RESEARCH PROJECT REPORT

Critical Assessment of Fisher's Supply Chain Strategy Framework in the Retail Footwear Industry

by

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Submitted to the MIT Malaysia Supply Chain Management Program in Partial Fulfillment of the Requirements for the Degree of

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ABSTRACT

This research report does a critical assessment of Fisher's Supply Chain Strategy Framework in relation to a retail footwear company. It serves to determine what factors determine a Functional and Innovative product and how relevant is the Fisher's supply chain strategy framework for the footwear industry. We will look at "Fashion V" current footwear composition and cluster its existing SKUs (inventory) into Functional and Innovative products, using Fisher's demand attributes as a framework. Findings indicated that the association between product nature and supply chain strategy are not clear. We found that Fisher's framework on Functional and Innovative products is limited and may not be so relevant to the footwear industry, as the product category can move from being both a Functional or Innovative product based on different aspects of demands, which is different from what Fisher's framework says.

Research Report Supervisor: Dr. Shardul Phadnis
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1 Introduction

Many firms are pursuing effective supply chain management strategies because of rapid globalization and technological innovation. Many companies invest in cutting-edge technology to focus on directing their supply chains to provide goods and services to customers as quickly and cheaply as possible. Many will also hire top-tier talent to enhance supply chains.

Even though so much technology and intellectual work has been put into enhancing supply chain performance over the years, according to Fisher (1997), these supply chains' performance has never established a durable edge over their competitors, and in some cases has deteriorated. Despite the increased efficiency of many companies' supply chains, the percentage of products that were marked down in United States went from less than 10% in 1980 to more than 30% in 2000 (Lee H. , 2004). Therein lies one of the biggest inefficiencies and problems facing a business - increasing markdowns due to increasing inventories resulting in reduced customer satisfaction.

1.1 The Cost - Responsiveness Paradox

In today's business environment, the perennial search for the lowest cost to increase the profit margins is unending. The belief that "the lower the cost, the higher my profit margins" rings through for every entrepreneur. Supply chains in many industries have consistently aimed to pursue greater speed and maximize cost efficiency – the holy grail of supply chain management. In fact, developing a successful supply chain strategy has become critical to a business's long term competitive success (Narasimhan, Kim, & Tan, 2008)

In addition, the 21st century also increasingly demands the business increase its responsiveness to meet the demands of its consumers. Consumers, especially Millennials, live in an "I want it fast, I want it now" world where speed, convenience, efficiency, and ease take precedence. To support consumers in their quest for speed and convenience, businesses need to increase

responsiveness in their consumer-facing touchpoints. Consumers demand instant gratification; they will not wait for the items they intend to buy with a long lead time. Consumers expect an immediate answer to a question asked on the website and hence businesses will use chatbots. Businesses that want to be responsive to consumers will need to invest more into IT digitalization to enable the business to respond immediately to consumers, and this will increase the cost of doing business.

In the fast-moving fashion apparel industry, the speed to market is most important. Zara was able to launch new designs in just 4 weeks after the fashion shows. For the fashion industry, it is very important for its products to be in stores and launched at the same time as the "luxury brands". A fashion brand is considered trendy when it launched similar types of products, shapes, or colors at the same time as a luxury brand product. It means that it can spot the trends correctly.

Herein lies the "Paradox of Efficiency and Responsiveness." Increasing responsiveness almost always increases cost because the businesses need to act fast and respond to the needs of the consumers, increasing the cost of doing the business.

The increase in costs can come in many ways, such as attending more buying trips and fairs overseas to seek inspiration for new trends for new product launches (more trips). These trips add up to the costs of running the business. Another example of adding cost to business is ensuring that its products reached the consumer in the shortest possible time for availability in-store and ensuring no stockouts. Additionally, using express delivery for e-commerce delivery increases responsiveness to consumers (and increases customer service level) but adds up the costs of doing business.

Excess inventories due to low sell-throughs are also adding to the cost of business, and the uncertainty of demand results in stock outs and loss of sales leading to perceived lack of responsiveness from the part of the business (and decrease in customer satisfaction)

1.2 Increasing Markdowns and Rise in Inventories

Lee (2004) had observed that while companies' supply chains become more efficient and cost-effective, they did not gain a sustainable advantage over their competitors. The performance of those supply chains steadily declined. Based on the same article, it showed that consumer satisfaction with product availability fell sharply during the same period. The data supports a marked increase in inventory levels.

1.2.1 Massive Discounting

The rise in inventory levels is making way for massive discounting in the retail arena. There are too many unsold inventories in the businesses, and retailers are resorting to creating a 'special occasion' for a promotion or sales event to clear excess inventory.

In an article published by Forbes in 2017, titled "Target and Walmart are leading the markdown death spiral" by Petro (2017), massive discounting was observed over the 2016 holiday season. Discounts across top retailers during Thanksgiving weekend rose from 5% to 16% from 2015. (Petro, G., 2017). Target's median discount for their Black Friday deals rose an additional 27% from 2015 to 43% in 2016. Walmart's average discount on promoted items went up by 17%! What is driving this massive discounting?

Retailers resort to "specially created occasion days" such as Black Friday (11.11) or Single's Day in China (11.11) for both online and brick and mortar to drive sales primarily by offering huge promotions and discounts on that day. An example of this massive discounting was the "Singles Day" by Alibaba. Although primarily an event in the online channel, brick and mortar stores were also seen to be participating on the "Singles Day" or 11/11 by offering discounts and markdown. It took merely one minute for Chinese retail giant Alibaba to hit $1 billion in sales during "Singles Day." "Singles Day" broke records, with Alibaba saying it topped the $30.8 billion in total sales for 2018 in less than 17 hours. According to the company, Alibaba's 11.11(Singles Day) sales on November 11 hit approximately $39 billion or 270 billion Yuan of gross merchandise volume, a whopping increase of 26 percent over 2018 (Kaplan, 2019). This massive growth in sales on that single day showed that retailers are willing to offer some

markdowns and consumers are attracted by it and will wait for that day to purchase due to the huge discount offered.

However, this "strategy" is not just a one-time occurrence during the "special" or holiday season. Sales promotions are a constant event throughout the year but are named differently, and in different promotion scales, but nevertheless, promotions and discounts happening throughout the year, such as Anniversary Sales, Member's Day Sales, etc. In the last effort to get rid of unsold merchandise, markdowns and discount levels will be high. (Kaplan, 2019) Perhaps the retailer did not have suitable styles, sizes, or colors. Alternatively, perhaps another "trendy" product came around, and demand shifted to that "trend." If buying and merchandising mistakes are few, the excess inventory created by the unsold items will be minimized. However, markdowns will be high and will cut very profoundly into the retailer's profits if too many mistakes are made continuously. (Kaplan, 2019)

In its strategy to use discounting to clearing slow-moving SKUs by retailers, customers are conditioned to wait and expect discounts. A November 2016 report of NRF (National Retail Federation, 2016) found that one in three shoppers said that they would only purchase their gift for the holiday season in 2016 if they were on sale. In another study performed by First Insight (First Insight.com, 2017), it was found that consumers are expecting to see a minimum 23% discount from the full price across several women's wear product categories on average. In the same article, they also reported that 45% of women had to see a discount of at least 41% to consider entering a store.

So, who stands to benefit from this massive discounting? Getting the right price and product mix starts from knowing the target customers. There is a long lead time for retailers and brands in launching a product to market. However, the first time they get to see if the customer loves their product is at the cash register when they decide whether they will pick up the products at the store. In today's competitive retail environment, retailers need to figure out how better to predict demand for their customers before making costly inventory investments, and this is done by having the right supply chain strategy with the right product strategy.

This paper seeks to answer a pivotal question: How can Fisher's framework help a company evaluate whether its strategic supply chain choices are appropriate based on its product characteristics. We will attempt to answer this using a retail footwear company in Malaysia. If yes, then what is the right supply chain strategy for the business?

1.3 Case Company: "Fashion V"

We attempt to answer this by using the case of a local footwear retailer in Malaysia. "Fashion V" is a fashion footwear retailer for men and ladies that manages an end-to-end supply chain. It handles sourcing from manufacturers to sales and distribution of footwear and handbags into its retail and departmental stores. Currently, it has 12 retail stores and 20 concessionaires in departmental stores in Malaysia. Footwear contributes 93% of the company's revenue, with a 7% contribution in handbags and accessories. Women's footwear contributes 90% of the revenue, while men's footwear contribution is approximately only 10% revenue of the business.

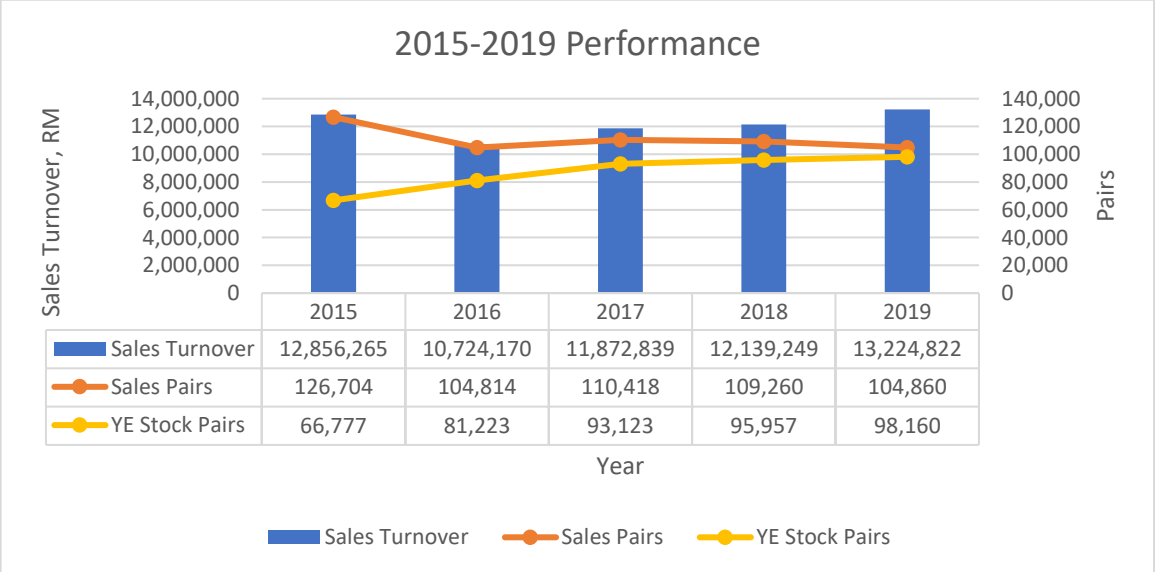

Figure 1: "Fashion V" 2015-2019 Performance

Figure 1 depicts the past five years' performance of "Fashion V" from 2015 to 2019. As can be seen, sales turnover hovered around RM12.8M to RM13.2M across the last five years. From Figure 1, sales are coming down while stock levels are rising year on year.

