Strategic sourcing in a direct import supply chain with increasing globalization trends while mitigating risk

by

Sophia E. Scipio

B.S. Mechanical Engineering,
Florida International University, 2005

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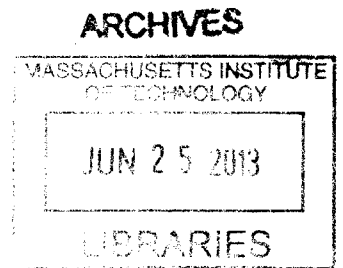
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Signature of Author_____
MIT Sloan School of Management, Department of Mechanical Engineering
May 10, 2013

Certified by_____
Chris Caplice
Executive Director, Center for Transportation and Logistics, MIT
Thesis Supervisor

Certified by_____
Stephen Graves
Abraham Siegel Prof of Management, MIT Sloan School of Management
Thesis Supervisor

Accepted by_____
David E. Hardt
Chairman, Committee on Graduate Students,
Department of Mechanical Engineering, MIT

Accepted by_____
Maura Herson
MIT Sloan School of Management Director, MBA Program

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Abstract

This thesis explores how a retailer should determine whether to source goods domestically vs. directly by imports through international sourcing. Through the research a landed cost model was developed and designed to calculate the total landed cost of items that were shipped from overseas locations into the US. The landed cost model is different from typical models in that it integrates the physical size of the item to be imported into the total landed cost considerations.

With the landed cost estimates at SKU level, the decision of whether to import or to source domestically is derived. What attributes make better import candidates over others given that a landed cost calculator outputs "yes" to import? What are some of the risks? In addition to creating a landed cost calculator, the research presents approaches around these questions. The characteristics of good import candidates are analyzed through evaluating the variables that contribute to total landed cost. Basker and Van (2008) present theories that examine the two way relationship between the size of a dominant retailer and the imports of consumer goods. They conclude that a chain needs to reach a threshold size before it begins to import. Benchmark studies of import giants like Wal-Mart are presented in this paper to understand how a longer history in the retail sector along with a robust IT infrastructure gives a company an advantage in importing retail goods.

The results of this research can help retail companies with new and small import programs understand the variables that are needed to calculate total landed costs with the consideration of container utilization. Additionally it will help the retailer to decide on the best items to import in a smaller program until they can acquire economies of scale through higher import quantities. Ordering methods such as the Periodic Order Quantity Method (POQ) for fixed order periods with variable demand and Newsvendor models for advance ordering are also addressed. The results show that given several import items of varying sizes, there is an optimum region of importing which relates to COGS, size, inventory holding cost, delta of domestic to imports COGS, demand and other costs. The retailer can find this optimum region by applying analytical techniques to evaluate the candidates that are under consideration for importing. In addition to these findings, the organizational and infrastructural needs of a small imports program are addressed. The research also ties in globalization of the retail industry and the world market economy into shifts in the retailer's decisions.

Thesis Supervisor: Chris Caplice
Title: Executive Director
Center for Transportation and Logistics

Thesis Supervisor: Stephen Graves
Title: Abraham Siegel Prof of Management
MIT Sloan School of Management

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Chapter 1 Introduction

1.1 General Problem

As the retail sector in the US continues to grow, many companies will face the issue of where to source goods in order to remain competitive while capitalizing on profits. For many of these companies goods arrive from international locations to the United States through direct imports. For other firms goods are still purchased from US distributors at a higher cost but bypass the need to own an import supply chain. As these companies continue to grow, sourcing higher volumes in the US becomes a challenge, in addition to the need to stay ahead of competition by lowering the costs of the supply chain. How a company determines the true costs associated with importing and when it becomes more profitable than sourcing domestically is a key consideration in switching to an import program and requires reliable landed cost methods in addition to robust import strategies.

1.2 Research Methodology

The history of retailing in the US and how it relates to imports was first studied to get an overview of imports in the retail industry. Various legs of the import process including customs, transloading, freight forwarding, and ocean transportation costs were then researched in an effort to understand key import variables. This was followed by the study of an import program at a retail company with observations to the key decisions made around imports. These were examined through both quantitative and qualitative methods across different product categories. Some of the current methods around import decisions were observed, in addition to the origination of the criteria used to make these decisions. Costs were aggregated to find the total landed cost of goods in over 15 different product categories for approximately 3500 SKUs in a subset of 7 million units. The total landed cost for imports was then compared to the total landed cost for domestic goods and additional analytical methods were used to ascertain in which cases procuring a good domestically was better than importing it and whether there were any key variables that were drivers of these outputs.

The end goal of the project was to identify ways to grow the imports program of a retail company and to design reliable and quick tools to help make the decisions of whether an item should be imported or whether it should be

sourced in the US. Through the course of the project, a landed cost calculator was developed in order to understand the tradeoffs between buying domestically and purchasing goods overseas. The larger issue is how companies should make these decisions and at which point the ownership of the supply chain should be transitioned to the company, rather than third party suppliers or local distributors, which increases cost. The main considerations would be making this transition smooth, while capitalizing on lower costs, mitigating risk and still meeting the needs of the customer on time.

In addition to full landed costs, the infrastructure needed for a successful import program was addressed in addition to the larger implication of imports in regards to globalization. Wal-Mart was also researched, addressing how the retail industry boom which started in the 1950s paved the way for Wal-Mart to establish an advantageous infrastructure in the imports industry today.

1.3 Research Question

A retailer with a relatively small import program provides a list of goods with variable levels of demand. Many of the items currently sell to a wide distribution of customers. The retailer currently purchases all the items from a domestic distributor in the United States and receives them about 5-14 days after ordering. However, the retailer believes that they can purchase many of the items by importing at a cheaper cost in order to increase profits but with a lead time of 1-3 months from the time of ordering. The retailer has received import COGS (cost of goods sold) from overseas suppliers and all the COGS for imports are lower than the COGS for identical domestic items. Should the retailer import all of the items? Which items should the retailer import? What are some of the variables that impact these decisions and how can the retailer make decision criteria around them? What are some of the risks that the retailer has to face? What is the general climate and barriers to entry in the import sector and will the retailer be affected by these? How? In short, in which instances should the firm source items domestically vs. taking ownership from the international point of manufacturing? In addition to making these decisions for the list of items that the retailer has now, how can the retailer reliably continue to make these decisions strategically for any other future goods with a given forecasted demand? To fully understand the implications of the questions above, the import and domestic procuring process will be explained in detail in Chapter 3.

