15.6
Total	2154	100.0

Brand one, a dominant brand of the wholesale firm, contained 63% of all the cases. The wholesale firm has held the distribution rights for this specific brand since the business started and has become well known and market competitive because of this brand. Brand two was introduced to the market about a decade ago. Due to the current trend in the foodservice industry, products from brand two have significantly increased in popularity and sales. Hence, this wholesale firm has put emphases on marketing the brand and its products in the past years.

Other brands were included in this study because of their contributions to the research interest, the effects of promotion. Those products and brands might not be the focus of the sales in the wholesale firm; however, they were actively involved in promotion activities. The practical explanation for their involvement in the promotion process could be that those products were essential for the promotion outcomes.

An item's category was another product factor that would have an impact on inventory movement, sales, and orders. Selected items were categorized into five groups according to their characteristics or their use. These five categories would help the researcher to understand whether specific categories have a significant impact on sales, or if a promotion focused on specific item groups, whether the effects of the promotion would or would not be significant relative to sales.

Additionally, in order to ensure the validity of the testing results, the unit price of the products was stated on a one-kilogram basis. The unit prices for the selected products ranged between 150 and 1500 in the local currency. The package sizes were also formulated into a consistent system by using a kilogram measure, instead of pounds or bags. The package sizes varied from 0.4 kilogram per container to 15 kilograms a bag.

Besides product attributes, marketing related factors were also critical for the investigation of inventory movement. Information about promotion and related factors was provided by a wholesale firm. The primary goal for wholesalers in implementing any marketing activity is to stimulate sales. Once the variation in sales is created, order volumes would then be influenced, based upon the demand created for the promoted products. Thus, the effectiveness of promotion activities must be examined in order to obtain better predictions of sales and order volumes. According to the information provided by a wholesale firm, six promotion groups including five types of promotion methods: demonstration (face-to-face promotion), holiday promotion, advertising, publicity/trade shows, new product introduction, and none, were included in the study (see Table 6). Out of the 239 promotion events, 120 events were delivered by local experts, and 119 were carried out by professionals from other countries (see Table 7).

Table 6

Summary of Promotion

Types of Promotion	N	%
Demonstration	122	5.7
Holiday Promotion	40	1.9
Publicity /Trade Show	31	1.4
Advertising	26	1.2
New Product Introduction	20	0.9
None	1915	88.9
Total	2154	100

Table 7

Summary of Promotion Representatives

Representative	N	%
Foreigner	119	5.5
Local	120	5.6
N/A	1915	88.9
Total	2154	100

Moreover, the repeated appearance of a product has been believed to have a positive association with buyers' product knowledge, which has an impact on their purchase behavior. Therefore, the researcher would like to evaluate whether the number of events in a month and the number of times promoted products appear in these events have significant influences on inventory, sales, and order volumes. Events indicates the number of events in which a product was introduced in the same month. The number of times a product appeared was another factor used to test the relationship between repeated exposures of products and buyers' purchase behavior.

In addition, the month of the promotion was utilized as an indictor variable for sales, orders, and the effects of promotions. There are four main holidays in this specialty foodservice segment. Hence, by utilizing the month variable, the impacts of months on sales and order volumes can be explored, and the researcher can then examine whether there was a significant difference among holidays on buyers' demands and wholesalers' order replacements. Moreover, the effects of seasonality can be estimated while analyzing the impact of a particular month.

Assumption Checks

Outlier

Both multivariate and univariate analyses of variance are extremely sensitive to

outliers since the existence of outliers could cause a Type I error or a Type II error, which

would affect the significance of the study (Tabachnick & Fidell, 2001). In the data

screening process, extreme numbers and outliers were observed from Box plots. Those

cases were deleted to ensure the significance of the study.

Normality

The multivariate normality assumption implies that the combined dependent

variables' means in each cell are normally distributed (Tabachnick & Fidell, 2001). Due

to unequal sample sizes in each cell and results from the Kurtosis statistics, the normality

assumption was not met. Even though sample sizes in each cell were unequal, the

univariate F would still maintain its robustness as long as the sample size in the smallest

cell is larger than 20 (Mardia, 1971). Furthermore, the violation of the multivariate

normality assumption would not be extremely critical, if the violation of the assumption

was not caused by outliers. Once normality violation was observed, the researcher

needed to detect the causes of the violation. If the violation was caused by outliers,

outliers must be found and further action must be employed. If not, proper

transformation might help the researcher to meet the normality assumption. In this study,

the violation of normality was observed. According to the spread-versus-level plots (see

Figures 8 and 9), the linear relationships were observed in the plots of the standard

deviation versus the mean; therefore, a log transformation was performed in both sales

and order volume (Norusis, 2004). The log transformed sales and orders were then used

in this study as dependent variables. After transformations, both sales and orders were

distributed normally and met the normality assumptions (see Figures 10 and 11).

Spread vs. Level Plot of Sales
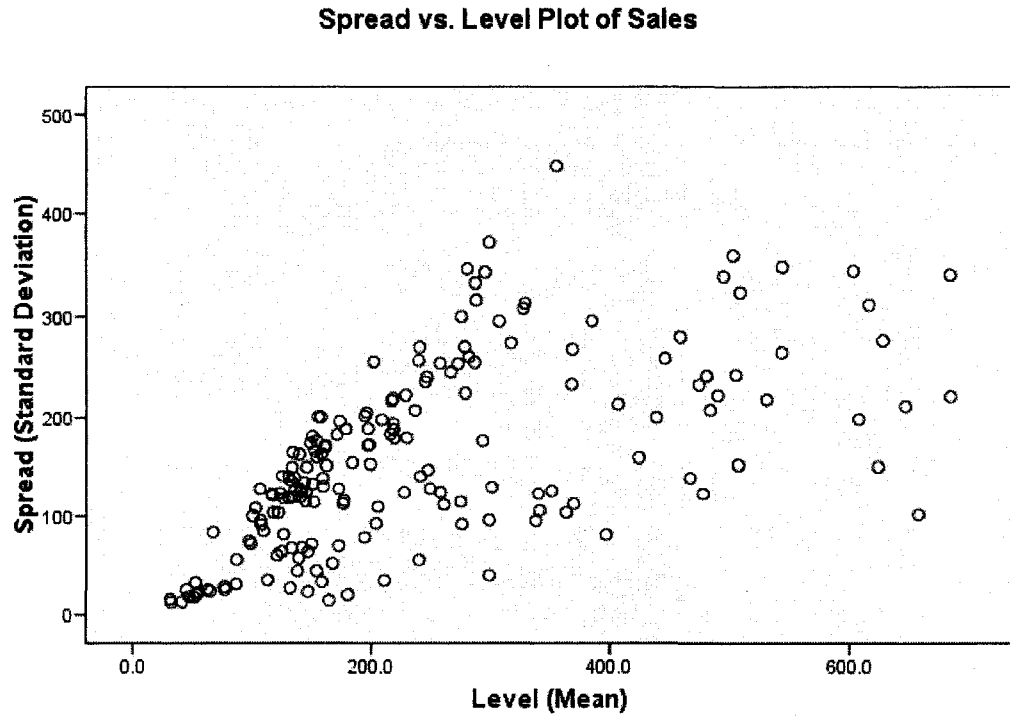
Figure 8. Normality Check: Sales