Correspondingly, there is an increase in average sales price from RM101.47 in 2015 to RM126.12 in 2019. This means that initial Retail Selling Price (RSP) are getting higher and higher.

“Fashion V” has consistently suffered from high inventory levels (with as much as 40-52 weeks of stock cover). Even with high stock levels, it is still having store profitability of 10%-15%. The company's strength is that the footwear styles and collections are on-trend, and sales have been picking up and on a growth trajectory. “Fashion V” has high incoming margins, (due to high RSPs) but also because of that, it has high markdowns because it sells a large part of its shoes under discounts and not at initial planned RSPs.

It currently sourced most of its products from China because China offers the flexibility of low minimum order quantity per style, which is characteristic of an Innovative (fashion) product. Because of lack of scale, cost per pair is slightly higher, and “Fashion V” maintains a consistent supply of new products launched into the marketplace week after week. The challenge is to increase the business volume and reduce the weekly cover of inventories.

1.4 Applying Fisher's Framework to “Fashion V”

Fisher's framework in 1997 suggests that supply chain improvements have not produced expected results due to the misalignment of the type of product strategies and its type of supply chain. He has said that companies need to match their supply chain strategies with product demand characteristics. In the same article, Fisher has identified two types of products, Functional and Innovative. Functional products are often staple products that satisfy basic needs which do not change much over time. Functional products have stable and predictable demand and long-life cycles. However, their stability also invites competition, which leads to low-profit margins.

Innovative products, on the other hand, have higher profit margins but their life cycle is short, as imitators erode the competitive advantage that innovative products have, making the

demand unpredictable. Companies are constantly trying to introduce a steady stream of newness in Innovative products.

Fisher also proposes two types of supply chain strategies- a physically efficient supply chain and a market-responsive supply chain. Fisher's framework suggests a physically efficient supply chain to provides the best performance results for Functional products. According to Fisher, efficient supply chains aim to "supply predictable demand efficiently at the lowest possible cost."

In contrast, an Innovative product performed the best when aligned with a market-responsive supply chain. Conversely, the primary objective of a responsive supply chain is to react to customer's needs in a quick way to "minimize stockouts, forced markdowns, and obsolete inventory" (Fisher, 1997). Cost is not a major concern in their strategy deployment.

This research project will determine what factors determine a Functional and Innovative product and how to identify them in a footwear company. We will look at "Fashion V" current footwear composition and cluster the existing SKUs (inventory) into Functional and Innovative products, using Fisher's demand attributes as a framework. We will be doing a critical assessment using Fisher's framework for the footwear retailing industry. By doing this assessment, we hope to see if Fisher's seven product demand characteristics are indeed applicable to the footwear retail industry and will it be able to solve our business problem, which is to reduce markdown and high inventories and provide insights into supply chain strategies.

2 Literature Review

Most supply chain works of literature are filled with ideal supply chain strategies based on different products characteristic and the business's strategy. In 1997, Fisher Marshall, in his famous article "What is the Right Supply Chain for Your Product?" recommends choosing a supply chain strategy based on the product's demand characteristics, - a cost efficient supply chain for predictable (Functional) products and a responsive supply chain for Innovative (fashion) product. The efficient supply chains would seek to meet demands efficiently at the lowest possible cost by selecting suppliers primarily on cost and quality, such as using offshore suppliers. Conversely, a responsive supply chain would seek to minimize stock-outs, forced markdowns, and obsolete inventory by selecting suppliers based on "speed, flexibility, and quality" to aggressively reduce lead time.

2.1 What is the right supply chain for the Product

Functional products satisfy a basic need with predictable demands and are readily available. These products are characterized by having a long product life cycle, with little change over time, and having few choices in their offerings. Moreover, it will often attract many competitors in the market because of its predictable demands, which will typically erode its margins. A company providing Functional products will usually embark on a strategy that minimizes the cost in its supply chain. A high inventory level is used to satisfy demand since the cost of obsolescence is low. (Fisher, 1997; Lee, 2002) In terms of footwear, this would mean the black women's working pump shoes with classic toe shape and with the standard 2-inch heel, which is usually long life. (See Figure 2 for Functional and Innovative Ladies Black footwear.)

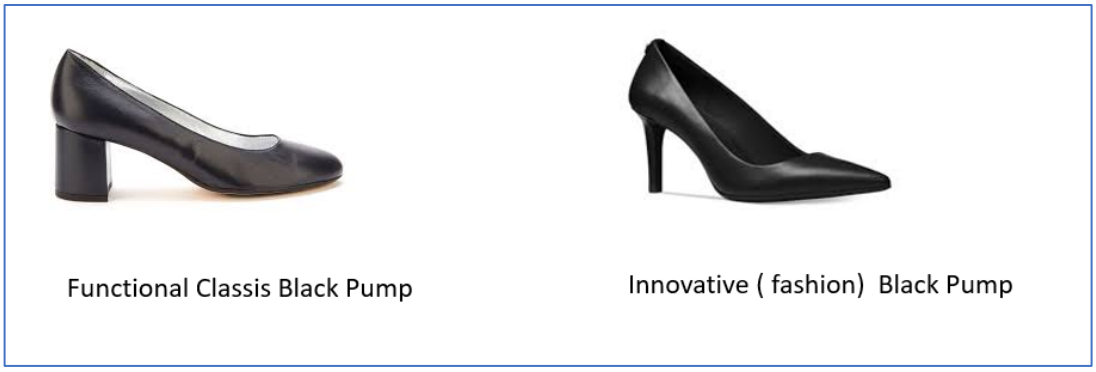

Figure 2: Examples of Functional and Innovative Ladies Black Pump

Innovative products are typically characterized by being trendy and fashionable and show high variability in their demands and predictability. Initial demand is relatively unknown for new products. Innovative products have shorter life cycles and more extensive product variety. The margins are typically high, which means stock out costs a lot more and may affect business performance. (Fisher, 1997; Lee, 2002) From Figure 2 above, we can see that Innovative Pump are more modern in outlook, sleeker, and usually with a modern pointed front as opposed to a rounded classic front in Functional pump. Due to its short product life cycle and high-profit margins, similar launches of products from a competitor will be high. Thus, businesses will have a steady stream of new introductions and arrivals continually. Critical decisions are made on where inventory should be positioned in the supply chain to be responsive to minimize customer response time. Cost minimization is accomplished within the confines of the primary goal of ensuring product availability. (Harris, Componation, & Farrington, 2010) Suppliers are chosen based on speed and flexibility (Fishers, 1997, Lee,2002)

Based on Fisher's (1997) model of Functional and Innovative product demand, seven attributes are used to determine the aspects of demand, as listed in Table 1 below.

Aspects of Demand	Functional (Predictable Demand)	Innovative (Unpredictable Demand)
Product Life Cycle	More than 2 years	3 Months to 1 year
Contribution Margins	5% to 20%	20% to 60%
Product Variety	Low (10-20 variants per category)	High (often millions of variants per category)
Average Margin of Error in the Forecast at the Time Production is Committed	10%	40%-100%
Average Stock Out Rates	1% to 2%	10% to 40%
Average Forced End of Season Markdown as % of Full Price	0%	10% to 25%
Lead Time Required for MTO Products	6 months to 1 year	1 day to 2 Weeks

Table 1: Fisher's Functional and Innovative Demand Attributes

2.2 Fisher's Physically Efficient Vs. Market Responsive Supply Chain

In the second dimension of Fisher's framework, supply chains are categorized as either Efficient or Responsive under the main strategic priority pursued. Accordingly, Efficient supply chains aim to "supply predictable demand efficiently at the lowest possible cost" (Fisher, 1997).

The primary focus of a physically efficient model supply chain is cost reduction and the efficient use of resources. Using a physically efficient strategy will include maximizing machinery capacity utilization and maximizing yield in a manufacturing environment. The aim is to create the lowest cost possible by extracting all non-value activities for economies of scale (Harris, Componation, & Farrington, 2010) . When a business's strategy is to go for a physically efficient supply chain strategy, it aims for the best cost efficiencies (Lee H. , 2002) and there may be some inflexibility in responding to changes in market conditions. (Randall, Ruskin, & Morton, 2003) In other words, an efficient supply chain is distinguished by longer production lead times, high set-up costs, and larger batch sizes that allow the efficient business to produce at a low unit cost, but often at the expense of market responsiveness.

Conversely, the primary objective of a responsive supply chain is to react to customer needs in a quick way "to minimize stock-outs, forced markdowns, and obsolete inventory" (Fisher, 1997); cost is not a significant concern in their strategy deployment. A responsive supply chain is distinguished by short production lead times, low set-up costs, and small batch sizes that allow the responsive business to adapt quickly to market demand, but often at a higher unit cost. The market-responsive supply chain is focused on meeting the requirements of the customers regardless of demand variability. (Fisher, 1997) Flexibility and order accuracy are critical. (Maltz, 1998; Lee H. , 2002) The risk of supply disruptions is alleviated by placing an immense number of inventories in the system to avoid stock-out issues and customer uncertainty at the expense of inflated inventories and efficiency. (Fisher, 1997)

Fisher's discussion on supply chain strategy covers numerous operational strategies within an organization when dealing with trading partners, including manufacturing strategy, approach to choosing suppliers, inventory strategy, lead time focus, and product-design strategy. All these operational strategies are summarised in Table 2.