1.4 Thesis Outline

Chapter 1 of this paper gives a general introduction to the thesis topic on imports and the methodology used to examine the issue. The research question is also presented. In Chapter 2, the need for retail companies to import, as well as literature review around the evolution of the retail sector is discussed. To increase understanding around the variables associated with imports, the entire import and domestic procuring process is discussed in detail in Chapter 3. Chapter 4 presents a case study of Wal-Mart, a dominant importer of retail goods in order to get a glance of what allows Wal-Mart to successfully import a large amount of goods into the US. In Chapter 5, the data collection, analysis and findings of the research is discussed. Chapter 6 delves into some of the recommendations coming out of the results and the main variables that are determinants of whether to import or not. Finally, the conclusion in Chapter 7 sums up the research and discusses the bigger global trade effect that impacts the import sector.

Chapter 2 Literature Review on Imports

2.1 Drivers and barriers for an import program for retail businesses

Key drivers for an import Program

The following are some of the reasons that a company decides to import:

1) Goods are highly attractive to customers but not available in the domestic area or region

2) Goods or services that satisfy domestic needs or wants can be produced more inexpensively or efficiently by other countries, and therefore sold at lower prices or make higher profits

3) Competitive advantage: Companies can have the opportunity to sell items that other competitors do not sell, by importing these goods from international locations

4) Less trade barriers: Doing business with international parties is much easier today than a few years ago due to advancements including offshore staffing and technology which enhances communication

Key challenges that create barriers for an import program

The issues that steer companies away from importing include:

1) Importing is outside the core competency of the company. The company has never imported before and doesn't have the know-how to start an import program

2) Longer lead times for receiving goods threaten customer fulfillment with demand shifts

3) Supply chain structure for imports and third party providers is too complex to manage

4) Insufficient demand for import volume

5) Higher inventory and carrying costs

6) Risks associated with goods that are shipped. This includes damages or quality control

The next section will review literature on the evolution of the retail process as a segway into the rapid growth of imports in the US today.

2.2 Key facts around imports and globalization of the retail sector

What caused the retail industry to rise so quickly and how does this relate to the import sector? Before 1965, the US retail sector was concentrated in a few large firms per sector. Some of these retail companies were Sears, JC Penney, ACP, Woolworth. In the decade before 1965 some important changes to American reform caused a change in the American retail industry.

The Interstate Highway Bill was approved in 1956. It was a vision of President Franklin Roosevelt that came from the 1930s. This was designed to create more jobs for people during the great depression. The goal was to enable more interconnectedness among many US cities through a network of highways and provide more access to certain routes in the US. This move would also impact the retail industry by making it easier for goods to be delivered to certain areas of the country and goods to be transported from one area to the next. Other changes include the Tax reform code in 1955, suburbanization/ high population growth on the outskirts of cities. Fair trade laws, where retailers were required to give a percentage of their revenues to charities were also declared unconstitutional during this period. These changes combined, opened the door for the retail industry boom.

In 1954 there were 500 shopping centers countrywide in the US and in 1964 this grew to 7600 shopping centers. Of these 30% were retail sales (1).

After 1960, firms that continued to be retail firms included (1):

- 1962: Wal-Mart, Target, Kmart, Kohl's

- 1963: The Limited

- 1966: Best Buy

- 1969: The Gap

- 1972: Nike

- 1978: Home Depot

- 1983: Costco

- 1986: Staples and Office Depot

After 1965, the globalization of supplier markets increased and chain stores became more predominant. Some segments of retailing became concentrated in a few major chain stores. These included toys and games, books, apparel, music, to name a few of the categories. Rapid worldwide consolidation followed this trend with the following events shown below:

- 1953—500 shopping centers in the U.S.

- 1963—All retail chain stores combined accounted for only 30% of all U.S. retail sales.

- 2005—20 of the world's largest retail firms account for 15% of the world's retail sales ($1.2 trillion/8 trillion) (Deloitte 2005)

- 2007—Over 50,000 shopping centers in the U.S.

These statistics highlight the tremendous growth of the retail industry since the 1950s.

2.3 China's involvement in the retail industry boom

From 1929-1965 importing was almost non-existent in US markets. During this time, all the goods that were sold in retail stores were supplied by US manufacturing firms. As the retail industry expanded through the 1960s, more supplier markets were created. As more supplier markets were created, U.S. retailers drove the industrialization of Asian economies after 1970. Figure 1 shows the import penetration and growth in different types of merchandise from 1965- 1995 to demonstrate the quick growth of imports from the time of its inception to years following soon after. Most of these goods were manufactured in East Asia. In the 1980s, much of the infrastructure development around the containerization of goods also occurred with many of the world's containers located in Asia. Much of the

movement around this development occurred with Wal-Mart and will be expanded on in the Wal-Mart case study later in this paper.
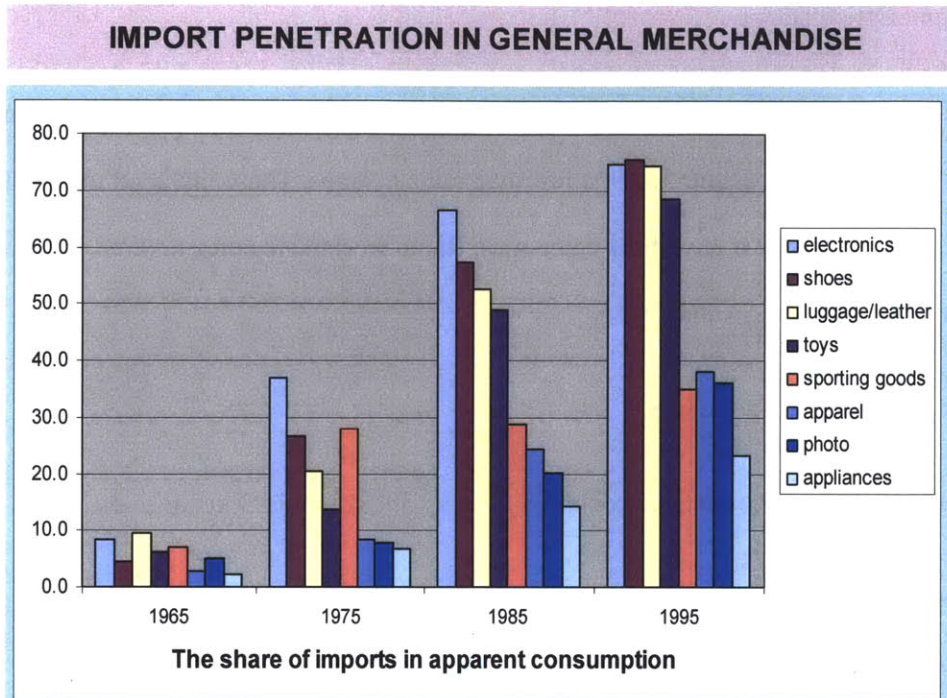
Figure 1 Import penetration in general merchandise 1965-1995 (1)

During the 1970s, some of the primary drivers of retail consolidation included lean retailing, barcodes and scanners, computerized systems to manage inventory and to restock items. Many of these changes came about through the growth of Wal-Mart and their move to import more goods from overseas. Many retailers also needed to become more competitive which drove a need for global markets as well as major improvements to management of the global supply chain. Figure 2 shows the growth of the China US imports landscape and the exponential growth of different retail categories from 1989-2001.