Spread vs. Level Plot of Order
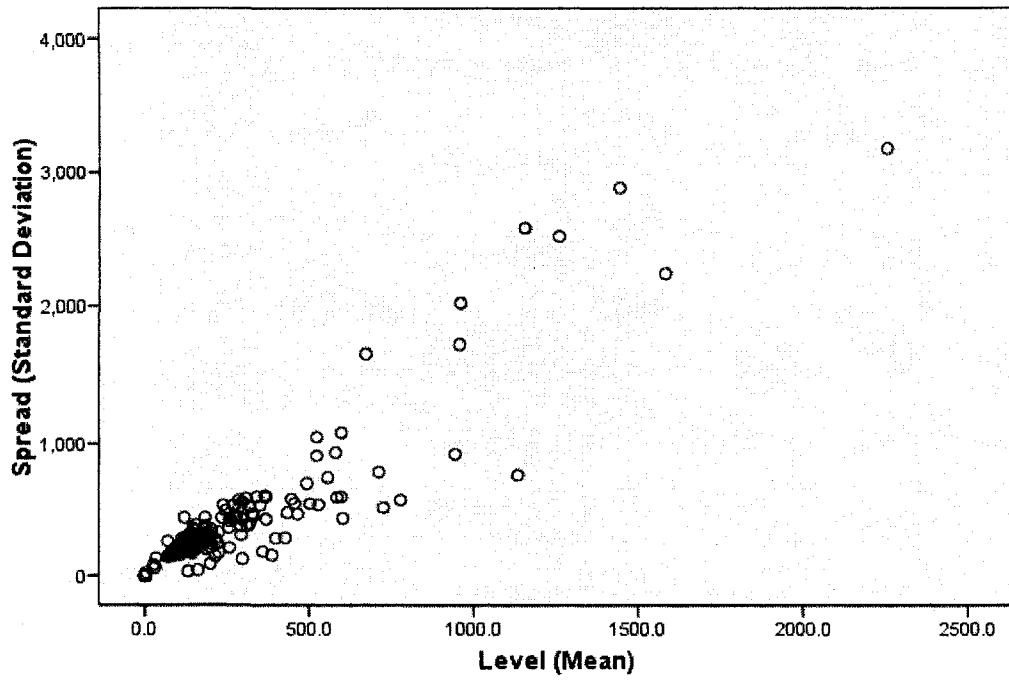
Figure 9. Normality Check: Orders

Dependent Variable: Transformed Sales

Mean =1.04E-14
Std. Dev. =0.999
N =2,154
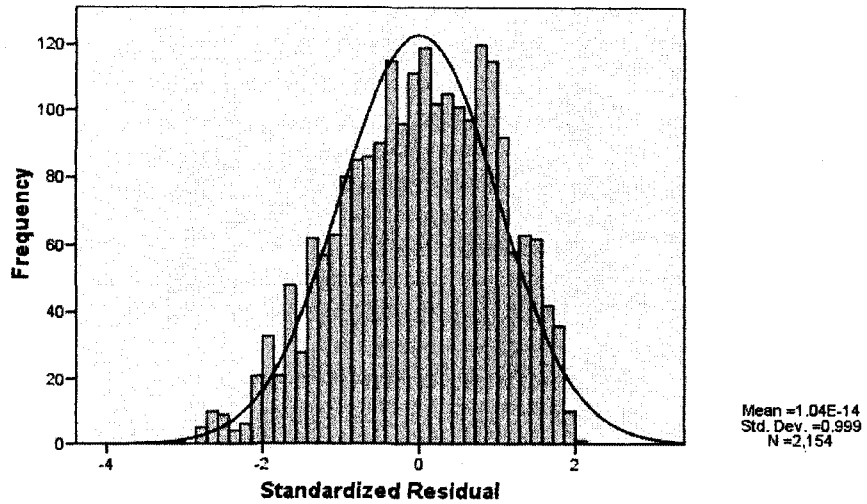
Figure 10. Normality Check: Transformed Sales

Dependent Variable: Transformed Orders

Mean =4.23E-15
Std. Dev. =0.998
N =808
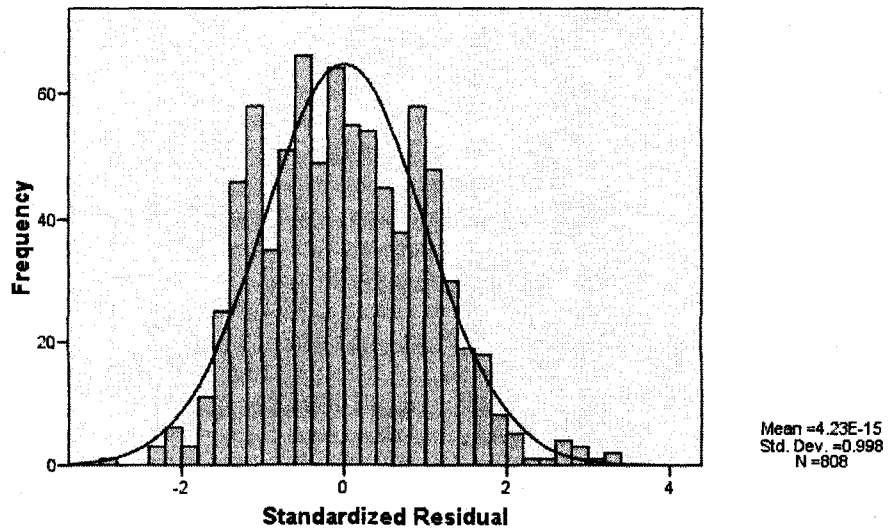
Figure 11. Normality Check: Transformed Orders

<u>Homogeneity</u>

Violation of the homogeneity assumption was observed in most tests. Box's M tests had p values < 0.05. Hence, the Pillai's Trace criterion was chosen as the multivariate statistic to examine the significance of the study. Besides, the Pillai's criterion is more robust compared to the other three statistics, especially when unequal sample sizes appear in each cell (Olson, 1976; Tabachnick & Fidell, 2001). In the follow up univariate analyses, Levene's test provided the significance test results of homogeneity of variance. A p-value from the Levene's test would act as a guide for the selection of a multiple comparison method. For example, if the equality of variance assumption was met, Tukey was then applied to test the group differences because of the large group number. Otherwise, Dunnet's T3 with a strict control over the significance level was employed to evaluate the differences of groups.

Multivariate Analyses

In this study, both multivariate analyses of covariance and variance were employed in order to have a better understanding of the effects of the influential factors on sales and order volumes. Two dependent variables, transformed sales and transformed orders, were used as pointers of the inventory movement. Several product-related and promotion-relevant independent variables were utilized to test the effects of promotion on sales and order variation. Moreover, numerous continuous covariates, which are essential factors of sales and order predicting, were also addressed in the study. The results of the overall F tests of the customized models are presented in Table 8. Significant effects were found in brands, categories, price, and package sizes. Post-hoc univariate F tests

(see Table 9) were then performed and illustrated the effects of the factors for individual dependent variables.