	Physically Efficient Process	**Market Responsive Process**
Primary Purpose	Supply predictable demand efficiently at the lowest possible cost	Respond quickly to unpredictable demand to minimize stock-outs, forced markdowns, and obsolete inventory
Manufacturing focus	Maintain a high average utilization rate	Deploy excess buffer capacity
Inventory strategy	Generate high turns and minimize inventory throughout the chain	Deploy significant buffer stocks of parts or finished goods
Lead-time focus	Shorted lead time as long as it does not increase the cost	Invest aggressively in ways to reduce lead time
Approach to choosing suppliers	Select primarily for cost and quality	Select primarily for speed, flexibility, and quality
Product -design strategy	Maximize performance and minimize cost	Use modular design to postpone product differentiation for as long as possible

Table 2: Physically Efficient and Market Responsive Supply Chains – Fisher (1997)

Figure 3 builds on the relevant observation and discussion of the above two dimensions of product nature and supply chain strategy as proposed by Fisher (1997). By Fisher's definition, all products can be classified into primarily Functional or Innovative product groups. Each of these groups should adopt 'Efficiency' and 'Responsiveness' as their supply chain strategy, respectively. From Figure 3, the Fisher's 2 x 2 model which has the Efficient and Responsive Supply chain on one axis, and the Functional and Innovative Product on another axis, the blue mismatch of the product types and supply chain strategy will result in significant problems in the business operations, and businesses should strive to stay away from these two colored boxes. (Fisher, 1997)

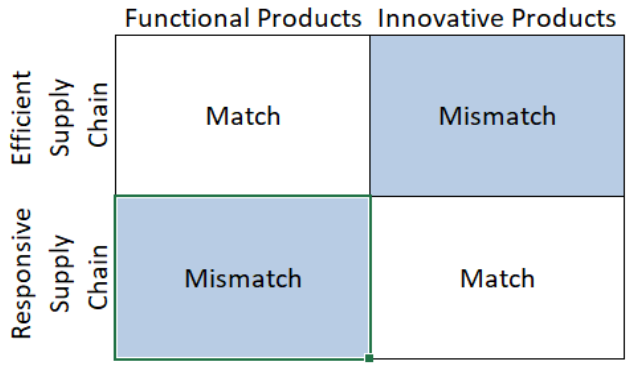

Figure 3: Fisher's Framework Matching Supply Chains with Products

Several researchers have contributed to extending the assumption that Fisher's model represents the ways businesses match supply chain strategy to product type. Fisher's approach of taking product nature and its demand attributes as the only factor affecting choices of supply chain strategy has been challenged by many later researchers from different perspectives. The next section will highlight some of the many different types of supply chain strategies.

2.3 Different Types of Supply Chain Strategies

Following Fisher's article, several academics and consultants have developed their own supply chain strategy formulations. Supply chain managers are confronted with a plethora of innovative and cutting-edge supply chain methods, as well as new terminologies and projects

that are always being developed. All these projects and methods, however, are not appropriate for all firms all the time.

2.3.1 Portfolio Approach

In another article, Olavson, Lee & Denyse (2010) recommend a portfolio approach to supply chain design and strategies. One supply chain design may not be enough for the business to be cost-effective, agile, and highly responsive to business needs. In the continuously changing environments where most businesses operate, where volatility in terms of oil prices, exchange rates, labor rates, tax policies, competitive policy, and as the maturity of product categories such as product characteristics and business strategies evolved, there is an urgent need for supply chains to be adaptable.

Hau Lee (2010) emphasized the need for agility, adaptability, and alignment for world-class supply chain performance in his paper Triple-A Supply Chain. Adaptable supply chains adjust supply chain designs to accommodate long-term market changes, whereas agile supply chains respond swiftly to unforeseen shocks and changes in demand and supply. Supply chains that are aligned amongst business partners because incentives will increase overall supply chain performance. Is there a way for a company to get the benefits of lower costs while improving the design of its supply chain so that it can respond more quickly to its target customer? The Portfolio model allows businesses to benefit from low-cost, lean supply chains while being profitable.

In the short term, a business could reoptimize its tactics to respond to short term macroeconomic and competitive threats by changing its prices and responsiveness, while in the long term, the Portfolio allows the business to phase in and phase out the supply chain design to adapt to its long-term market trends, business strategy shifts and maturing product categories. At its core, supply chain design involves trade-offs between its cost and its customer's responsiveness, and by having multiple supply chain designs, it will be more efficient overall in its responsiveness. This is totally in contrast to Fisher's framework where Fisher advocates a single supply chain strategy based on the demand characteristics of the

products, whether it is Functional or Innovative, and the matching Efficient or Responsive supply chain strategy.

2.3.2 Product Demand Characteristics and Initial Investment

Randall, Ruskin, and Morton (2003) looked at the relationship between product demand characteristics and the initial supply chain investment made at market launch. They claim that supply chain assets frequently outlast product line decisions made during the first market entrance phase. Though they agree that supply chains can be responsive or efficient, their hypothesis claims that a company's decision to use a responsive supply chain is linked to lower industry growth rates, higher contribution margins, greater product variety, and greater demand or technological uncertainties. The interactions between these variables can either strengthen or weaken responsive supply.

When we check this against Fisher's framework, we found that largely, what Randall et al (2003) say is that higher contribution margins, high product variety and high demand uncertainty are all Innovative products based on Fisher's framework and would need a responsive supply chain strategy. The only exception is that the industry growth rate is not one of the seven attributes of product demand characteristics. Lower industry growth rates are associated with responsive market entry, but this effect is offset if growth occurs during periods of high variety and high demand uncertainty. Higher contribution margins are also associated with responsive market entry and that this effect is more pronounced when occurring with periods of high variety. Responsive market entry also is correlated positively with higher technological demand uncertainty. This serves to support the Fisher's framework to a large extent based on the three product attributes based on a general industry growth rate.

2.3.3 Dynamic Supply Chain

To be competitive in today's business environment, a business should match its product characteristics to its customer's requirements so that supply matches demand. As product proceeds through its lifecycle, its supply chain must also dynamically change with each stage of its product life cycle. (Aitken, Childerhouse, & Towill, 2003) Supply chain strategy must

be dynamic and not remain static during the product's life cycle to maximize its competitiveness. As a product proceeds through its life cycle, its demand characteristics change through its life cycle resulting in a consequential requirement to change its supply chain strategy to maintain competitiveness. These are done through its selection of five key variables aptly named as DWV^3 acronym, which stands for Duration of the life cycle, time Window for delivery, Volume, Variety, and Variability.

The above is slightly different from Fisher's framework where only an Efficient or a Responsive Supply Chain is designed based on the product characteristic, which does not change dynamically.

2.3.4 The Uncertainty Framework

Companies first need to understand the uncertainties facing the demand and supply of their products and try to match them with the right supply chain strategies. (Lee H. , 2002) In his article, not only do demand uncertainties need to be understood, but supply uncertainties also play an essential role. Whether the supply process is stable or highly evolving will affect the types of supply chain strategies that will be deployed.

Fisher proposed that supply chain tactics be matched to the appropriate level of product demand uncertainty. Demands for functional products are predictable, whereas those for innovative products are unpredictable. However, this uncertainty framework also considers supply-side uncertainties such as supplier reliability, supply source stability, and capacity constraints. Fashion apparels have short selling cycles, and demand is unpredictable, but supply is steadier and more predictable thanks to a well-developed production process, cutting-edge technology, and dependable supply bases. As a result, supply-side uncertainty is another aspect that Fisher ignores in his model.

Despite all of these diverse supply chain tactics, there is a general understanding that in today's complicated business world, one size and one kind of supply chain will no longer suffice. The

most crucial aspect that is lacking is that the supply chain strategy for a certain product category must fit the company needs.

The summary of the various types of the supply chain discussed is summarized below in Table 3.

Types of Supply Chain	Authors	Approach
Matching SC strategy with Product Demand Attributes	Marshall Fisher (1997)	7 attributes of product demand characteristics determine if a product is Functional or Innovative. If it is Functional, an Efficient SC is adopted. If it is Innovative, Responsive SC is adopted.
Portfolio Approach	Olavson, Lee and Denyse (2010)	One SC is not enough for a firm to be cost-effective, agile, and responsive. The portfolio approach allows the firm to reap the low cost and lean benefit while remaining agile and responsive where needed.
Dynamic SC	Aitken, Childerhouse & Towill (2003)	The firm should engineer its product characteristics to match its customer's requirements by dynamically changing its SC design in each of its life cycles.
Product Demand and initial investment in SC at time of market entry	Randall, Ruskin, and Morton (2003)	Efficient SC offset the lower cost at expense of market responsiveness; Responsive SC to adapt quickly to market demand, but often at higher unit cost.
Demand and Supply Uncertainties Framework	Lee, H (2002)	Companies first need to understand the uncertainties facing the demand and supply of their products and then try to match these uncertainties with the right SC strategies.

Table 3: Types of Supply Chain

3 Research Method

Since the purpose of this research paper is to critically assess the Fisher's Supply Chain framework and its relevance to the retail footwear industry, we have started this research project by comparing the product demand attributes of Fisher with "Fashion V". We went through every single attribute of the product demand attributes and sorted all the data accordingly into Functional and Innovative products.

3.1 Approach

This research will use the quantitative data obtained from "Fashion V" as the method for analysis. Types of data, its source report, and its uses or purposes are summarized in Table 4 below. Once all data are collected and analyzed, we will cluster the categories under Functional and Innovative products based on Fisher's framework.

Table 4 below summarizes the source report, types of data, and description of the reports obtained from "Fashion V."