China, US Imports Landscape, 1989-2001

Legend:
- Electronics and el. machines
- Computers, office machines
- Optical, photographic, watches
- Toys, Games, Sporting Goods
- Footwear
- Apparel, total
- Furniture
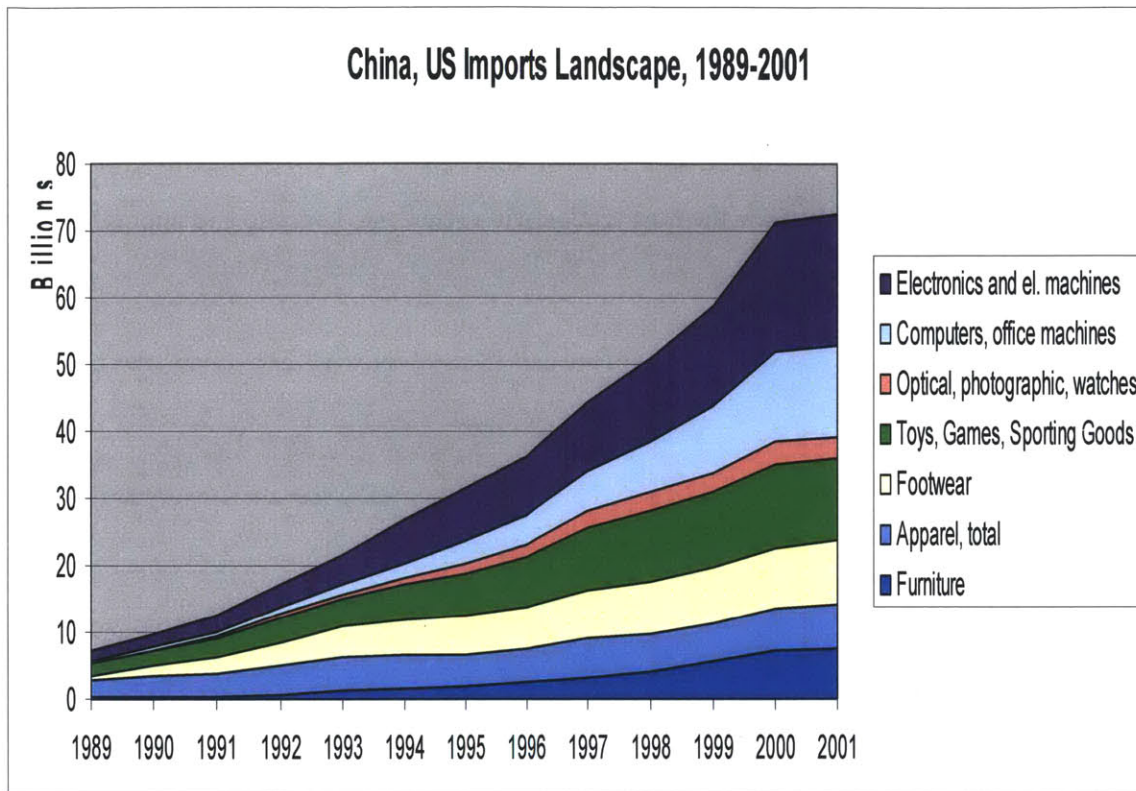
Figure 2 Importation of consumer goods into the US from China 1989-2001(1)

2.4 What globalization of retail means for imports today

From the 1980s to today, global retailers are the main drivers of China's export-oriented economy and China has become the preferred site of global manufacturing in consumer products. Bigger importers in the retail market have more bargaining power to drive costs down, more efficiency which lowers costs and better supply chain management with continuous improvement over time.

Basker and Van (2008) postulate a two way relationship between the size of a dominant retailer and imports of consumer goods. In their model, the relationship between chain size and imports emerges from an interaction between economies of scale in retailing and economies of scale in the import process. They conclude that a chain needs to reach a threshold size before it begins to import. They further elaborate that these factors combine to generate an equilibrium that depends on the chain's technology. When the chain becomes sufficiently large it switches from domestic to offshore suppliers. The movement of production

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overseas further reduces marginal cost, increasing the chain's profit per store and giving it an added incentive to expand. In contrast, how importing plays out for a retailer with a smaller import program depends on the import strategy and the infrastructure design.

Before addressing some of these challenges, the next section will review the domestic and import procuring process.