Table 8

Multivariate Tests: Overall

Effect	Df	F	Sig.	Partial Eta Squared	Observed Power(a)
Intercept	2	57.25	0.00	0.14	1.00
Brand	12	6.32	0.00	0.05	1.00
Categories	8	4.17	0.00	0.02	1.00
Type	8	1.05	0.40	0.07	0.50
Representative	2	0.12	0.89	0.00	0.07
Month	22	0.47	0.98	0.01	0.40
Price	2	3.38	0.04	0.01	0.64
Package	2	47.66	0.00	0.12	1.00
Number	2	0.53	0.59	0.00	0.14
Times	2	0.02	0.98	0.00	0.05
Brand * Month	86	1.18	0.13	0.07	1.00
Brand * Type	8	0.57	0.81	0.00	0.27
Type * Month	18	0.61	0.90	0.01	0.46
Type * Representative	2	0.54	0.58	0.00	0.14
Categories * Type	24	0.84	0.68	0.01	0.74

a Computed using alpha = .05

Table 9

Post-hoc Univariate F Tests

Source	Dependent Variable (a)	Df	F	Sig.	Partial Eta Squared	Observed Power(b)
Corrected Model	Sales	104	4.16	0.00	0.38	1.00
	Order	104	4.16	0.00	0.38	1.00
Intercept	Sales	1	48.16	0.00	0.06	1.00
	Order	1	114.45	0.00	0.14	1.00
Brand	Sales	6	7.92	0.00	0.06	1.00
	Order	6	7.29	0.00	0.06	1.00
Categories	Sales	4	7.02	0.00	0.04	1.00
	Order	4	5.04	0.00	0.03	0.96
Type	Sales	4	0.63	0.64	0.00	0.21
	Order	4	0.65	0.63	0.00	0.21
Representative	Sales	1	0.03	0.87	0.00	0.05
	Order	1	0.21	0.65	0.00	0.07
Month	Sales	11	0.30	0.99	0.01	0.17
	Order	11	0.39	0.96	0.01	0.22
Price	Sales	1	6.36	0.01	0.01	0.71
	Order	1	1.56	0.21	0.00	0.24
Package	Sales	1	89.20	0.00	0.11	1.00
	Order	1	68.24	0.00	0.09	1.00

Table 9 (Continued)

Source	Dependent Variable (a)	Df	F	Sig.	Partial Eta Squared	Observed Power(b)
Number	Sales	1	0.57	0.45	0.00	0.12
	Order	1	0.00	1.00	0.00	0.05
Times	Sales	1	0.04	0.85	0.00	0.05
	Order	1	0.01	0.91	0.00	0.05
Brand * Month	Sales	43	0.68	0.94	0.04	0.79
	Order	43	0.98	0.51	0.06	0.95
Brand * Type	Sales	4	0.66	0.62	0.00	0.22
	Order	4	0.19	0.95	0.00	0.09
Type * Month	Sales	9	0.36	0.96	0.01	0.18
	Order	9	0.60	0.80	0.01	0.30
Type * Represent	Sales	1	0.68	0.41	0.00	0.13
	Order	1	1.05	0.31	0.00	0.18
Categories * Type	Sales	12	0.69	0.76	0.01	0.41
	Order	12	0.55	0.88	0.01	0.32
Error	Sales	703				
	Order	703				
Total	Sales	808				
	Order	808				
Corrected Total	Sales	807				
	Order	807				

Table 9 (Continued)

a The sales and order are log transformed data.

b Computed using alpha = .05

c R Squared = .381 (Adjusted R Squared = .289)

Because the customized model was used, the lack of fit F test was then performed to ensure the fitness of the model and make sure no error occurred due to the misfitting model. The lack of fit F test results present as follows.

Table 10

Lack of Fit F Tests

Dependent Variables(a)	Df	F	Sig.	Partial Eta Squared	Observed Power(b)
Sales, Order	594	1.82	0.00	0.57	1.00
Sales	297	3.10	0.00	0.70	1.00
Order	297	2.02	0.00	0.60	1.00

a Transformed depenent variables

b Computed using alpha = .05

Product attributes

Product characteristics have been found to have significant influence on consumers' purchase intentions in a retail environment. Hence, in this study, the researcher examined the effects of the product attributes on sales and order volumes in

organizational buying and identified whether there were any significant differences between retailer purchasing and organizational buying.

Brand

First, the main effect of brands on sales and orders was estimated by employing the MANOVA test. Due to unequal sample sizes in the seven groups and the violation of the homogeneity of variance-covariance, $p < 0.001$, the Pillai's Trace criterion was utilized to determine the significance of the multivariate test. According to the results from the multivariate test, there was a statistically significant difference among the seven brands on product inventory fluctuation levels (sales and order volumes), $F (12, 1406) = 6.32$, $p < 0.001$; however, an association between brands and inventory variation was relatively weak with a partial eta square $(\eta^2) = 0.05$.

Post-hoc univariate F tests were conducted for dependent variables (see Table 9). Product sales were significantly differentiated by seven different brands with $F (6, 703) = 7.92$, $p < 0.001$, but an insubstantial association was observed between brands and sales volume, $\eta^2 = 0.06$. Moreover, an association between order volume and brands was also significant with a p-value < 0.001. However, there was no strong relationship between orders and brands as well.

In order to understand the effects of these seven brands on sales and orders, the advanced post hoc tests were implemented. Due to violations of the equality of error variance assumption on both sales and order volumes (Levene's p-values < 0.001), the Dunnett T3 pairwise multiple comparison tests were applied to evaluate the sales and order differences among theses seven brands (see Table 11) because the alpha significance level was controlled at the exact 0.05 level (Garson, 2008).

Table 11

Pairwise Multiple Comparison Tests: Brand

Dependent Variable(a)	Brand	Brand	Mean Difference	Standard Error	Sig.	95% Confidence Interval	
						Upper Bound	Lower Bound
Sales	1	2	.2873(*)	.04398	.000	.1523	.4224
		3	-.2535	.08440	.285	-.6914	.1844
		4	-.1267	.04138	.086	-.2627	.0094
		5	.0569	.03482	.874	-.0574	.1711
		6	.4914	.10489	.116	-.1735	1.1563
		7	-.3783(*)	.06357	.000	-.5993	-.1574
	2	1	-.2873(*)	.04398	.000	-.4224	-.1523
		3	-.5408(*)	.09187	.013	-.9504	-.1313
		4	-.4140(*)	.05504	.000	-.5862	-.2419
		5	-.2305(*)	.05030	.000	-.3869	-.0740
		6	.2040	.11099	.726	-.4026	.8107
		7	-.6657(*)	.07320	.000	-.9060	-.4254
	3	1	.2535	.08440	.285	-.1844	.6914
		2	.5408(*)	.09187	.013	.1313	.9504
		4	.1268	.09066	.920	-.2869	.5405
		5	.3103	.08786	.157	-.1118	.7325

Table 11 (Continued)

Dependent Variable(a)	Brand	Brand	Mean Difference	Standard Error	Sig.	95% Confidence Interval	
						Upper Bound	Lower Bound
Sales	3	6	.7448(*)	.13232	.016	.1564	1.3333
		7	-.1249	.10271	.976	-.5320	.2822
	4	1	.1267	.04138	.086	-.0094	.2627
		2	.4140(*)	.05504	.000	.2419	.5862
		3	-.1268	.09066	.920	-.5405	.2869
		5	.1836(*)	.04805	.010	.0279	.3392
		6	.6181(*)	.10999	.049	.0030	1.2331
		7	-.2517(*)	.07168	.032	-.4903	-.0130
	5	1	-.0569	.03482	.874	-.1711	.0574
		2	.2305(*)	.05030	.000	.0740	.3869
		3	-.3103	.08786	.157	-.7325	.1118
		4	-.1836(*)	.04805	.010	-.3392	-.0279
		6	.4345	.10769	.152	-.2002	1.0692
		7	-.4352(*)	.06810	.000	-.6655	-.2049
	6	1	-.4914	.10489	.116	-1.156	.1735
		2	-.2040	.11099	.726	-.8107	.4026

Table 11 (Continued)