Source Report	Types of Data	Description/ Purpose
Retail Integrated Merchandising Systems (RIMS)	Category Performance by Sales pairs and turnover, Stock Pairs and Values, against last year, budget and actual by season	All sales pairs with retail values and stock pairs with stock values
Sales and Inventory Report (SIR)	SKU lists, Age of the SKU based on first receipt and last receipt, (weeks in the company). Landed Cost, RSP, Margins %, Total Store stock, DC stocks, total stocks, total stock level by season	First and Last receipt of the SKU into DC. All data of SKUs. Total store stock level and total DC
Store Size Report	Quantities by size by SKU by category with store name and location	To analyze sizes per SKU per store

Table 4: Description of Report and Level of Information Provided by "Fashion V"

"Fashion V" was chosen because of its range of products, as it has both Functional and Innovative footwear, which is useful for evaluating Fisher's (1997) framework. Quantitative

data were collected from “Fashion V” for two years from the company's Retail Integrated Merchandising System (RIMS), a proprietary system for Merchandising department, from July to December 2017, right through 2018, till the first half of June 2019. (January to June 2019) With twenty-four months of data, the data will suffice to see a general trend for the business. The company has two seasons a year, Season 1 and Season 2, which correspond to January to June and July to December respectively. Reports are kept at a block of 6 months weekly (for 26 weeks).

Data obtained consisted of each SKU with related landed cost, initial retail price, first receipt by week, last receipt by week, age by week, incoming margins, sales pairs, and revenue data for that period. Since we have taken 24 months of data, margins at end of every Season across two years are also tabulated. Data obtained are aggregated at category level based on sales pairs and sales turnover, stock pairs, and stock cost value across two years of data. All data will be compared to last year's (LY) actual sales and against the anticipated sales forecast. Also collected were distribution centers (DC) stock levels, store stock levels, and total stock levels at the end of each block of 6 months. (data kept by the company are in blocks of 6 months closing as it records sales per season basis, and a season is six months selling period)

All these SKU data are grouped into category level (the function of shoes) and subcategory level (types of shoes). For this research, the choice of the unit of analysis is in the category and some instances, the subcategory level. We will omit the other categories such as non-footwear and shoe care and handbags in this research and focus on footwear. A visual representation of the various category and sub-categories are listed in Table 5 and Table 6 for both men and ladies footwear of “Fashion V”. In “Fashion V” footwear data were divided into category levels such as Men's Dress, Men's Casual, and Men's Summer. It further subdivides into subcategory level, which is Men's Work, Semi Dress, and Slip-Ons. For Men's Casual, the subcategories are Loafers, Slip On, and Sneakers. Additionally, the subcategory for Men’s Summer category is casual and fisherman sandal. (Table 5)

Category	Sub-Categories	Examples	
Men Dress	1)Dress		
Men Dress	2)Semi Dress		
Men Dress	3)Slip Ons		
Men Casual	4)Loafers		
Men Casual	5)Slip Ons		
Men Casual	6)Sneakers		
Men Summer	7) Casual		
Men Summer	8) Fisherman		

Table 5: Category/ Sub-Categories of Men Footwear of "Fashion V"

For the Ladies category, "Fashion V" has Ladies Dress, Ladies Casual, and Ladies Sandal as the category of shoes. In the Ladies Dress subcategory, we categorize ladies' dress into flats, heels, peep toe, and wedges. For Ladies casual, its subcategories are ballerina, evening, boots, flat sandal, wedges and sneakers, while for Ladies Sandal, the subcategories are flats, heels, and wedges. These are summarized in Table 6.

Category	Sub-Categories	Examples	
Ladies Dress	9)Flats		
Ladies Dress	10)Heels		
Ladies Dress	11)Wedges		
Ladies Dress	12)Evening		
Ladies Casual	13)Ballerinas		
Ladies Casual	14)Boots		
Ladies Casual	15)Evening		
Ladies Casual	16)Flat Sandal		
Ladies Casual	17)Wedges		
Ladies Casual	18)Sneakers		
Ladies Sandal	19)Flats		
Ladies Sandal	20)Heels		
Ladies Sandal	21)Wedges		

Table 6: Category/ Sub-Categories of Ladies Footwear of "Fashion V"

We wanted to analyze the new introductions of the footwear by category to look at the number of new variants. The number of SKUs in each category and subcategory are listed below, with their corresponding year of introduction in Table 8.

CATEGORY/ SUBCATEGORY	New 2017/1 (before data collection	New 2017/2 (after data collection)	New 2018	New 2019/1	Grand Total
MENS DRESS	**20**		**41**	**8**	**69**
DRESS	14		39	6	59
SEMI DRESS	2				2
SLIP-ON	4		2	2	8
MENS CASUAL	**8**	**7**	**32**	**18**	**65**
LOAFER	3		16	7	26
SLIP ON				2	2
SNEAKERS	5	7	16	9	37
MENS SUMMER	**7**	**8**	**8**	**6**	**29**
CASUAL	6	8	8	6	28
FISHERMAN	1				1
LADIES DRESS	**6**	**32**	**137**	**49**	**224**
FLATS			26	5	31
HEELS	5	31	88	36	160
PEEP TOE		1			1
WEDGE	1		23	8	32
LADIES CASUAL	**2**	**37**	**75**	**44**	**158**
BALLERINA		30	48	39	117
BOOTS			4	2	6
EVENING	2			1	3
FLAT SANDALS		5	18	2	25
LEATHER		2	3		5
SNEAKERS			2		2
LADIES SANDAL	**5**	**55**	**165**	**92**	**317**
FLATS		19	32	27	78
HEELS	2	16	73	43	134
WEDGE	3	20	60	22	105
Grand Total	**48**	**139**	**458**	**217**	**862**

Table 7: Number of SKUs based on Category and Subcategory introduced in past 24 months

From Table 7, we can see that, on average, there were a total of 139 SKUs that were introduced in the 2nd half of 2017 (the start of our data collection period). In 2018, across 2 seasons, 458 SKUs were introduced. From the total of 458 SKUs introduced in 2018, 81 are coming from the Men category, while the balance is in Ladies. If we aggregate this across two seasons, we will see that ladies will have new introductions (variants) of 188 in 6 months on average. (higher than 124 in 2017/2). We can also see that the Men Dress category was reintroduced again in 2018 as a new category after a change of category strategy. In the first half of 2019,

217 SKUs were newly launched. On average, the introduction of new variants or new SKUs for Men remains haphazard and sporadic, with no distinct pattern, as “Fashion V” was looking to find its footing after stopping Men’s category for a short period of time due to change of leadership.

As “Fashion V” is a fashion footwear company, it also uses Qualitative reports such as WGSN (formerly known as Worth Global Style Network) future trends report (for future direction on what trends to buy). WGSN is a subscription-based trend forecaster with over 250 trend forecasters and data scientists globally, which helps businesses stay relevant and find their new growth opportunities. WGSN offers insights and inspiration from around the globe that could be accessed at the click of a mouse. Identifying the right trend helps in predicting the future direction of something which would affect the “Fashion V” buying decisions. Trend forecasting in fashion acts as an essential qualitative tool to decide the upcoming trends which would influence the brand's seasonal business. If trends identifications are wrong, “Fashion V” will miss its sales budget for the season. An example of how the WGSN trend report is being used is depicted below in Figure 4.