Chapter 3 The import and domestic procuring process explained

3.1 Overview and summary of the direct import process

The import process is an extremely complicated system of receiving goods from international suppliers. If a company decides to import, they own the entire process from start to finish along with a few third party providers that they may contract to handle specific services. These 3PL (third party logistics) providers have services such as customs brokerage and freight forwarding. This will be described in a simplified manner using Figure 3 after which a detailed description of the process will follow. The ownership of the inventory at each portion of the process depends on the incoterms which are part of the shipping contract. It is important to understand who owns the inventory in case of liability. Incoterms will be described in detail in section 3.3.
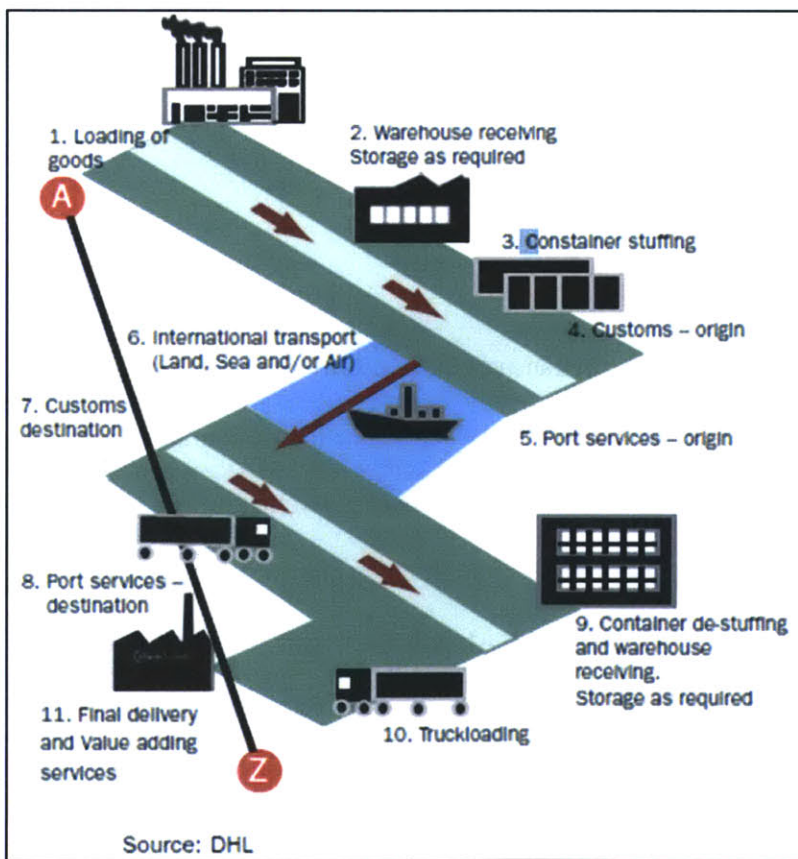
Figure 3 The direct import process (DHL)

Import Process Summarized

1) Goods are loaded onto a container for shipment

2) A warehouse in the international location may store the goods if necessary until the ship is ready to be loaded. This is known as drayage

3) The containers are loaded onto a ship and the carrier takes possession of the bill of lading

4) The customs process begins

5) The ship is processed for departure from the port of origin

6) The vessel departs

7) The vessel arrives to the port of destination and the customs process is completed

8) The ship is processed to be completed for unloading

9) Containers are unloaded from the ship and transported to a warehouse or transloader

10) Goods are allocated to trucks at the transloader and transported to the retailer via rail or over the road

11) Retailer receives goods

3.2 Detailed review of the import process

To begin importing a company needs a carrier or shipper to transport the goods from the international location which typically are transported via air or ocean. This research however, focuses on the ocean shipping process. The international import location of China is also the focus given that the majority of imported goods arrive from China to the US on ocean containers. The shipping company usually provides rates for transporting different sizes of containers in a yearly contract with the retailer which is finalized by a bidding process and several negotiations. Additionally, each aspect of the import process comprises a cost to the retailer which should be factored into the final landed cost of the goods that they import. The process is very complex and includes many terminologies and segments. However the most important ones will be discussed below.

Before delving into the details, three basic terms must be understood:

Place of origin: The place or country where the goods are originated to be shipped to the international location

Port of origin: The seaport where the containers are loaded to be shipped

Destination Port: The final port for the destination of the goods in the US

3.3 Elements of the import process

Purchase Order

The first step occurs when an order is placed by the company or corporation that wants to import. A PO (purchase order) is generated by an internal corporation or team based on the needs of the company and this order needs to be transmitted to the manufacturer or vendor of the goods in China. The purchase order can be processed internally by the company but handled by a freight forwarder that is also stationed in China. The retailer and the freight forwarder may have a computer system set up for communication and EDIs (Electronic Data Interchanges) that communicates the need for a purchase order to be processed. This freight forwarder is an expert in the shipping process and can work out the details of the documentation needed with the international vendor to process the goods for smooth shipment.

Freight forwarder

Ocean freight forwarders are licensed by the federal maritime commission (FMC). The freight forwarder manages the transaction of getting the goods from the manufacturer to the buyer or corporation that has ordered the items. The freight forwarder is the source of communication between the buyer/corporation and the carrier and is more knowledgeable than the corporation in the handling of ocean transportation and imports. They are knowledgeable on the amount of space that is needed to ship items, arrangement of storage if needed, routing information, shipping rates and the most important steps to take to successfully ship merchandise. Some companies like DHL and UPS have their own freight forwarder services and

Wal-Mart has announced plans to have its own freight forwarder as it seeks to make its supply chain more efficient (3).

Incoterms

Incoterms are international commercial terms and were created to provide an understanding of critical items in the international trade process and to create agreements between the shipper and the receiver of the goods. These play a major role in the responsibility and risk allocations between the corporation and the parties and should not be underestimated. Many retailers who have goods damaged along the import route have experienced major headaches of liability because their contracts did not stipulate detailed incoterms or they did not pay attention to the incoterms in the contracts. Incoterms can also help to calculate the total landed cost of the goods. Incoterms vary in detail and some work more in favor of the retailer than the shipper of the goods. There are 13 incoterms in the shipping process (4). The full list of incoterms and definitions are detailed in descending order of most risk to buyer to most risk to seller in Appendix 1 (5).The incoterms start with a letter and these are defined below (4):

E- Departure

F- Main Carriage Unpaid

C- Main Carriage Paid

D- Arrival

One of the main incoterms mentioned often in the international trade world is FOB (Freight on board). FOB means that the shipper/seller uses his freight forwarder to move the merchandise to the port or designated point of origin. Though frequently used to describe inland movement of cargo, FOB specifically refers to ocean or inland waterway transportation of goods. "Delivery" is accomplished when the shipper/seller releases the goods to the buyer's forwarder. The buyer's responsibility for insurance and transportation begins at the same moment (6).

The purpose of incoterms is to address three major questions: (6)

1) **Costs-** Who is responsible for the expenses involved in a shipment at a given point in the shipment's journey

2) **Control-** Who owns the goods at a given point in the journey

3) **Liability-** Who is responsible for paying damage to goods at a given point in the shipment's transit.

Vendor or Supplier

The vendor or supplier receives the order through the freight forwarder or retailer and they begin to process the order. When the order is ready to be shipped, the freight forwarder will work with the carrier for the goods to be picked up. Depending on the arrangements or the **incoterms**, a container will arrive at the supplier's facility for transportation of the goods. In other cases, the goods will go to the freight forwarder's location for consolidation into the freight forwarder's containers and then the freight forwarder will ship them to the US.

Bill of Lading

The bill of lading is issued by the carrier and lists the merchandise included in the shipment. This bill gives title to the goods and requires the carrier to deliver the goods to the appropriate party. It is a legally binding document providing the information necessary to process and accurately invoice a freight shipment.