Dependent Variable(a)	Brand	Brand	Mean Difference	Standard Error	Sig.	95% Confidence Interval Upper Bound	Lower Bound
Sales	6	3	-.7448(*)	.13232	.016	-1.333	-.1564
		4	-.6181(*)	.10999	.049	-1.233	-.0030
		5	-.4345	.10769	.152	-1.069	.2002
		7	-.8697(*)	.12011	.007	-1.436	-.3032
	7	1	.3783(*)	.06357	.000	.1574	.5993
		2	.6657(*)	.07320	.000	.4254	.9060
		3	.1249	.10271	.976	-.2822	.5320
		4	.2517(*)	.07168	.032	.0130	.4903
		5	.4352(*)	.06810	.000	.2049	.6655
		6	.8697(*)	.12011	.007	.3032	1.4362
Order	1	2	.0448	.03876	.997	-.0743	.1639
		3	-.7786	.21977	.192	-1.969	.4125
		4	-.2851(*)	.04627	.000	-.4395	-.1306
		5	-.0314	.04558	1.000	-.1860	.1232
		6	-.0433	.06579	1.000	-.4455	.3588
		7	-.6445(*)	.11811	.001	-1.062	-.2265

Table 11 (Continued)

Dependent Variable(a)	Brand	Brand	Mean Difference	Standard Error	Sig.	95% Confidence Interval Upper Bound	Lower Bound
Order	2	1	-.0448	.03876	.997	-.1639	.0743
		3	-.8234	.22214	.162	-1.998	.3518
		4	-.3299(*)	.05648	.000	-.5092	-.1505
		5	-.0762	.05592	.973	-.2549	.1025
		6	-.0881	.07333	.966	-.4394	.2631
		7	-.6893(*)	.12247	.001	-1.113	-.2647
	3	1	.7786	.21977	.192	-.4125	1.9697
		2	.8234	.22214	.162	-.3518	1.9986
		4	.4935	.22357	.557	-.6731	1.6601
		5	.7472	.22343	.214	-.4202	1.9147
		6	.7353	.22841	.226	-.4106	1.8811
		7	.1342	.24858	1.000	-.9519	1.2202
	4	1	.2851(*)	.04627	.000	.1306	.4395
		2	.3299(*)	.05648	.000	.1505	.5092
		3	-.4935	.22357	.557	-1.660	.6731
		5	.2537(*)	.06136	.004	.0551	.4523
		6	.2418	.07756	.207	-.1014	.5849
		7	-.3594	.12505	.158	-.7891	.0703

Table 11 (Continued)

Dependent Variable(a)	Brand	Brand	Mean Difference	Standard Error	Sig.	95% Confidence Interval	
						Upper Bound	Lower Bound
Order	5	1	.0314	.04558	1.000	-.1232	.1860
		2	.0762	.05592	.973	-.1025	.2549
		3	-.7472	.22343	.214	-1.914	.4202
		4	-.2537(*)	.06136	.004	-.4523	-.0551
		6	-.0120	.07715	1.000	-.3564	.3325
		7	-.6131(*)	.12479	.002	-1.042	-.1838
	6	1	.0433	.06579	1.000	-.3588	.4455
		2	.0881	.07333	.966	-.2631	.4394
		3	-.7353	.22841	.226	-1.881	.4106
		4	-.2418	.07756	.207	-.5849	.1014
		5	.0120	.07715	1.000	-.3325	.3564
		7	-.6011(*)	.13351	.006	-1.065	-.1368
	7	1	.6445(*)	.11811	.001	.2265	1.0625
		2	.6893(*)	.12247	.001	.2647	1.1139
		3	-.1342	.24858	1.000	-1.220	.9519
		4	.3594	.12505	.158	-.0703	.7891
		5	.6131(*)	.12479	.002	.1838	1.0424
		6	.6011(*)	.13351	.006	.1368	1.0655

Brand 1 indicated significantly more sales compared to brand 2 but fewer sales compared to group 7. Brand 2 had significantly fewer sales compared to other brands, except brand 6. Some brand 2 products were introduced to the market within less than 5 years and usually required a specific storage environment. That might help to explain why brand 2 had significantly lower sales compared to other brands in the wholesale firm. Among those brands, brand 7 indicated the significantly highest sales and orders. One possible explanation for the significance could be the demand for different products. However, the researcher would like to examine further whether other factors contributed to this statistical significance. When sales are mentioned in the retail environment, price is always identified as a prominent factor affecting overall sales. According to previous studies, package is another factor that affects buyers' perception of the product and influences their purchasing decisions. The researcher would like to include price and package variables into the analysis and to investigate their effects on sales and orders.

Price and Package

According to the findings from MANCOVA, price did have a significant covariate effect on sales and order volumes. Packaging also displayed its covariate effect to differentiate the inventory indicators. The results of the multivariate tests presented in table 8 provided the significance tests for both price and package sizes. Once again, Pillai's Trace was used to test the significance because of the violation of homogeneity of covariance. Because of the statistically significant difference observed in the multivariate tests, the researcher estimated the effects of price and package sizes on sales and order volumes. A post-hoc univariate F test was carried out, and the results were included in Table 9.

According to the findings of the post-hoc univaraite F-tests, only price was found to have the effect on sales with a p-value = 0.001. However, package sizes demonstrated significant effects on both sales and order volume with p-values < 0.001. The association between package and sales was less strong, $\eta^2 = 0.11$, which means that only 11% of variances in sales can be explained by package sizes. Moreover, package sizes can only explain 9% of variance in order even though a significant difference was found.

Item Categories

Selected items were categorized into five groups, including chocolate, fruit products, flavors, jelly, and nuts, according to their characteristics and functions. Based on the MACNOVA test results, statistically significant differences were found in these five item categories, $F (8, 1406) = 4.17$, $p < 0.001$, and $\eta^2 = 0.02$. Post-hoc univariate F tests were performed to analyze the difference in sales and orders discretely in order to investigate the effects of categories on sales and order volumes.

Significant differences were found in both sales and orders by using item categories as a group factor. Therefore, pairwise multiple comparison tests were implemented to examine the group differences. Because of the violations of homogeneity of variance for both sales and orders, the p-values of Levene's test of equality of variances were less than 0.05. The Dunnett T3 was then used as a criterion for the comparison tests (see Table 12).

Table 12

Pairwise Multiple Comparison Tests: Item Categories

Dependent Variable(a)	Category	Category	Mean Difference	Std. Error	Sig.	95% Confidence Interval Upper Bound	Lower Bound
Sales	1	2	-.1003	.04339	.193	-.2225	.0219
		3	-.2683(*)	.05151	.000	-.4141	-.1225
		4	.0103	.04664	1.000	-.1217	.1424
		5	-.1919(*)	.03645	.000	-.2946	-.0892
	2	1	.1003	.04339	.193	-.0219	.2225
		3	-.1680(*)	.05838	.042	-.3327	-.0032
		4	.1106	.05413	.346	-.0421	.2634
		5	-.0916	.04564	.371	-.2201	.0370
	3	1	.2683(*)	.05151	.000	.1225	.4141
		2	.1680(*)	.05838	.042	.0032	.3327
		4	.2786(*)	.06083	.000	.1068	.4505
		5	.0764	.05343	.808	-.0747	.2275
	4	1	-.0103	.04664	1.000	-.1424	.1217
		2	-.1106	.05413	.346	-.2634	.0421
		3	-.2786(*)	.06083	.000	-.4505	-.1068
		5	-.2022(*)	.04874	.000	-.3401	-.0643

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Table 12 (Continued)