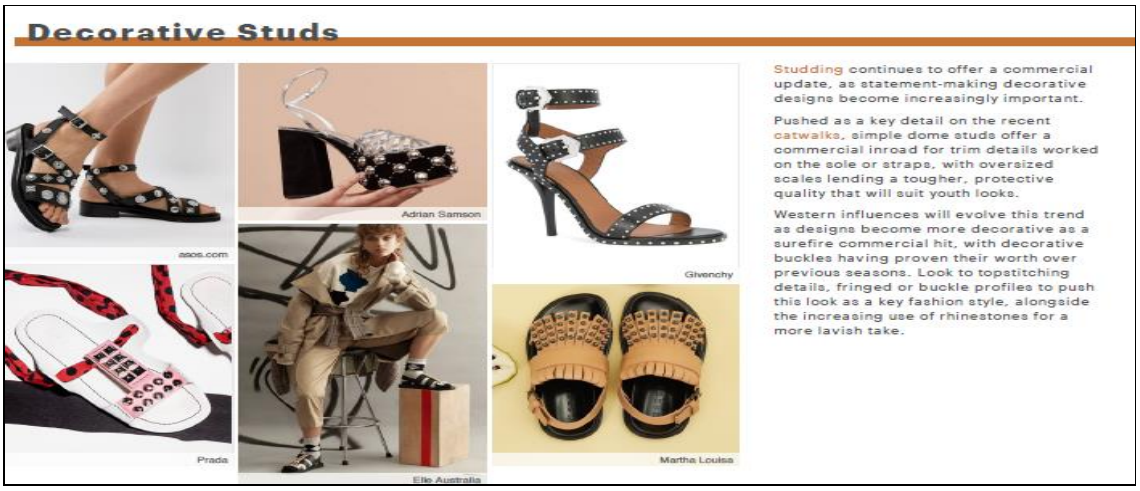

Figure 4: WGSN Trend Report: Decorative Studs

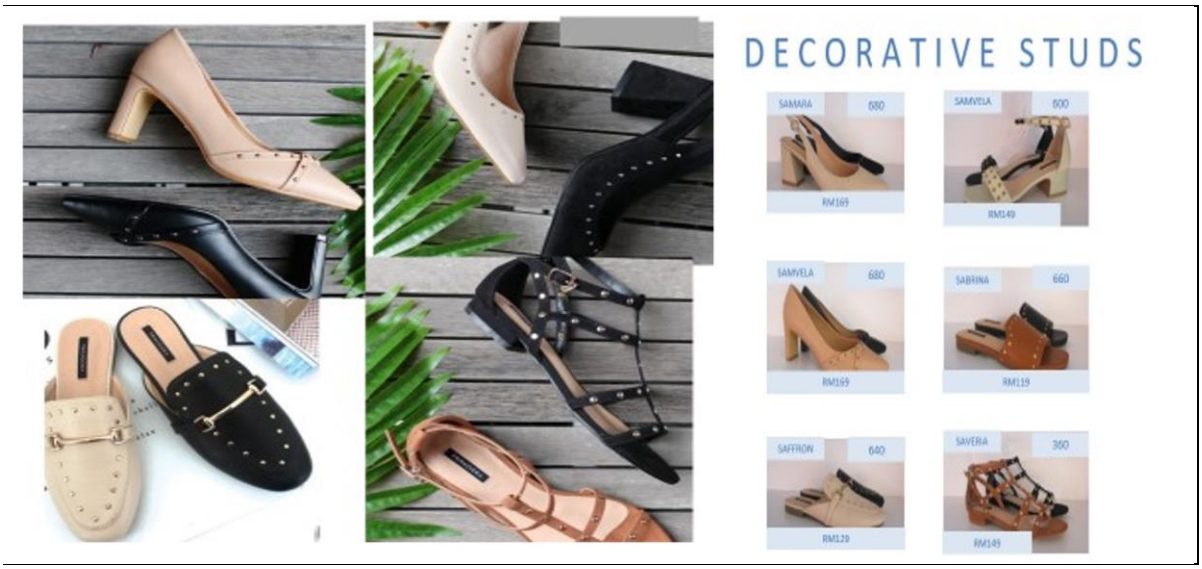

Figure 5: "Fashion V" interpretation of Decorative Studs into products

MONTH	CAT	ARTICLE	PROJECT	COLOR	WEEK	MONTHS	QTY ORDER	QTY SOLD	SOR	COST	RSP	RV	CV
OCT	11	711-6251	SAMARA	BLACK	43	3.25	350	70	20%	45.35	169	59,150	15,873
OCT	11	711-8251	SAMARA	BEIGE	43	3.25	330	94	28%	45.35	169	55,770	14,966
OCT	11	711-6252	SAMVELA	BLACK	43	3.25	360	61	17%	40.09	169	60,840	14,432
OCT	11	711-8252	SAMVELA	BEIGE	43	3.25	320	48	15%	40.09	169	54,080	12,829
OCT	12	551-6372	SAFFRON	BLACK	43	3.25	320	70	22%	39.09	129	41,280	12,509
OCT	12	551-8372	SAFFRON	BEIGE	43	3.25	320	118	37%	39.09	129	41,280	12,509
OCT	13	661-6304	SABELLA	BLACK	43	3.25	310	48	15%	46.36	149	46,190	14,372
OCT	13	661-8304	SABELLA	BEIGE	43	3.25	290	33	11%	46.36	149	43,210	13,444
OCT	13	561-4292	SABRINA	CAMEL	43	3.25	320	45	14%	35.33	119	38,080	11,306
OCT	13	561-6292	SABRINA	BLACK	43	3.25	340	45	13%	35.33	119	40,460	12,012
OCT	13	561-4293	SAVERIA	CAMEL	43	3.25	180	20	11%	47.11	149	26,820	8,480
OCT	13	561-6293	SAVERIA	BLACK	43	3.25	180	37	21%	47.11	149	26,820	8,480
							3620	**689**	**19%**			**533,980**	**151,210**

Table 8: "Fashion V" interpretation of Decorative Studs into products

From Figure 4, an example of a WGSN trend report on Decorative Studs is being picked as one of the collection inspirations with studs. The buyer of "Fashion V" will work with suppliers to create the styles with stud inspiration, and the final products in Figure 5 are the new introductions with the initial inspiration from WGSN. The sellout rate for this collection is at 19% for 12 weeks selling period as depicted in Table 8.

3.2 Data Collection

For this research, as we had 24 months of data from July 2017 till June 2019, we had to organize the SKUs into the attributes that determine the aspects of demand, based on Fisher's (1997) model of Functional and Innovative products. Columns were created in excel sheets based on the seven attributes of Fisher (1997), such as Product Life Cycle, Contribution Margins, Product Variety, the Average Margin of Error in the forecast at the time production is committed, Average Stock Out Rates, Average Forced Markdown at the end of the season, and lastly Lead Time of Deliveries and analyses of categories were classified based on the attributes. Some of the data require additional calculations, such as margins % based on retail prices minus costs, or markdowns, which are added as additional columns. Sales across two years were totaled up for pairs sold and turnover(revenue) and balance stocks of all SKUs till the end of Season 1, 2019.

3.3 Data Analysis

Due to the massive amount of data, we started with data cleaning first. Outliers such as negative stocks are removed from the database. We do not know why there were some negative stocks. Across the two years, many SKUs went into liquidation (losing of identity/ end of SKUs) and could not be identified by their original SKU anymore. These are clustered under "liquid" in the excel sheets where these “aged” SKUs were given new liquidation SKUs. All these SKUs will not be included in the datasheet so as not to distort the analysis.

A summary depicting how we operationalize the data from “Fashion V” into Fisher’s product demand attributes is listed below in Table 9.

Fisher's Product Demand Attributes	Criteria for the Data
Product Life Cycle	SKUs by categories analyzed on its repeat orders and first receipt and last receipt. Classify under Functional or Innovative product using criteria from Fisher.
Product Variety	Each SKU per category is tabulated and listed under Functional and Innovative products based on Product Variety criteria.
Contribution margin (incoming initial margins)	Margins are calculated based on initial RSP and landed cost. Categories clustered under Functional or Innovative based on criteria.
Average forced markdown as % of the full price	Original RSP and final net RSP at point of data collection compared. The difference between both RSP is the markdown.
The average margin of error in the forecast at the time the production is committed	The average margin of error is done using performance of 18 months actual sales pairs data by category against its budgeted sales pairs
Average Stock Out rate	Data of each SKU by store by size is analyzed by category. Each size is counted as 1 and stock out as 0. Results tabulated against a full-size count summation and percentage of stock out tabulated by category.
Lead time required for made to order products	The lead time for both Functional and Innovative products is the same. No significant lead time differences for production.

Table 9: Criteria for Data Analysis

3.3.1 Fishers Product Demand Operation Criteria

For the Product Life Cycle, the SKUs were sorted by their product life cycle based on the timing when they were launched. As the company based its reporting on a six-monthly block, we will have Season 1 and Season 2 in a year. We clustered products that were already in the company before the data collection period as "New 2017/1". "New 2017/2" were SKUs that were launched from July till Dec 2017. "New 2018" are new SKUs launched across season 1 and season 2 of the year 2018 and "New 2019" are new products that were introduced in the first six months of 2019.

By looking at the stock balance of each season across the two years of data and totaling it across four seasons in our data would allow us to understand if there were any repeat orders for that single SKU. For example, if the balance stock pairs for SKU A are 300 pairs at end of

season 2, 2017, (Dec 2017) and stock pairs are at 400 at end of Season 1 2018, (June 2018) it means that there were replenishments(repeat orders) for SKU A in Season 1 2018, as, not only did it sell in the across the 6 months, but stock levels were higher than the beginning of the season at 300 pairs, which meant that there were replenishments. These were promptly listed as "repeat," which included products with at least one repeat order. The buyer of the category will usually do a repeat order for replenishment in the company based on the performance of the SKU in terms of sell-out rate. Therefore, our assumption was as long as there is a repeat order for that SKU, the demand will be predictable as there are actualized data on product sell-through before the repeat orders were made. A repeat order meant that the demand was predictable. These SKUs were classified as Functional footwear with predictable demand.

For the Contribution Margins attribute, “Fashion V” had a pre-set minimum incoming gross margin for each SKU at the category level, and each category buyer will have to achieve a minimum incoming margin before the purchase order can be approved. Thus, for the classification of the Fisher's parameter, since Fisher listed 5%-20% margin on the Functional attributes and 20% to 60% on Innovative attributes, we have tweaked the incoming margins by category to be Functional if it is below 60% margins and above 60% to be Innovative products for “Fashion V” company. This was because 60% was the minimum threshold margin for all new launches set by the company, and if it was below 60%, it must be a volume SKU which was decided at the start of the SKU master creation to generate volumes or a Functional category.

In terms of Product Variety, the variants per category are listed based on the category and subcategory level and are presented in the next chapter.

The Average Margin of Error in the forecast at the time of production indicates the variance between the actual performance of the category against its budget at the end of one season. As we are analyzing two years of data, we aggregated the actual sales performance across three seasons as the budget for 2017/2 was not available. “Fashion V” sets its budget based on each category's growth prospects. The budget is planned before the season starts and before

the buying period begins. Hence, a buyer is supposed to work out the open-to-buy based on the budget given to buying the appropriate pairs of shoes in the right RSP to hit the budget. We compared the actual turnover obtained for three seasons against its budget for each of the six product categories. The variance of the actual performance against budget will be the average margin of error.

Average forced markdown is calculated based on the SKUs initial planned retail price and its final retail price at the end of the data based on the collection period across four seasons of sales. (of six months each). Total sales pairs across four seasons are tabulated, together with its retail turnover. (Initial retail price * units sold). For example, if SKU B is in "Fashion V" for four seasons, the same thing is calculated. Total pairs sold for SKU B and its total turnover for four seasons are totaled. Then the average price that was sold for that four-season is calculated based on the total turnover of four-season against total pairs for four seasons. This would give us the actual average price of SKU B that was sold across four seasons. This new average retail price is then compared against the initial retail price. The variation between the two retail prices at the initially launched timing and the retail price at the end of the data collection period would be the difference that indicates the markdown for that category. This is promptly categorized into Functional or Innovative based on Fisher's parameters.

Average stock-out rates examine how widespread is the instance of zero stock of a particular SKU in each store. The first step in examining the average stock out rate is to get the store size report of "Fashion V". Each size available in a store for an SKU is counted as "1" while stock out as "0". Analyses were done by doing a summation of all the "1" of each SKU in each category for all stores. Results tabulated against a full-size count for total SKUs and total store and percentage of stock out tabulated by category. The stock-out rates are then classified into Functional and Innovative products, based on the parameters by Fisher.