The bill of lading serves three purposes: (7)

1) As a receipt once the goods are loaded onto the vessel for proof of shipment, customs and insurance purposes, and also proof of completing a transaction especially under incoterms.

2) As a title to the consignee noted on the bill

3) As a negotiable instrument. The bill represents title to the goods and can be traded as goods or borrowed upon if desired

The bill of lading lists all the items that are transported in the shipment and sums up the total costs/ value of the items. A merchandising processing fee of .21 % ad valorem is charged on the cost of goods for formally entered merchandise for each bill of lading with a minimum of $25 and a maximum charge of $485 per bill of lading (8). This charge also becomes part of the landed costs for items that are shipped. Additional fees also include harbor maintenance fees charged by the port. An example of a bill of lading is shown in Appendix 2.

Customs brokerage

After completion of the bill of lading, the customs broker can begin the customs process for the goods. This process, if done while the goods are in transit can speed up customs clearing at the port of destination and allow the goods to leave the port as soon as possible. Customs is extremely complex due to the nature of classifying items to be shipped into correct categories as this determines how much duties an item is assigned. If the item is put under the wrong classification, this can cause major delays at the port of destination which causes delays and extra costs for the retailer. The customs process therefore needs to be handled by experts who have the license to fully understand customs and compliance procedures. Customs brokers are licensed by the US department of Treasury. Their services can be outsourced to a third party company that can complete the customs process and ensure that the appropriate paperwork and classifications are assigned to the goods. This allows for the lowest tariff schedules/duties costs and all recent regulations to be followed. In many cases the same company that performs freight forwarding services may also have a division that performs customs brokerage services or the two parts of the import process can be handled by separate companies. In 2010 about 30 percent of all imported goods into the US were dutiable (9).

Ocean Carrier

The carrier is the company that owns and operates the freight ships and takes the goods at the port of origin and delivers them to the port of destination unless they have agreed to perform other duties in the import process including drayage services. Some of the top ocean carriers include Maersk, APL and

Evergreen (10). In 2010 the US Customs and Border protection received about $2 trillion worth of imported goods from import carriers (11). The carrier negotiates rates for the shipment of ocean carriers with the buyer. This is usually done in a yearly bid process by some companies and then a contract is set with agreements by all parties.

3.4 Container Pricing and volume implications

Container volume highly impacts supply chain costs and the total landed cost of goods. Companies such as Wal-Mart profit from high economies of scale as a full containers optimize costs. Additionally a high quantity of containers creates bargaining power for retailers to get lower prices, driving costs down. For companies with smaller import schedules or a company that wants to start an import program, the lack of full containers and high costs to ship containers greatly impacts total landed costs.

The cost to ship containers also fluctuates based on economic conditions. According to Clarkson data, (12), costs to carry 40 ft. US import containers rose about 30% between Dec 2011 and February 2012 after being on the decline in the same period of the previous year. Container prices were expected to rise, but were still 36% below the $2833 price reached in July 2010 to ship a 40 ft. container from China to the West coast.

Apart from container rates, the volume to cost ratio does not increase linearly as containers get bigger. The four main types of containers that can be shipped are 20S, 40S, 40H and 45H. The maximum capacity of these four containers is 33, 66, 76, 85 cubic meters (cbm) respectively.

 To illustrate volume to cost ratios, container rates were obtained from Universal Cargo Management, a shipping company based in California that provides a service for consumers where multiple carriers/ freight companies submit their rates in real time. When a consumer wants to ship a container, the company quotes a rate from these multiple networks according to the market rates which are live. The rates obtained to ship containers shown are PORT to PORT, in the case of this illustration, from CNSHA

(Shanghai China) to port of Tacoma Washington and exclude all other fees for the containers. The rates were obtained in January 2013. These are shown in Table 1.

Container Type	Max Volume (cbm)	Cost	Cost/cbm
20S	33	$2,036.26	$61.70
40S	66	$2,502.66	$37.92
40H	76	$2,941.50	$38.70
45H	85	$3,121.70	$36.73

Table 1 Costs for shipping various sizes of ocean containers from Shanghai to Tacoma Seattle

The first observation shown from this table is that as the volume per container increases, the cost /cbm to ship the container decreases. This means that a retailer with more merchandise has the opportunity to capitalize on lower marginal costs, hence higher profits. The drop in container costs is most pronounced between the 20S and 40S containers. Between the 20 S and 40S containers, the volume capacity doubles from 20S to 40S containers while the cost /cbm is almost halved. For a smaller retailer with insufficient volume, this difference may make a huge impact to costs. After the 20S containers, the gap significantly decreases as the cbm volume increases from 40S to 40H to 45H containers, with a small increase in cost/cbm going from 40S to 40H containers and then a drop in cost/ cbm with a 45H container. This is further illustrated in Figure 4.
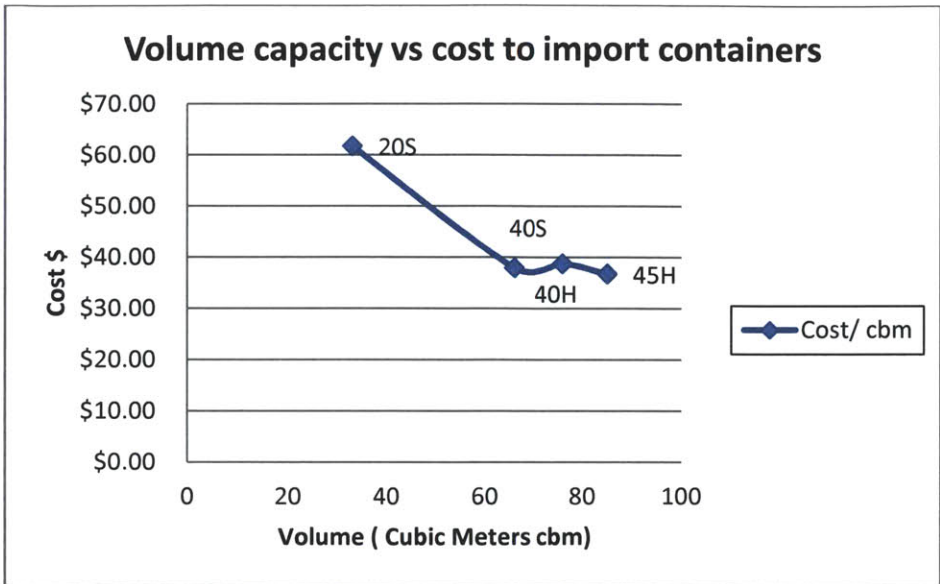
Figure 4 Volume capacity vs. cost to import ocean containers

As the graph illustrates, 20S containers cost far more to ship than other sizes when looking at cost/cbm. Cost/weight can also be addressed however the upper limits for container weights are very high and except for very heavy items, containers tend to cube out before weighing out. In order to save on container costs retailers may try to consolidate shipments. This can be done through a freight forwarder. However there is an additional cost for consolidation which comes in the form of overhead costs for the freight forwarding company, which is absorbed by the retailer for the cost of shipping the goods. The retailer then needs to decide whether consolidation and the additional overhead costs are cheaper or more expensive than shipping a full container load. The illustrations shown above demonstrate that the main advantage for a retailer to import depends on **volume**, which is mainly controlled by demand of the consumers and size of a retail chain.