Dependent Variable(a)	Category	Category	Mean Difference	Std. Error	Sig.	95% Confidence Interval Upper Bound	Lower Bound
Sales	5	1	.1919(*)	.03645	.000	.0892	.2946
		2	.0916	.04564	.371	-.0370	.2201
		3	-.0764	.05343	.808	-.2275	.0747
		4	.2022(*)	.04874	.000	.0643	.3401
Order	1	2	-.2637(*)	.03845	.000	-.3720	-.1554
		3	-.3043(*)	.04242	.000	-.4243	-.1843
		4	-.0054	.03717	1.000	-.1106	.0997
		5	-.1642(*)	.03248	.000	-.2557	-.0726
	2	1	.2637(*)	.03845	.000	.1554	.3720
		3	-.0406	.04925	.995	-.1795	.0983
		4	.2583(*)	.04481	.000	.1320	.3847
		5	.0996	.04100	.145	-.0159	.2151
	3	1	.3043(*)	.04242	.000	.1843	.4243
		2	.0406	.04925	.995	-.0983	.1795
		4	.2989(*)	.04826	.000	.1625	.4352
		5	.1401(*)	.04474	.019	.0137	.2666

Table 12 (Continued)

Dependent Variable(a)	Category	Category	Mean Difference	Std. Error	Sig.	95% Confidence Interval Upper Bound	Lower Bound
Order	4	1	.0054	.03717	1.000	-.0997	.1106
		2	-.2583(*)	.04481	.000	-.3847	-.1320
		3	-.2989(*)	.04826	.000	-.4352	-.1625
		5	-.1587(*)	.03980	.001	-.2712	-.0463
	5	1	.1642(*)	.03248	.000	.0726	.2557
		2	-.0996	.04100	.145	-.2151	.0159
		3	-.1401(*)	.04474	.019	-.2666	-.0137
		4	.1587(*)	.03980	.001	.0463	.2712

Tables 12 revealed the sales differences among item groups. Flavors had the most significant sales compared to other categories, M = 266.49. Chocolate and similar products were found to have significantly fewer sales compared to nuts and fruit products. No significant difference was found between chocolate and jelly or between fruit and nuts. Among the five item groups, flavors had the most significant orders compared to chocolate, jelly, and nuts. Even though the orders for flavor (M = 263.22) were more than fruit (M= 237.23), the difference was not significant according to the multiple comparison tests. Similar to the sales outcome, chocolate presented significantly less order volume.

Promotion and Relevant Factors

In this section, numerous factors related to promotion activities were tested. Moreover, the effects of those variables, including types of promotion, month of promotion, promotion representative, and repeat appearances, were evaluated and discussed. Once multivariate significance was found, the follow-up evaluation was employed to obtain more detailed information.

Types of Promotion

Promotion information provided by a wholesale firm consisted of six types of promotion: demonstration, holiday promotion, advertising, publicity/trade shows, new product introduction, and none. In a consideration of the robustness of the study, Pillai's Trace was used to estimate the multivariate test results. From the MANCOVA result, there was no statistically significant difference among those groups, $F (8, 1406) = 1.05$, $p = 0.40$. Although the new product introduction promotion helped the wholesale firm generate more sales ($M = 277.38$), the sales level was not significant enough to differentiate this type of promotion from others

Table 13

Descriptive Statistics of Sales and Transformed Sales: Types of Promotion

Types of Promotion	Mean	Std	Mean(a)	Std(a)
Demonstration	217.07	196.50	2.12	0.48
Holiday Promotion	233.83	189.30	2.20	0.37
Advertising	225.29	193.15	2.16	0.45
Publicity/Trade shows	197.40	196.73	2.17	0.33
New Product Introduction	277.38	286.05	2.20	0.48
None	201.14	205.16	2.06	0.50

a   Transformed statistics

Lagged Effect

Types of promotion were found to have significant lagged effects on inventory variation. The researcher found that the types of promotion significantly differentiated inventory vacillation two and three months later. A multivariate significance was found in the combined sales and orders two months after the promotion was implemented, F (10, 1520) = 2.28, p = 0.01, with partial η^2 = 0.02. The association was very weak because only 2% of the covariance can be explained by the types of promotion. The further post-hoc univariate F tests indicated that the effect of the types of promotion was only found in orders (see Table 14).

Table 14

Post-hoc Univariate F Tests: Types of Promotion (Lag 2)

Source	Dependent Variable(a)	Df	F	Sig.	Partial Eta Squared
Corrected Model	Sales2	5	0.84	0.52	0.01
	Order2	5	2.96	0.01	0.02
Intercept	Sales2	1	2043.06	0.00	0.73
	Order2	1	3626.37	0.00	0.83
Type	Sales2	5	0.84	0.52	0.01
	Order2	5	2.96	0.01	0.02
Error	Sales2	760			
	Order2	760			

a Sale and order data were transformed.

b Computed by using $\alpha = 0.05$.

c Sales2 means the sales volumes two months after the promotion.

d Order 2 indicates order volumes two months after the promotion was over.

In addition, the advanced multiple comparison tests demonstrated the differences among the six types of promotion. Since the Levene's test showed the equality of variance in Order2, the Tukey comparison in Table 15 was applied to illustrate the group differences.

Table 15

Tukey's Homogeneous Subsets

Order 2		Subset 2	Subset 1
	Advertising	2.1955	
	New Product Introduction	2.4978	2.4978
	Demonstration	2.5233	2.5233
	None	2.5728	2.5728
	Publicity/Trade Show		2.6891
	Holiday Promotion		2.7354

Table 16

Descriptive Statistics of Orders and Transformed Orders in Lag 2: Types of Promotion

Types of Promotion	Mean	Std	Mean(a)	Std(a)
Demonstration	192.65	361.47	2.52	0.39
Holiday Promotion	325.33	941.65	2.73	0.42
Advertising	68.97	130.37	2.20	0.28
Publicity/Trade shows	265.15	515.56	2.69	0.37
New Product Introduction	165.65	376.48	2.50	0.40
None	208.52	495.17	2.57	0.39

a   Transformed statistics

Combining the information provided in tables 15 and 16, the researcher found that the wholesale firm did not respond to the advertising but placed significant additional orders later. However, the firm significantly increased order volumes two month later for products introduced in trade shows and holiday promotions. Holiday promotion events usually took place about two months before the holiday. Hence, the findings show that the wholesaler expected increased sales of promoted products during the holiday seasons.

Additionally, after three months, significantly increased sales were found in products that had been demonstrated in new product introductions compared to other promotion methods, $F (5,750) = 2.45$, $p = 0.32$, with a partial $\eta^2 = 0.02$. In the Tukey comparison test, new product introductions increased sales to 309.30 kilograms compared to promoted products that were not promoted ($M = 213.65$ kilograms).

Month

Month is one of the critical factors that influences the sales and order volumes. In the specific foodservice segment in which this wholesale firm is positioned, several main holidays are believed to have a significant impact on sales. Seasonality is always a predicting variable for food sales. By using month as a variable, the researcher can examine the effects of holidays and seasonality at the same time.

According to the result from the overall multivariate F tests, no significant effect was found in month, $F (22, 1406) = 0.47$, $p = 0.98$. However, the observed power is below 0.08, which indicates the Type II error is not low enough for us to accept the result with confidence. Table 17 presents the orders in 12 months, and the researcher found that the orders increased in March and April, an increase which might supply the demands in May, the month in which Mother's Day falls. Moreover, September's and

October's orders were also higher compared to previous months. A possible explanation of this variation would be the holidays in November and December.