Lastly, the lead time required for made-to-order for both Functional and Innovative footwear would be the same. There are no significant lead time differences for production as the production of shoes would be similar, whether the shoes are Functional or Innovative

products. It takes about the same time to produce either a Functional or Innovative product. The manufacturing process is similar.

4 Results

To know if "Fashion V has got the right supply chain strategy, we have to determine the nature of the product demand, whether it is a Functional product or an Innovative product and align the right supply chain strategy such as Efficient or Responsive type of supply chain strategy to the right product demand characteristics. For the footwear industry, some of Fishers' product demand attributes are applicable, but not all. Some of the attributes have limited functions in the footwear industry. There are some product attributes that are valid for the footwear industry, such as low product variety for Functional products and high product variety for Innovative products which is similar to the attributes listed by Fisher, but the vast majority of the demand attributes are listed by Fisher are not applicable.

We will go through each of the product demand attributes based on the data collected.

4.1 Fisher's Product Demand Attributes

We analyzed the product demand attributes individually based on Fisher's model and insert the "Fashion V" experience next to it using Categories as the unit of analysis. The data and results of the analysis are presented in the table listed below based on each product's demand attributes.

4.1.1 Product Life Cycle

According to Fisher's (1997) product life cycle attributes, the product life cycle for a Functional product will be more than two years, while for Innovative products, it is between three months to one year.

Aspects of Demand	Functional (Fisher, 1997)	"Fashion V", Functional	Innovative (Fisher, 1997)	"Fashion V", Innovative
Product Life Cycle	> 2 years	With Repeats Total -6 categories (21 SKUs) **Ladies Dress** Heels (5 SKUs) & Evening (2 SKUs) **Ladies Casual** Flat Sandal (3 SKUs) **Ladies Sandal** Flats(2SKUs), Wedge(2SKUs) and Heels(7SKUs)	3 months - 1 year	No Repeats Total - 21 categories **Ladies Dress**-Flats (31 SKUs), Heels (127 SKUs), Evening (1 SKU) and Wedges (25 SKUs) **Ladies Casual** - Ballerinas (118 SKUs), Boots (6SKUs), Evening (4 SKUs), Flat Sandal (22 SKUs), Sneakers (2 SKUs) Wedge(2 SKUs) **Ladies Sandal** - Evening (6 SKUS), Flats (69 SKUs) Heels (126 SKUs), Wedges (105 SKUs) **Men Dress** - Dress (55 SKUs), Semi Dress (2 SKUs), Slip-On (6 SKUs) **Men Casual** - Loafer(19 SKUs), Sneakers (29 SKUs) **Men Summer**- Fisherman (1 SKU), Casual(22 SKUs)

Table 10: Fisher's Framework of Product Life Cycle attributes compared to "Fashion V" Product Life Cycle

"Fashion V" orders footwear so that each store has at least one pair of each size (minimum six pairs), and medium sizes are usually two pairs or more. Ladies' footwear sizes range from size UK4-9 while men's sizes are from UK6-10. 70%-80% of quantities sell out in one year. So, they are all "Innovative" by Fisher's definition.

If some products sell well, “Fashion V” may order more (repeat order), so the SKU may last for more than two years. So, Fisher's definition makes it Functional, and so it is consistent with Fisher's attribute. In this, we assumed that if the SKU has at least one repeat, it becomes a Functional product. (Need not necessarily be more than two years but if there is a repeat order). However, we will only know for sure after the product sells. We cannot tell if the product is Functional or Innovative when we buy. Thus, we cannot understand the suitable supply chain before the product hits the store. Fisher (1997) has an excellent framework, but it is limited in this case.

From Table 10, there were only six categories that had SKUs which were repeated and classified as Functional products. This means that the Product Life Cycle is more than two years, and that demand is predictable and there is a repeat order. However, because the category only had very few SKUs that were repeated and since the category is the unit of analysis here, the category will be classified as Innovative as most of its SKUs in the category are not repeated and thus regarded as Innovative products. In comparison, fourteen other categories were classified as Innovative products, and even though the footwear is still in the company after one year in terms of aging, there is no repeat order. We have tweaked Fisher’s definition by applying the rule that if there are no repeats, the Product Life Cycle is less than a year. If the footwear is an Innovative product, even though it has been in the company for more than one year, it is still considered an Innovative product as most shoes do not sell to their last pair within a year. This theory supports Fisher’s Product Life Cycle characteristics.

All SKUs grouped under Functional shoes were from the ladies category. It consisted of twenty-one SKUs from Ladies Dress Heels, Ladies Dress Evening, Ladies Casual Flat Sandal, Ladies Sandal Flat Sandals, Ladies Sandal Wedges, and Ladies Sandal Heels category. “Fashion V” launched these fifteen SKUs before the data collection period. Only six SKUs were introduced after the data collection period and have remained active throughout.

For SKUs without any repeats across the two years, 797 were introduced in the two years of data collection with the introduction year/ season below breakdown:

Intro Year/Season	No of Lines (SKUs) (without any repeats across the 2 years)
2017/1(before data collection period)	42
2017(2nd half)	123
2018(full year)	457
2019(first half)	74
Total	**797**

Table 11: No. of SKUs without any repeats across the two years of the data collection period

From Table 11, we can see that most "Fashion V" footwear is Innovative as not many SKUs are repeated. Thus, we can see that Fisher's theory is limited in explaining the Product Life Cycle in the Footwear category as only some SKUs in the category satisfy the criteria of a Functional product, but most does not. Hence, all twenty-one categories are listed as Innovative products.

4.1.2 Contribution Margins

Regarding contribution margin attributes, "Fashion V" adopts a minimum incoming margin for each of its purchases, ranging from 56% to 84%. (Table 12) According to Fisher's Contribution Margin attribute, Functional products have a lower contribution margin ranging from 5% to 20%. In comparison, Innovative products have incoming margins ranging from 20% to 60%.

Aspects of Demand	Functional (Fisher, 1997)	"Fashion V", Functional	Innovative (Fisher, 1997)	"Fashion V", Innovative
Contribution margins (incoming initial margins)	5% to 20%	below 60% 3 categories Ladies casual Ballerina-2 SKUs Ladies Dress Heels- 2 SKUs Men Dress Work - 10 SKUs	20%-60%	>60% 21 categories

Table 12: Fisher's (1997) and "Fashion V" Contribution Margin Attribute

From Table 12, due to its buying policy of having a minimal fixed margin at the point of buying, we adapted the criteria for its Functional product incoming margin to be from the range of below 60% while its Innovative products incoming margins to be above 60% margin for "Fashion V".

There were only three categories with fourteen SKUs that had incoming contribution margins below 60%, where two SKUs are Ladies Casual Ballerina, two SKUs from Ladies Dress Heels, and ten SKUS from Men's Dress Work. However, when we use the unit of analysis as categories, all categories will be in the contribution of the Innovative product margin column. In aggregate, all incoming contribution margins were above 60%. (due to its minimum margin policy). Hence, Fisher's theory may be limited in explaining incoming margins for "Fashion V." This is because a company does not care if its product is Functional or Innovative products, but only cares when it knows what the supply chain strategy is.

4.1.3 Product Variety

Fishers (1997) had written that Functional product have lower product variety while Innovative products have high variants. This is also true for the "Fashion V" company. Analyses were done, and product variety attributes were summarized in Table 13 below.

Aspects of Demand	Functional (Fisher, 1997)	"Fashion V", Functional	Innovative (Fisher, 1997)	"Fashion V", Innovative
Product Variety	Low (10-20 variants (SKUs) per category)	LOW (10 categories) Ladies Dress Peep-toe (1 SKU) Ladies Casual Leather (5 SKUs) Ladies Casual Ballerina (17 SKUs) Ladies Casual Evening (1 SKU) Ladies Casual Sneaker (2 SKUs) Ladies Casual Boots (6 SKUs) Men Casual Slip-On (2 SKUs) Men Semi Dress (3 SKUs) Men Dress Slip-On (6 SKUs) Men Summer Fisherman (1 SKU)	High (often millions of variants (SKUs) per category)	HIGH (11 categories) Men Dress Work Shoes- 45 SKUs Men Casual Loafers (23 SKUs) Men Casual Sneaker (32 SKUs) Men Summer casual (21 SKUs) Ladies Dress heels (159 SKUs) Ladies Dress Flats (31 SKUs) Ladies Dress Wedges (31 SKUs) Ladies Casual Flats (25 SKUs) Ladies Sandal Wedges (104 SKUs) Ladies Sandal Heel (128 SKUs) Ladies Sandal Flat (78 SKUs)

Table 13: Fisher (1997) and "Fashion V" Product Variety attributes

From Table 13, Fisher has said that the low product variety variant ranges from ten to twenty variants. Ten categories were having below twenty SKU variants, namely, Ladies Casual Leather, Ladies Casual Ballerina, Ladies Casual Evening, Ladies Casual Boots, Ladies Casual Sneaker, Ladies Dress Peep toe, Men's Casual Slip-On, Men Dress Slip-On, Men Slip-On, and Men Summer Fisherman. These categories are well within the Functional products according to Fisher's demand attributes.

For Innovative products, Fisher's parameters say that it often consists of millions of varieties. Obviously, for "Fashion V", this was not the case. Thus, we have followed Fisher's parameters

to have below twenty variants for Functional products and for Innovative products, to be above twenty variants. Eleven categories had variants ranging from twenty-one SKUs to one hundred twenty-eight SKUs, respectively. Thus, in line with Fisher's attributes, these eleven categories have high product varieties and are Innovative products.

From the above, in terms of Product Variety, it is easy to comply with Fisher's criteria. However, there are some interesting observations. Both categories have a nearly equal number of men's and women's footwear. This is somewhat surprising as women's footwear is generally considered more Innovative than Men footwear.