3.5 Container consolidation and storage in China before shipping

In order to mitigate the issue of half-filled containers, it is possible that instead of sending containers to specific vendors to be loaded directly onto the ocean vessel, or working with separate vendors to consolidate shipments into containers, retailers in the US can have their own consolidation centers in China where all the vendors send their goods to warehouses and then freight forwarders can pack the

goods onto containers to make sure they are fully utilized. By doing this, quality checks can be made for all the goods going into a warehouse. Having a consolidation center for storage can also make it easier to return items to the supplier before they are shipped, instead of shipping possibly defective items overseas. Despite the fact that this removes the issue of underutilized containers, having a consolidation center will increase the cost of the supply chain. The items will sit in warehouses until they are ready to ship and labor/overhead, holding costs associated with this consolidation, will increase the total landed costs. A cost benefit analysis can be performed to see whether a service of this nature will be beneficial.

3.6 Import Vendors and Volume constraints

There is another major contributor to the total volume constraint created by containers. Many import suppliers in China are also the manufacturers of the goods. For example, for Fisher Price, when an ocean container arrives at the Fisher price facility in China, they will only pick up Fisher Price goods to be loaded onto a container. If the retailer purchases only10 cbm volume of toys from Fisher Price, it means that the retailer still did not purchase enough merchandise to fill a 20S container, which can hold a maximum of 33 cbms. This causes the landed cost per item to increase for that shipment, closing in on possible profits for the retailer.

This brings up the possibility of consolidation from vendor to vendor. The limitation to this is the **incoterms** associated with each contract to purchase from two different vendors. The Fisher Price vendor may not be willing to consolidate because he may have to accept liability of any other goods being damaged while loading his goods onto the same container. Because of these complications, many vendors prefer their containers to be loaded at their warehouses, handled only by them and then transported to the ports for shipment. This is of course unless a freight forwarder is completing the transaction then the incoterms are different.

3.7 Vendors and minimum order quantities (MOQ)

An additional constraint is minimum order quantities (MOQ). Many vendors require a minimum order quantity for each good that is purchased. The quantity may be in the hundreds for example 300-500 but it depends on the supplier. Minimum order quantities require the retailer to purchase a certain amount of each unique item from the supplier. More quantity purchased also helps to fill containers however the retailer is constrained by forecasted demand and purchasing too much inventory due to MOQs will possibly cause overstocking of goods, causing later losses due to markdowns, liquidation and obsolescence. This highlights several tradeoffs in filling containers, meeting order quantities, markdowns and stock outs. A good import program takes all these factors into consideration and should find an optimal position between these variables and constraints in order to maximize on the benefits of importing.

3.8 Variable Costs: Bunker Fuel Surcharge

Marine bunker fuel is the main type of fuel used by ships that carry containers. Fuel accounts for as much as 60% of a carrier's sailing cost for transport of containers from international locations to the US (13). The price of fuel in an ocean vessel varies with the price of crude oil (13) and therefore there are many fluctuations in the total cost of the journey for ocean carriers. There are other factors including speculation in the crude market, refining priorities and capacity constraints, inherent difficulties for vessel operators in either storing or hedging fuel and these all create pricing distortions (13). If oil prices are up, this means that the typical journey costs more for the ocean carrier. Because of this, carrier companies assign a bunker fuel surcharge for each trip across the ocean; this cost is separate from the standard costs of ocean containers and causes the total landed cost of the goods to fluctuate depending on the price of oil. The transpacific shipment agreement (TSA) provides guidelines for the bunker fuel surcharge released in a yearly document.

Demurrage and Storage

A retailer can also incur extra costs at the port of origin and port of destination if the empty containers are not returned on time. When a vessel arrives at port, the freight company allots time between when the containers leave the port to go to the warehouse to be loaded/unloaded and are returned to the vessel. The freight company determines the length of the window according to a specified contract. If the freight forwarder fails to deliver the containers within the window then demurrage fees occur. This causes extra charges to be added to the landed cost of the containers shipped and hence transferred to the landed cost of the goods. In a similar sense, the port where the vessel is stationed allots the freight company a specified window for the containers to be removed from the port before they are picked up to be taken to a warehouse. If the containers stay in the port longer than the allotted time, the port charges the freight company storage fees, and these fees may be absorbed by the retailer according to the shipping contract. This also causes fluctuations in the final landed cost of the goods. A retailer can independently incur both storage and demurrage costs (14).

Drayage

Drayage is the transportation of goods over a short distance; from the port to the supplier's warehouse, from the port to the transloader or between two areas of a short distance that are typically within the same area (15). It may be for delivery to a seaport, border point, inland port or intermodal terminal in the same urban area. Drayage may or may not be included in the cost of shipping the containers and may also result in a higher landed cost.

Other variable costs

Depending on the packaging needed for the container, additional variable costs may be incurred. Some of these variables include whether a container is floor loaded or pallets are used. Floor loaded containers are cheaper than pallets and the cost for pallets depends on how many are needed in the shipment. Seeing that pallets also have an additional physical dimension, using pallets can decrease the volume that can be

loaded in a container. Loading less means that the landed cost of goods will be higher, therefore many

retailers prefer to floor load goods unless special packaging is needed for specific merchandise.

3.9 Transportation of goods in the US after the customs process

Once the goods arrive to the US and clear customs, they are then transported to the final destination.

Goods may arrive to the final destination by a number of methods.

1) Bridge rail (similar to DC Bypass, discussed in Chapter 4) goods bypass a trans-loader or

distribution center and go straight from the port to the retailer

2) Over the road by trucks

3) Combination of road and rail, transloader or distribution center

4) Air

There are many companies in the US that transport these goods. Approximately 650 railroads operate rail

service with around 150k miles of railroad track in the US (16).