Table 17

Descriptive Statistics of Sales and Orders: Month

Month	Sales	Orders
January	231.66	141.79
February	178.41	211.91
March	197.47	259.74
April	211.65	287.18
May	226.21	214.65
June	199.50	177.20
July	209.00	252.13
August	212.19	187.50
September	170.19	264.03
October	205.84	248.94
November	198.09	137.77
December	202.50	134.48

Promotion Representative

Asians display a preference toward Western brands or products since they believe that the quality of Western brands or products is superior. Therefore, Asian wholesalers like to invest in foreign professionals to promote products. They believe that a foreign

representative is more professional and is most likely attract more buyers. However, the cost of hiring foreign promoters is higher than that of investing in local experts to be their representatives. Thus, an evaluation of the effectiveness of the promotion representatives is estimated according to sales outcomes. To ensure reliable outcomes, the Pillai Trace was chosen as a preferable test due to its robustness. The multivariate result of the promotion representative analysis did not present any significant differences in the inventory variation, $F(2, 702) = 0.12$, $p = 0.89$. Post-hoc univaraite F tests also supported the findings of the multivariate test with no significant differences in sales and order volumes based on the variable of the promotion representatives.

Repeated Appearance

Repeated appearance of the promoted products increases buyers' awareness of these products. Buyers might feel more comfortable about purchasing items they saw frequently. Thus, when discussing the effects of promotion, the researcher determined whether the repeated appearance of the products would have a positive impact on promotion. The two variables used to assess the effect of repeat appearance are events and times. Events stand for the number of the events in which products appeared in promotion related activities in a month. Times, a covariate variable, indicates the number of times that product is either introduced or used during a promotion event. According to the multivariate tests, there were no covariate effects of either events ($p = 0.59$) or times ($p = 0.98$).

Multiple Linear Regressions

MANOVA with the post hoc function was used to differentiate the group means for the categorical independent variables. For the continuous variables, covariates, multiple linear regressions were performed to evaluate their effect on sales and order volumes. According to the multivariate tests and post-hoc univariate F test results, price had the most significant effect on sales. However, according to the coefficients, price did not show any impact on sales with unstandardized coefficient = 0.00. However, the standardized coefficient indicated that the sales increased $0.18 when the price increases 1 dollar (see Table 18). In order to understand the differences between the unstandardized and standardized coefficients, the relationship between price and sales is illustrated in Figure 12. According to the illustration, sales vary at different price levels. It could be that there are differences in demand for the different products, which are in different price levels, thereby accounting for the difference in sales.
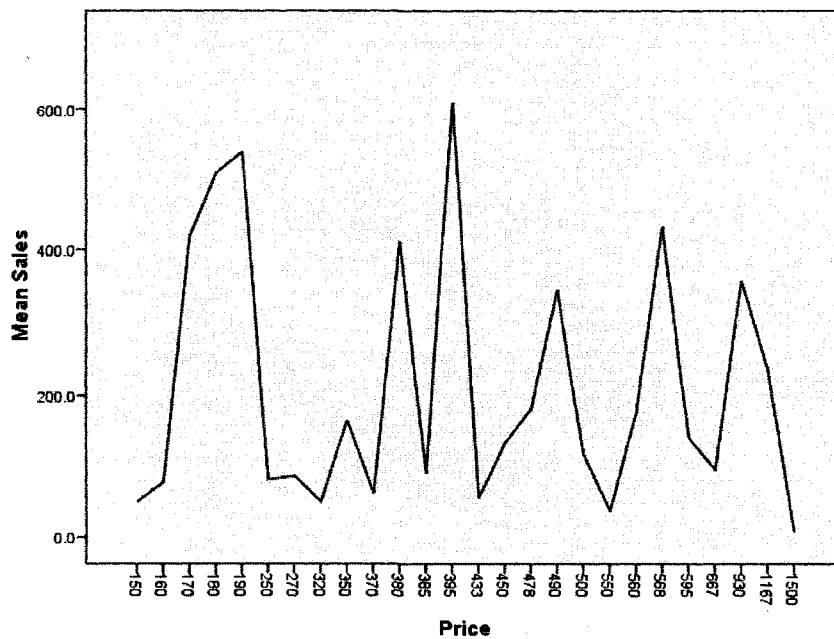
Table 18

Multiple Linear Regression: Transformed Sales

Mode		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.61	.04		41.60	0.00
	Price	0.00	.000	0.18	7.77	0.00
	Package	0.04	0.00	0.30	13.01	0.00
	Number	0.07	0.04	0.06	1.72	0.09
	Times	0.03	0.02	0.00	0.13	0.90

a Dependent Variable: Transformed Sales

Figure 12. Price and Sales

Package sizes were shown to have significant effects on both sales and orders (see Tables 18 and 19). According to the multiple linear regression results for both sales and order, package sizes have a positive impact on sales and orders. When package sizes increase, sales increase. Buyers perceive larger quantities as value purchases and believe that the unit price for the larger package product is less than that of small packages. That wholesale buyers tend to purchase in bulk could be another explanation for the higher sales of large packaged products.

Table 19

Multiple Linear Regression: Transformed Orders

Mode		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.37	0.05		45.42	0.00
	Price	9.46	0.00	0.05	1.19	0.23
	Package	0.02	0.00	0.22	5.95	0.00
	Number	0.03	0.07	0.03	0.44	0.66
	Times	-0.03	0.05	-0.04	-0.55	0.59

a Dependent Variable: Transformed: Orders

Summary

According to results from multivariate statistics, post-hoc univariate F tests with pairwise multiple comparisons, and descriptive statistics, significant effects of the

independent variables were presented. Interaction effects among independent variables were also illustrated. The results indicated that sales and order volumes were significantly influenced by several critical factors (see Figure 13). The findings of this study provide valuable information for wholesalers. In the next chapter, the researcher will recommend how to utilize the information gained by these data analyses.
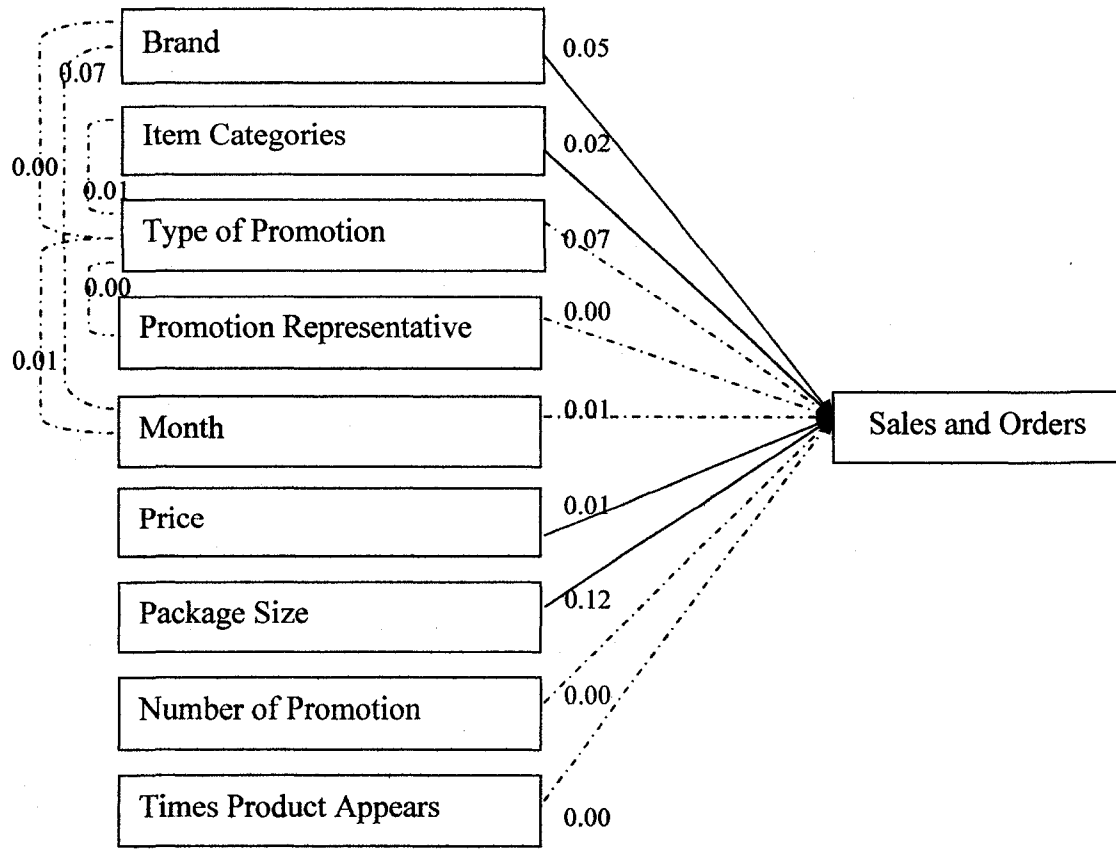
Figure 13. The Model of the Influential Factors on Products' Sales and Orders