4.1.4 Average Forced Markdown

According to Fisher's framework (1997), the average forced markdown as a percentage of the full price for a Functional product is at 0% markdown as the Functional products hardly go on reduction. Functional products satisfy a basic need and change very little over time (hence there is no need for a discount). The average forced markdown for an Innovative product ranges from 10%-25% markdown.

For "Fashion V", we have modified the criteria. We have assumed that the average forced markdown for Functional products is below 10% markdown (as opposed to Fisher's 0% markdown) as it is impossible to have zero markdown due to the sizing assortment involved. Shoes hardly ever sell to the last pair, and most of the shoes will need markdown to clear the SKU due to their many sizes. We chose 10% as the threshold for Functional products markdown because 10% markdown is considered a very minimal markdown for a footwear category. We can see that only four categories have markdowns below 10%, making them Functional products according to Fisher's framework. Another seventeen categories fall into the Innovative product column. These are all listed in Table 13 below. The markdowns are tabulated based on the difference between the final selling retail price and the original planned retail price.

Aspects of Demand	Functional (Fisher, 1997)	"Fashion V", Functional	Innovative (Fisher, 1997)	"Fashion V", Innovative
Average forced markdown as % of full price	0%	< 10% markdown (difference in average RP) 4 categories Ladies Casual Boots - 8.5% Ladies Casual Sneaker - 8.1% Ladies Sandal Evening - 7.4% Ladies Sandal Wedge - 8.3%	10%-25%	> 10% markdown(difference in average RP) 17 categories Men Dress Work-14.7% Men's Dress Semi Dress - 33.7% Men's Dress Slip-On - 22.9% Men Casual Loafer -12.6% Men Casual Sneaker-26.4% Men Summer Casual - 27.6% Men Summer Fisherman - 47% Ladies Dress Evening - 32% Ladies Dress Flats - 21% Ladies Dress Heels - 17% Ladies Dress Wedge - 14.7% Ladies Casual Ballerina - 22.9% Ladies Casual Evening - 32% Ladies Casual Flats - 20.2% Ladies Casual Wedge - 17.9% Ladies Sandals Heels-14.6% Ladies Sandal Flats - 24.7%

Table 14: Fisher (1997) and "Fashion V" Average Forced Markdown as % of Full Price

We felt that because "Fashion V" practices a minimum margin of 60% with every purchase of footwear, there may be a correlation between setting high retail selling prices (RSP) to hit

the minimum threshold of 60%. And because of higher RSP, the footwear could not be sold at the higher RSP but will need to incur markdown to sell. We did a regression analysis for the categories to check the correlation between higher markdowns and higher incoming margins due to the minimum fixed floor margins that "Fashion V" adopts at the point of buying. We used the category aggregate incoming margins percentage as an independent variable and category markdown % final markdown as a dependant variable.

Based on the regression analysis done, there seemed to be no significant relationship between the high incoming margins and higher markdowns as R square is a mere 0.07 and P-value is not lesser than 0.05.

4.1.5 Average Stock Out Rate

Fisher's (1997) framework states that the average stock out rate for Functional Products will range from 1%-2% stock out, while Innovative products will run from 10% to 40% stock out rates. The comparison of "Fashion V" data is listed below in Table 15.

Aspects of Demand	Functional (Fisher, 1997)	"Fashion V", Functional	Innovative (Fisher, 1997)	"Fashion V", Innovative
Average Stock Out rate	1%-2%	(below 10%) Men Dress Slip-On - 8.3 % Men Casual Slip On - 0%	10%-40%	(more than 10%) 19 categories Men Dress Semi Dress - no stock Men Dress Work- 20.5% Men Casual Loafer - 16% Men Casual Sneaker- 30.7% Men Summer Casual - 40.3% Men Summer Fisherman - 18.5% Ladies Dress Flats - 40.2% Ladies Dress Heels - 22.8 % Ladies Dress Wedge - 29.6% Ladies Dress Evening - no stock Ladies Casual Leather - 19.4% Ladies Casual Ballerina - 25.8% Ladies Casual Evening - 32% Ladies Casual Flats - 20.2% Ladies Casual Wedge - 17.9% Ladies Sandals Heels- 41.7% Ladies Sandal Flats - 18% Ladies Sandal Wedge - 46.6% Ladies Sandal Evening -13.4%

Table 15: Fisher (1997) and "Fashion V" Average Stock Out Rate

We modified the stock-out framework a little here. While Fisher's framework had a 1% - 2% stock-out rate for Functional products, for "Fashion V," we used below 10% stock out as

Functional products. A missing size across six sizes in an assortment of footwear is roughly 16% of stock out. Hence, a threshold of 10% will mean that not all stores have a missing size as it is below 16% stock out. The Innovative product was anything above 10% stock out rate. A 1% - 2% stock out rate is very low for footwear and not realistic due to the many size assortments for men's and ladies' footwear.

The data analysis found that only two categories had low stock out rates: Men's Dess Slip-On with 8.3% stock out rate and Men's Casual Slip-On with no stock out in any sizes. It means that these two categories have got low stock out rate. However, a low stock-out rate could represent two conflicting views. There can be insufficient demand for the shoe (hence the stocks in the stores are full of sizes still), or another theory is that is it due to timing issues. At the point of analysis, there may be a possibility that the whole batch of shoes was just launched and hence full sizes across the stores. The other seventeen categories have stock-out rates ranging from 14.6% to 40.3%, meaning a high percentage of missing sizes at the store level, resulting in a missed opportunity for sales. Two categories had no stocks. The data suggests that “Fashion V” data are consistent with Fisher's Functional and Innovative products framework. However, for products with multiple sizes in their product ranges, such as footwear or apparel, stock out in a single size is common, especially at the tail end of size assortments where quantities ordered were minimal to start with. Thus, Fisher's framework (1997) may be limited in this product attribute.

4.1.6 Average Margin of Error at the Time the Production is Committed

Based on Fisher’s theory, the average margin of error in the forecast at the time the production is committed for a Functional product is at 10%, while for Innovative product, it ranges from 40% to 100%. This means that the margin of error is higher for Innovative products as demand is unpredictable as compared to the Functional product.

Aspects of Demand	Functional (Fisher, 1997)	"Fashion V", Functional	Innovative (Fisher, 1997)	"Fashion V", Innovative
The average margin of error in the forecast at the time the production is committed	10%	<11% Average Margin of Error Ladies Casual - no error Ladies Sandal - 11%	40% to 100%	>15% Average Margin of Error Men Dress - 50% Men Casual - 24% Men Summer - 35% Ladies Dress - 18%

Table 16: Fisher (1997) Framework and "Fashion V" on Average Margin of Error in the Forecast at the Time the Production is Committed Attribute

For "Fashion V", the average margin of error in the forecast at the time of production results indicates the category's actual performance against a pre-set forecast in which the category will have to cover for the company to hit its budget. Actual sales performance was analyzed against the company's given set of budgets across three seasons. Analysis was done on a product family or gender level and not at the category level as the company does its budget based on its product family level. (By types of shoes such as dress shoes, casual shoes or sandals) Thus, six product families/ gender constitute twenty-one categories, and analysis was done using an approximate aggregated gender/product family approach.

We saw that only one product family/gender level in the Ladies Casual has minimal Margin of Errors with no error that falls under Functional products criteria. This means that Ladies Casual achieved its budgeted forecast. Another gender level or product family of Men Dress has an average margin of error at 50%, which is well in the range of Fisher's criteria of Innovative products. However, four other gender level or product family falls in-between Functional and Innovative criteria of average margin of error in the forecast at time production is committed. Most of "Fashion V" somewhat falls in the middle between 11% to 39% which makes it neither Functional nor Innovative based on Fisher's framework. Fisher's criteria are limited here as does not fully explain this attribute.

4.1.7 Lead Time Required

Based on the Fisher (1997) framework, there is a significant lead time difference for a Functional and Innovative product, with Functional Products having a longer lead time of 6 months to a year for production, while Innovative products had one day to 2 weeks of production lead time. (Table 17)

Aspects of Demand	**Functional (Fisher, 1997)**	**"Fashion V", Functional**	**Innovative (Fisher, 1997)**	**"Fashion V", Innovative**
Lead time required for made to order products	6 months to 1 year	No difference	1 day to 2 weeks	No difference

Table 17: Fisher (1997) and "Fashion V" Lead time required for made to order product

In the case of "Fashion V" and footwear production in general, Fisher's Model does not apply. The average lead time of production in footwear manufacturing is approximately the same, irrespective if it is Functional or Innovative products, as the stitching, manufacturing process, and production process for both products are very similar. The only difference is the accessories used, types of material accessibility, and how complicated the footwear design is. (basic design in contrast with stitching of many overlapping materials). Hence, in this case, Fisher's theory is limited here.

In conclusion, Fisher's (1997) Functional and Innovative product may be suitable for certain products but does not fully explain all attributes for footwear. Table 18 summarises all the seven product attributes of demand and the corresponding twenty-one categories in "Fashion V" which indicated whether the categories are Functional or Innovative products. As can be seen clearly, some categories moved from being Functional to Innovative based on the product demand attributes, and some are not applicable at all. There are some attributes which Fisher's framework explained clearly and could fit fully into the criteria of the Functional or Innovative products, but some attributes do not, thus, making the framework limited in the case of retail footwear companies.