There are also many carrier/trucking companies including J.B Hunt, YRC Worldwide Inc., Swift

Transportation, Schneider National and Werner Enterprises to name a few. The final leg of the

transportation increases the landed costs and also increases the lead time of the shipments. Costs with the

rail carriers and trucking companies are also negotiated in order to bring the total landed costs down.

There is typically a rate for the carriers as well as the number of trucks that a retailer needs in any given

year. These are specified by contract at the beginning of the year. Due to seasonal fluctuations, the retailer

also needs to forecast the number of trucks that are needed based on volume. If the forecast is missed due

to additional unanticipated demand in high seasons, then the retailer will have to purchase extra trucks at

the last minute to account for the additional demand, most often at a higher cost.

3.10 Types of imported goods and seasonal considerations

Product categories of imported consumer goods include electronics, toys, games and sporting goods (1).

The growth of these imports into the US was highlighted in figure 1. Apart from the challenges of

knowing the right quantity to import, there are also seasonal considerations that may impact the price of imported goods. Seasonality can cause a major challenge in terms of when to order, when to produce and when to import in order for goods to arrive on time. This is driven by consumer demand and is a major challenge in the forecasting and planning process of imports. For example, toys are in high demand in the Christmas season of the year. Many of these toys need to be ordered and imported ahead of season. Another example is lawn and garden goods which have a higher demand in the spring season. Some items such as turkey fryers follow events such as Thanksgiving. Seasonality therefore depends on the time of the year as well as events throughout the year.

Seasonality is critical in the import process because items where the season has expired can have markdowns and price drops and these can impact the profit margin of goods. Excess goods cannot be returned overseas and therefore have to undergo higher markdowns or liquidation because they are also out of season.

3.11 The process of distribution in the US for indirect imports

The process to obtain goods in the US at first glance appears more straight-forward than for direct imports. A distribution channel makes it possible for the retailer to receive their goods and the flow of these goods involves various choices that are available to the retailer. These choices may change the final anticipated landed cost of the goods bringing unforeseen and variable costs to the retailer. The process of acquiring goods in the US typically has a lead time of a few days to 2 weeks and there are mainly three types of distribution methods:

1) Merchant distributor

2) Manufacturer division / branch

3) Broker/ Agent

Most of the goods that are sold in retail outlets are manufactured in international locations, mainly China. According to the US Census bureau (17), the amount of sales for US merchant distributors was

$ 4.13 trillion in 2010 with a total operating expense cost of $.7 trillion or 17% of total sales. Sales were $2.4 trillion in 1998. For the first option described above, the merchant distributor sells goods to US retailers after purchasing from the manufacturer overseas. Also known as middle men, the intermediary in most cases will have the intention to sell to many retailers in the US therefore the intermediary buys in **bulk**. By purchasing a large quantity from the manufacturer, the intermediary gains the advantage of being able to meet the minimum order requirement (MOQ) set by the manufacturer overseas that a smaller retailer may not be able to meet due to demand constraints. When the intermediary purchases goods from the manufacturer overseas, the goods will be stored in a warehouse in the US to await orders by retailers or wholesalers. There is a markup from the original manufacturer associated with this purchase. The intermediary experiences the first markup when goods are purchased from the manufacturer and then in turn applies a second markup when the goods are sold to the retailer in the US. The distributor in the US also incurs holding costs for storing the items in a warehouse in the US. The advantage of the distributor in the US is that they can negotiate deals with the manufacturer overseas by buying in large amounts as well as negotiate good rates with the shipping companies by importing high volumes of merchandise. They further capitalize on this advantage by charging a markup price to retailers that buy goods from them. This does not necessarily mean that it will be cheaper for the retailer to import their own goods. The markup charged by the distributor may still be lower than the total landed cost, if the retailer were to try to own the supply chain of importing goods and purchase the goods in the US without the help of an intermediary such as the distributor. Figure 5 shows the flow of goods from manufacturer to consumer for the three different types of distribution systems.
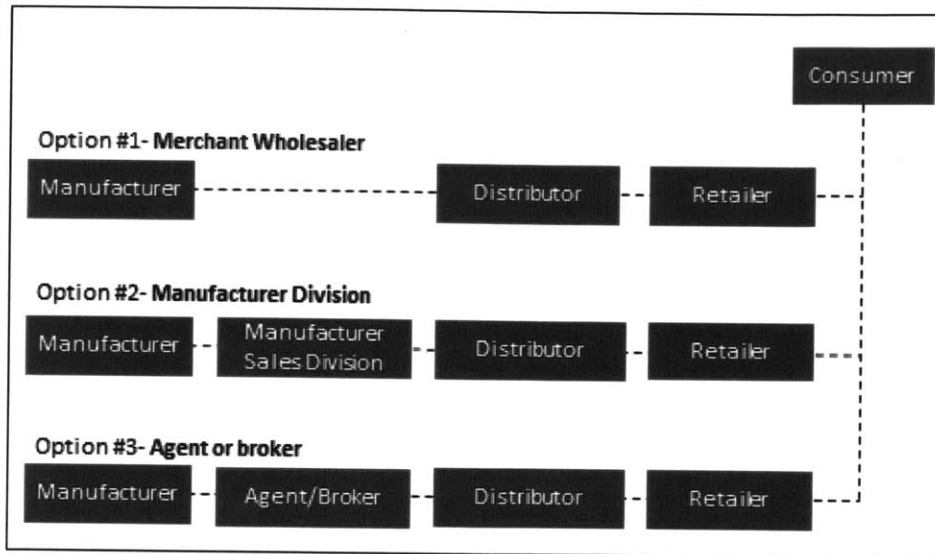
Figure 5 Types of distribution systems for the indirect import process

The distributor has the unique advantage of accomplishing economies of scale by buying goods in bulk directly from the manufacturer. This also means that the distributor bears the risk of overstocking and being stuck with too much inventory or the risk of obsolescence if new product hits the market. An additional advantage to the retailer is that the same intermediary supplies different goods. This means that the **diversity** of offerings in addition to procuring them from the same intermediary saves the retailer from having to buy the items separately from many different manufacturers if directly imported. Furthermore, some intermediaries offer the goods to the retailer on credit purchases as well and this provides a means to obtain goods until sale.

Advantages of purchasing domestically to the retailer

Some of the distributor advantages to the retailer include but are not limited to:

- Bearing the risk of buying inventory in bulk- The risk of overstocking or obsolescence is carried mostly by the distributor.