a   —— Significant association

b   ‑‑‑‑ Insignificant relationship.

c   numbers listed in the figure represent the association (partial Eta square)

d   Price had a significant effect on sales only.

CHAPTER 5

SUMMARY, DISCUSSION, AND RECOMMENDATION

Inventory is one of a wholesale firm's most important assets. A better understanding of the factors affecting inventory fluctuation would permit wholesale firms to maintain greater control over their investments. In addition, improved inventory management is believed to be positively associated with a company's profit gain (Patton, 2005). According to chaos theory, uncertainty creates unexpected outcomes in operations. Thus, it is a challenge for wholesalers to maintain ideal inventory levels for all products. However, several studies have found that using historical information related to products and marketing activities helped wholesale firms to improve inventory control and product demand forecasting (Albright, 2005; Cheng & Sethi, 1999; Trusov et al., 2006). The purpose of this study was to evaluate the effects of product- and marketing-related factors on product sales and order volumes with a focus on promotion.

In this chapter, a summary of the hypothesis testing will be provided as a guideline for the discussion. Discussion will be divided into two main segments: (1) effects of the product attributes, (2) impact of promotion and other factors. Recommendations for future study will also be addressed.

Summary of the Results

Inventory levels are consistently affected by marketing activities and other associated factors, such as holidays, seasonality, and promotions. In this study, the researcher evaluated the impacts of product attributes and promotion-related factors on both sales and orders of the selected products. Table 20 presents the results of the hypothesis testing in this study.

Table 20

Results of Hypothesis Testing

	Hypothesis	Result
Product Attributes		
H1	The effect of the brands is not significant to the overall combined sales and order volumes.	Not Supported
H2	The effect of the price is not statistically significant on the combined sales and orders.	Not Supported
H3	There are no statistically significant differences in sales and order volumes according to item categories.	Not Supported
H4	Package sizes do not have a significant effect on sales and order volumes.	Not Supported

Table 20 (Continued)

Results of Hypothesis Testing

	Hypothesis	Result
Promotion and Related Factors		
H5	The month of the promotion does not have a significant impact on sales and order volumes.	Supported
H6	There are no significant differences among different types of promotions with regard to sales and order volumes.	Supported
H7	Nationality of promotion representatives does not statistically affect the sales and orders.	Supported
H8	The number of promotional events has no significant impact on sales and orders.	Supported
H9	The number of times a product appears in each event does not have significant impact on product sales and orders.	Supported
Lagged Effects of Promotion		
H10	No significant lagged effects of sales and orders are observed according to different types of promotions.	Not Supported

Discussion

Product Attributes

Buyers' perceptions of the products have been found to be influenced by brand, price, packaging, and product quality. Among those factors, brands are always used as an

indicator of product quality, which significantly affects buyers' purchase decisions (Herbig, 1998). In the Asian wholesale market, signature brands that represent a company play a critical role in operations (Kotabe & Jiang, 2006). According to the findings of the study, brands had a significant effect on product sales and order volumes. Comparisons of sales and orders between brands 7 and 6 revealed statistically significant differences. Brand 7, a leading brand in the canned fruit industry, is popularly accepted by clients. The average unit price of brand 7 is $180, which is in the lower end of the price range. Therefore, the researcher also tested the effect of price on the inventory in order to find a proper indicating factor for sales and order predictions.

Price is an influential determinant affecting purchase decisions (Chang & Wildt, 1996; Lee, 1995). Price is also an indicator of the buyers' perception of product quality. The prices of food products are easily manipulated by marketing activities, the economy, and seasonality (Thaler, 1985; Monroe, 1990; Herbig, 1998). In the study, price was found to have a significant effect on sales but not orders. However, the follow-up test demonstrated that when price increased, sales also increased. That result was different from what was expected. A probable explanation for the result could be that the data provided by the wholesale firm did not include price discount information that may have had a significant impact on the results. This uncertainty is one of the biggest limitations for the study. According to Lowe and Corkindale (1998), buyers' price sensitivity depends on their purchase motivation and intention. In the wholesale environment, buyers might be less price sensitive than retail consumers because of different purchase motivations. Furthermore, in Asia, consumers tend to create positive links between price

and product quality. They believe that the higher the price, the better the product quality will be (Sternquist et al., 2004).

Brand 3 in this study also showed high sales and order volumes. Going back to the raw data, the researcher found that brand 3 is a well-known international brand and is always used in professional competitions. Moreover, the product is an essential ingredient in many baking products. These reasons may explain why its sales and order volumes were higher than those of other brands. The researcher found that specific item categories revealed significantly higher sales and order volumes. Based on the multiple comparison results and the descriptive statistics of item categories, flavors had statistically significant sales and orders compared to other categories. Flavors are seldom a main ingredient, but they play a crucial role in the taste of the final products.

In addition, fruit and similar products also illustrated significant sales and orders compared to chocolate and jelly (or glaze). A possible explanation for the difference could be found in the products' storage methods. Most of the fruit items are packaged in cans, making them quite durable under normal circumstances. However, specific humidity and temperature levels must be maintained in order to ensure the quality of the chocolate products. According to Martínez-Ruiz et al. (2006), buyers' purchasing response would be affected by product characteristics, such as storability and perishablity.

Another factor that was found to have a significant impact on inventory variation was package size. Significant differences in both sales and orders were found among package sizes. Package sizes were found to be positively associated with sales and orders. In wholesale operations, the package sizes of the products are usually larger than the

retail versions. Most buyers believe that buying larger package sizes is a value purchase, and that the unit price of the larger package size is lower (Dorfman, 1975).

Promotion and Other Factors

Promotion is one of the most widely applied strategies to stimulate sales. Depending on operational objectives, a wholesale firm implements marketing strategies in order to increase brand awareness, to build positive brand images, and to keep a company competitive in the market (Childs, 1997; Trusov et al., 2006). Promotion and other marketing related factors influence buyers' purchase decisions and impact product demands (Cheng & Sethi, 1999). In the consumer purchase decision-making process, the perceptual-cognitive component identifies that awareness of products, comprehension of items, and brand image perception all influence buyers' intention in purchasing. In addition, according to the theory of reasoned action, buyers' behaviors are always influenced by marketing factors (Dempsey, 1999). Hence, the focus of the study was to investigate the influential factors affecting product demands and inventory fluctuation.