	Product Life Cycle	Contribution Margin	Product Variety	Average Forced-Markdown as % of the full price	Average Margin of Error	Average Stock Out Rate	Lead Time required
Men Dress Formal	INNO	INNO	INNO	INNO	INNO	INNO	SAME
Men Dress Semi Dress	INNO	INNO	FUNC	INNO	INNO	INNO	SAME
Men Dress Slip-On	INNO	INNO	FUNC	INNO	INNO	FUNC	SAME
Men Casual Loafer	INNO	INNO	INNO	INNO	INNO	INNO	SAME
Men Casual Slip On	INNO	INNO	INNO	INNO	INNO	FUNC	SAME
Men Casual Sneaker	INNO	INNO	INNO	INNO	INNO	INNO	SAME
Men Summer Casual	INNO	INNO	INNO	INNO	INNO	INNO	SAME
Men Summer Fisherman	INNO	INNO	FUNC	INNO	INNO	INNO	SAME
Ladies Dress Flats	INNO	INNO	INNO	INNO	INNO	INNO	SAME
Ladies Dress Heels	INNO	INNO	INNO	INNO	INNO	INNO	SAME
Ladies Dress Wedges	INNO	INNO	INNO	INNO	INNO	INNO	SAME
Ladies Dress Evening	INNO	INNO	FUNC	INNO	INNO	INNO	SAME
Ladies Casual Ballerinas	INNO	INNO	FUNC	INNO	INNO	INNO	SAME
Ladies Casual Boots	INNO	INNO	FUNC	FUNC	FUNC	INNO	SAME
Ladies Casual Evening	INNO	INNO	FUNC	INNO	FUNC	INNO	SAME
Ladies Casual Flat Sandal	INNO	INNO	INNO	INNO	FUNC	INNO	SAME
Ladies Casual Wedge	INNO	INNO	FUNC	INNO	FUNC	INNO	SAME
Ladies Casual Sneaker	INNO	INNO	FUNC	FUNC	FUNC	INNO	SAME
Ladies Sandal Flats	INNO	INNO	INNO	INNO	FUNC	INNO	SAME
Ladies Sandal Heels	INNO	INNO	INNO	INNO	FUNC	INNO	SAME
Ladies Sandal Wedges	INNO	INNO	INNO	FUNC	FUNC	INNO	SAME

Table 18: Summary of Fisher's product demand attributes with "Fashion V" data

4.2 Limitations of Fisher's Framework

Additional factors need to be considered when we look at Fisher's framework based on its aggregate demand for Functional and Innovative products. As seen earlier, Fisher's model may

fit perfectly in some attributes but may be limited to footwear retailing. Examples, where Fishers' model may not be a good fit for “Fashion V”, are in aspects of Product Life Cycle determination, Average Forced Markdown, Average Margin of Error, Average Lead Time of Production, and Average Stock Out Rates.

As “Fashion V” is a fashion retail footwear company, the qualitative aspects of trends and fashion lifecycle cannot be ignored. The unexplained and often unpredictable effects of fashion trends will affect the success rate of the collection can wreak havoc on a business's demand and supply chain. As can be seen from Table 20, some categories are both Functional and Innovative, depending on which demand attributes are analyzed. Hence, even though the Fisher (1997) framework seemed to offer guides on the best supply chain strategy, the framework at best could work with some products but does not fully explain all the footwear fashion products.

5 Discussion

5.1 What does this mean?

This case study aims to evaluate Fisher's (1997) supply chain strategy framework by applying it to a company in the footwear industry. Findings indicated that the association between product nature and supply chain strategy is not clear. We found that Fisher's framework on Functional and Innovative products is limited and may not be so relevant to the footwear industry, as the product category can move from being both a Functional or an Innovative product based on different aspects of demands, and this is different from what Fisher's framework says.

Fisher (1997), in his argument, separates products into two exclusive groups (Functional and Innovative). In an article by Lo and Power (2010), most businesses do not identify themselves as providing pure Functional or pure Innovative products, respectively. Most companies identify themselves by providing a mixture of both Functional and Innovative products. This finding is supported by (Huang, 2002) who recognized that most businesses identified themselves as providing products with a mixture of Functional and Innovative characteristics that support the concept of a hybrid product consisting of a mix of "Standard and Innovative product components." This research pushes this even further, as we can see that Fisher's framework does not only face challenges at the company level but also at the product category level. As specified in Chapter 4, at the product category level, a product can move from being a Functional or an Innovative product, depending on the product demand attributes, hence the framework has some sort of limitation in usage here.

Additionally, Fisher's framework uses the attributes of demand to describe the types of products. This theory is questionable. The demand characteristic of a product is highly correlated with the position of the product within the supply chain ((Lee & Tang, 1997) . As the business moved further away from the customers in the chain, the accuracy of demand prediction is lowered. According to Lee (2002), even though Functional product demand is stable and predictable, the supply base does play a role as well. If the demand is stable, but

the supply and manufacturing supply chain is not reliable, the distortion of demand signals can occur in the supply chain resulting in unpredictable demands.

One commonality, irrespective of the types of products provided by the business, is that cost efficiency appears to be common objective pursuit by most businesses. One may argue that for Innovative product company, it may not be the primary objective, but cost efficiency will have a place in its overall strategy. More than two-thirds of surveyed organizations found to be pursuing both efficiency and responsiveness strategies simultaneously, meaning it does not seem to be perceived to be mutually exclusive and not an "either-or" approach (Lo & Power, 2010)

From the result of Table 20 presented earlier on the different aspects of Fisher's framework of demand, a footwear company should not only differentiate its products into Functional and Innovative products using the seven attributes of Fisher's demand to determine its supply chain strategy. It will also need to be aware of the other supply chain parameters when investigating the best supply chain strategy for a product.

5.2 Practical Recommendation

5.2.1 Other Determinants of Supply Chain Strategy

Based on the model presented, there is a clear indication that Fisher's (1997) framework needs to be further researched. While many agree with his framework, many other researchers add additional elements such as grouping the product classifications into different categories. Examples of these new groupings are such as "Innovative - unique" grouping (Lamming, 2000) and "hybrid" type (Huang, 2002). These new categories may not solve the challenges highlighted before. This further highlights the problem that there is no standard agreement in the literature regarding which product characteristics can be isolated as critical to the determination of supply chain strategy. Therefore, further research is required into this area.

A study of the supply chain complexities in the footwear industry may also be warranted in tandem with Fisher's framework. Many studies support that better management of supply

chain complexities produces better supply chain performance. (Kearney, A.T, 2004) There are three types of supply chain complexities – static, dynamic, and decision making. (Serdarasan, 2013) We view that in the case of "Fashion V", the static complexity driver could be improved upon by looking at the variations of products. One of the most common ways to reduce complexities is to limit the number of SKUs in the company to reduce the variation of products. This is especially so in the footwear company where there are so many variations, types, heels, and functions for footwear. "Fashion V" needs to exercise SKU rationalization so that the number of SKUs is manageable. This is because the more SKUs "Fashion V" has, the higher the complexities of the supply chain, the higher the cost of responsiveness. In the quest of achieving excellence, high responsiveness will undoubtedly incur a higher charge, and low cost will only result in low responsiveness. (Fisher, 2007)

The complexities present in the footwear industries can be viewed from product nature, such as a large number of assortments in terms of sizing and colorways, making the varieties more straightforward by only allowing for full sizes rather than half sizes (eg, size 5.5 for a ladies size) (thereby reducing inventory carried) and also the choice counts in terms of colors and models. The more space the store has for display for racks or gondolas; the more SKUs are required to fill them. Some may argue that this is not true, as there is no rule on how densely packed a product in a store needs to be, but the general perception is if the products are spaced out in terms of visual merchandising(with more space in between product displayed), there is a general perception of premium pricing and luxury while the more densely packed and how close each product is placed to each other, the perception is it is a commodity product. (for example, supermarket shelves which are mostly filled densely with products next to each other)

5.3 Limitations

The results reported here invite additional research on several topics. The qualitative approach using trends described deserves further study. Not much qualitative and quantitative analysis was done on the importance of trend spotting in the fashion industry and how it affects the retailer. The quantitative approach uses historical data, but in the fashion industry, a new

trend does not have historical data but uses more gut feel and experience of the buyer to know what to launch. Hence, qualitative data, such as color trends, designs, prints, and patterns will be useful to add confidence to “Fashion V” business results.

Data sources of “Fashion V” have their limitations as it only takes account from one single company and may be limited in scope for other companies in the industry. It may not be that all the challenges listed are because Fisher’s framework is wrong, but it may be due to the idiosyncratic decisions of the leadership of “Fashion V” which makes the results inapplicable.

This is also complicated by the slight change of categories and classification in the two years where the data was compiled, making the analysis inconsistent. It will be interesting if the data could be compared across other companies in the same industry. It is also fair to mention that in the period of the data collection, the country underwent a general election which resulted in a change of the government after 60 years and this created a euphoric sentiment of buying which may affect the data presented.

5.4 Future Research Direction

Fisher's (1997) classifications of products into two distinct groups of Functional and Innovative products have been challenged by many researchers who have contributed to the works of extending or building on Fisher's (1997) model. Fisher's approach of taking only product nature as a significant and only factor affecting the choice of supply chain strategy has been rebuked. For the footwear industry, we should not only rely on product demand attributes but also investigate the Hybrid supply chain model where companies could offer both a responsive and efficient supply chain model.

Most products have characteristics requiring some components of both approaches. By doing this, both Responsive and Efficient supply chains could run parallel. Especially in products that display characteristics of both such at the same time due to different geographic locations and trend cycles. Eg, white canvas shoes as basic canvas shoes with predictable demand but

last few years as Innovative products and “in trend” products. Many lines of product classifications are not so clear cut, blurring and becoming hybrid in the future.

According to research, an entirely focused efficient supply chain strategy or a fully focused responsive supply chain strategy is best suited to a small number of products and sectors. Some, but not all, of the characteristics are applicable. Quantifying a product as a Functional or Innovative product is more difficult. Supply chain strategies based on the "one size fits all" or "try everything" philosophy are likely to fail. Most supply chain strategies will need to consider their consumers to suit their requirements.

5.5 Conclusion

In conclusion, the association between supply chain strategy and product nature is tested via Fishers’ model of demand attributes, and findings are not conclusive for the footwear industry. Certain attributes are applicable, but not all. It is not so straight forward to quantify a product as a Functional or Innovative product. Irrespective of the type of products provided by the firm, cost efficiency appears to be common objective pursued by all, even though may not be the primary objective of Innovative products company. Most companies are found to be pursuing efficiency and responsiveness strategies simultaneously.

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