The optimization model introduced by Hall and Hitch (1993) pointed out that most firms were not applying promotion strategies as a method to advance their profits; instead, promotions were implemented for different operational purposes, such as to increase brand awareness or establish brand images (Skouras et al., 2005). Moreover, Orgel's (1996) and Srinivasan et al.'s (2004) studies also supported this statement by demonstrating that only 20% of promotions were profitable.

In this study, five main promotion types, including demonstration, holiday promotion, advertising, publicity/trade shows, and new product introduction, were used to evaluate the effects of promotion types on sales and orders. However, no significant

differences were found in either sales or orders using promotion types as an indicator. According to the descriptive statistics of types of promotion (see Table 20), new product introduction was found to have the highest sales in the month of promotion. The availability of new products could stimulate demand for the promoted products.

In addition, two months after a trade show or holiday promotion, significant differences were found in orders. Trade shows have been used by wholesale firms as an order-generating method. In this test, the results indicated that wholesale firms expected to have sales increases that lead directly to increased order volumes. However, the sales increases were not significant even though sales did increase from 197.40 kilograms to 265.15 kilograms after using a trade show as a promotion method.

Holiday promotion was another promotion method found to have significant differences in product order volumes in the lag two (two months after a promotion event). The researcher found that holiday promotion was always carried out two months before a holiday. In order to fulfill the demand created by the upcoming holiday season, wholesale firms ordered more to satisfy holiday demands. Although the sales increase from holiday promotion in lag two was not significant, the increase in sales could not be ignored (from 233.83 kilograms to 325.33 kilograms).

Significant differences in sales and orders were found for different types of promotion. In lag two, holiday promotion revealed the effect of the holiday on sales and orders. Wholesale firms tended to order ahead to meet the demand anticipated one or two months later. For example, a wholesale firm placed additional orders in March and April in order to prepare for Mother's Day, one the most important holidays for wholesale firms.

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In lag three, three months after the promotion activity, sales of the products introduced in new product introductions were found to be significantly higher compared to other promotion methods. The reason behind the sales increases could be that buyers have more understanding of the products and feel more comfortable purchasing them. In Asian culture, uncertainty avoidance is very important (Hofstede, 1984). Advice and information provided by a company would decrease a buyer's feeling of uncertainty and increase purchase intention.

According to the literature review, advertising is one of the most widely applied marketing strategies used to stimulate demands in the retail environment (Neslin & Shoemaker, 1989; Davis at al., 1992). Abraham and Lodish's study in 1990 also noted that advertising helped a retail store generate more than 50% in sales. However, the effect of advertising was not significant in this study, which emphasized the wholesale environment. Advertising is known as a pull marketing strategy, and buyers' response to a pull strategy is usually delayed (Agrawal, 1996; Shankar, 1997). However, in the lagged effect evaluations, no significant differences were found in advertising. Therefore, the purpose of advertising might not be profit or sales generating. Instead, for a wholesale firm, the advertising as a marketing strategy could serve to reinforce brand image and to increase brand awareness (Deighton et al., 1990).

In the wholesale environment, a wholesale firm might employ marketing strategies for particular operational purposes. In Asia, many wholesale firms spend heavily on promotion, but not because they want to maximize profit. Sometime wholesale firms carry out different promotion activities because they want to deliver designated information to clients or competitors. For example, Asian companies prefer

hiring foreigners to promote their products, and buyers love to attend events held by foreign personnel; however, the responses were not shown in sales. In this study, the researcher found that sales outcomes between foreign experts and local professionals were not different. Therefore, a wholesale firm might need to re-evaluate its promotion representative selection with a cautious consideration of the costs. In addition, repeated appearances of the promoted products were found to make no differences in sales and orders. Hence, when wholesalers develop marketing strategies or plan promotion events, they may want to refer to other similar products or products that have some of the functions of the promoted item, instead of mentioning the same product repeatedly.

Conclusion

Several theories related to the study were addressed in chapter two. The theory of reasoned action provides the verification to the direction of the study. Among three main components of the theory, the cognitive component identifies the impact of external factors on consumers' behaviors (Dempsey, 1999). The theory of reasoned action explains that buyers evaluate available information and develop their perceptions of products, which furthermore influence their purchase decision (Ajzen & Fishbein, 1980). According to the findings of the study, buyers purchase products based on a variety of factors, including product attributes and marketing activities, and wholesalers place orders according to their expectations of the promotion effects.

However, unexpected situations and outcomes still exist, making sales and order predictions more challenging. In chaos theory, researchers try to investigate uncertainty by evaluating small deviations between forecasted and actual demands and explaining the

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differences between prediction and actual values (Zhang, 2004; Stapleton et al., 2006). Many influential factors affect buyers' purchase decisions. The focus of this study was on buyers. However, in the supply chain, other roles also have a significant impact on sales. For example, buyers determine the amount of purchase based on the demands of the end users. In addition, buyers' purchase decisions are influenced by gatekeepers, who make the final purchase decisions. In this study, these roles were not included, and the results demonstrated a weak association between factors and inventory variation, even though the relationships were statistically significant. Wilding (1998) suggested that the use of planning systems that consider all members of the supply chain would minimize the damage caused by unpredictable outcomes. In addition, the optimization theory suggests that using systematic management procedures would provide the best outcomes in uncertain circumstances (Beveridge & Schechter, 1970).

Recommendation

Sales are strongly influenced by social and marketing factors (Chopra & Meindl, 2001). Orders are also affected by operational and external situations. Hence, in forecasting sales and order volumes, those influential factors cannot be disregarded. In the discussion, marketing factors were mentioned. However, social effects were not addressed thoroughly enough. Therefore, some recommendations about social effects on product sales will be discussed.

Interdependence and collectivism are two of the cores of Asian culture. Both formal and informal social groups influence buyers' purchase decisions. In this study, the researcher found that wholesale firms tried to create informal social groups in many

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promotion activities, such as demonstration, new product introduction, and trade shows. Moreover, in the wholesale environment, seller-buyer relationships are much more important than price (Skouras et al., 2005). Studies found that the seller-buyer relationship is involved in the repurchase intention, and strong seller-buyer relationships are believed to help wholesalers promote new products because trust between sellers and buyers has been built up and uncertainty is minimized (Hewett et al., 2002; Jap et al., 1999). Therefore, advanced research should be conducted into the link between seller-buyer relationships and sales outcomes. Additional studies about the effectiveness of different types of promotion might also help wholesalers to implement the best strategies with regard to social and cultural factors.

In the Asian wholesale industry, information delivery is an art. Sellers want to provide sufficient information for buyers to make decisions, without leaking operational information to their competitors. Knowing how to effectively deliver desirable information to their clients is critical. According to the literature, several roles impact buyers' purchase decisions. Wholesale firms must figure out who is the most important person in the purchase decision-making process: the buyer, the gatekeeper, or the decider. Targeting the right person and providing information that serves to increase his or her purchase intention is also critical to the overall operation performance.

In this study, the researcher found that the effect of promotion was not so significant. In future studies, researchers might investigate why wholesalers implement costly promotion activities if they know that the return is low; why buyers participate in different promotion events; what are buyers' purposes are in attending promotion

activities; and whether or not there are any patterns in buyers' purchase behaviors when promotion is ongoing.

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