- Financing through offering many goods for sale at a credit, requiring no capital by the retailer- Many retailers are too small to pay upfront for goods and this a great advantage rather than taking out loans at high interest rates. The ability to purchase goods with flexibility on MOQ (Minimum

order quantity)-The retailer is not required to conform to high MOQs required by imports and has some flexibility on MOQ requirements domestically.

- Storage of the goods until sale to the retailer-The retailer can avoid storage costs associated with buying larger quantities and can buy as needed more frequently for just in time demand.

- Promotions of the goods that are for sale. Many distributors promote and market items that they sell making it easier for the retailers to sell the goods.

- Diversity in the offerings available to the retailers- Because the distributor purchases many goods internationally, the retailer has access to a wider variety of items vs. sourcing the items from different vendors internationally

- Market Information- Information about pricing, new products, market trends, consumer trends, competition. Distributors may have some of the latest market information about goods and provide these to the retailer vs. the retailer having to find this information on their own.

- Accounting and inventory managing advice, store management advice- Some distributors provide management of retailers' inventory as opposed to retailers managing themselves. Because of more experience, they know the best time to replenish and use sophisticated technologies to make these decisions.

In the scenario described above, the intermediary is a third party that is independent from the manufacturer and not affiliated with the manufacturer except for the purpose of buying goods from the manufacturer to sell. In some cases this intermediary makes an exclusive buying contract with the manufacturer to be the only intermediary in the US to sell specific goods. In other cases, the manufacturer will make contracts with other distributors to also sell the same goods. In this scenario, different intermediaries will offer different prices to retailers, so the retailer can have a choice in which distributor to purchase goods from.

In the second option –manufacturer division, many of the goods that are sold in the US, originate from international manufacturers who also have a distributor in the US; that is a child of the parent

manufacturer. In other words, LEGO is the manufacturer of LEGO products in China. However in the US LEGO will set up a distributor's warehouse or another division of LEGO, where they will also sell the LEGO items to retailers in the US. In this case the child distributor has more of an opportunity to increase their marginal profit because there is no markup for the movement between the parent and child distributor as it stays within the same company but moves to a different division downstream.

In the first option, the intermediary has to negotiate for a best price from the manufacturer in the US in order to make a profit after he sells the goods to the retailer in the US. In the second option, the child distributor does not experience a markup from the manufacturer. This does not preclude the retailer's transaction from a markup similar to the first scenario or result in cheaper goods to the retailer. The distributor in this case has the opportunity to also charge a markup making more profit than the merchant distributor.

The third type of intermediary is a broker that works with the manufacturer to sell goods in the US to another intermediary such as a distributor. These act on behalf of the manufacturer, but unlike the first option, they never own title to the goods that are part of the transaction of sale. They receive a commission from the distributor for being able to negotiate a good price of the goods with the manufacturer.

3.12 Logistics to deliver goods in the US

The logistics system for the goods to be delivered to the retailer involves another level of complication. In some cases, the retailer may desire for the distributor to deliver the goods to the retailer's warehouse. This is because the retailer may not have access to carriers or trucks or the overhead needed to factor carriers or a delivery system into their supply chain. Another reason may be that the volume of trucks needed for distribution is low, and it may be more expensive for the retailer to schedule trucks than to have to pay a higher price for a lower volume of trucks.

It is therefore cheaper for the retailer to factor the price of delivery into the cost of the goods. This will

depend on factors such as how far the goods need to be delivered as well. Therefore different retailers may have a different cost of the goods from the same distributor.

The second method is for the retailer to negotiate the lowest possible cost of the goods with the distributor and then organize their own transportation method to have the goods delivered to the site where they will be sold. Many companies that choose this method don't have their own network of trucks so they are still dependent on the costs of trucks from other companies. These truck/carrier companies typically have a contract with the retailer to provide a set number of trucks for different periods of the year. The issue with this for the retailer is that delays at the retailer's site sometimes causes the trucks to sit for hours for goods to be unloaded which drives up the total cost. Another issue is that at certain times of the year, for example peak periods during the Black Friday shopping period or during Christmas, the retailer may need extra trucks due to deviations from the forecast. At this time, many truck companies are overbooked and trucks may not be available. This means that the retailer will now have to pay a premium price to get transportation for the goods to be delivered in time to fulfill customer orders. These overages in cost may make it better for the retailer to use the distributor's trucks and have the distributor incur costs if the goods do not arrive on time or pay the distributor if the trucks are held up at the retailer's site. Whereas this may seem like a better option, this does not mean that the distributor will not also encounter challenges in the on time delivery of goods. Assessing a charge to the distributor for late deliveries still causes the retailer an inconvenience by not being able to have the goods needed for the customer and therefore incur stock out costs and customer dissatisfaction.

3.13 Lead time and Item Tracking Visibility

Another advantage of buying goods in the US is the lead time it takes to obtain the goods. An imported good can take over 35 days from the time of order to deliver at the retailer's warehouse in the US. However typically if a good is ordered in the US the distributor receives the order and starts processing the order immediately because the inventory is readily available. The average time it takes the goods to arrive to the retailer's store is usually one to two weeks and then the order is complete. There are many

technological systems in place between US distributors and retailers to track goods that are being delivered. During the time of transit from the distributor to the retailer, the retailer may have the advantage of easy tracking and visibility of the goods as they are in transit by being able to gain ready access to the trucks that contain the goods. In order to decrease lead time, some suppliers use DC Bypass.

3.14 Cancellations and returns

Another advantage of buying from a US retailer is the fact that distributors in the US may allow ease of cancelling orders that are placed. Because the time period from order to delivery is so short, if the retailer cancels an order they may not inconvenience the distributor within a certain window and the retailer may be able to cancel the order at no cost. Additionally the return of defective goods to the distributor may also be easier, whereas if the retailer receives defective goods from directly importing overseas, it is impossible to return the goods. Additionally depending on the defective quantity, the retailer may have to wait for another batch of imports to arrive, before it can fulfill any orders made by customers. Overall, buying the goods from the distributor in the US, may give a retailer an added level of convenience over direct imports.

3.15 Summary: Direct imports compared to domestic procurement

Table 2 shows the main difference between the direct and indirect imports (domestic) process. The next chapter will examine Wal-Mart and its advantages for imports in retail.

Category	Direct Imports	Indirect imports
Costs	Lower cost of goods	Higher Cost of goods (Price discrimination ok)
	Complex cost modeling structure involving many different components	Straight-forward costing structure
	High inventory holding costs from receipt to sale	Lower inventory holding costs from receipt to sale
	Foreign exchange conversion costs	No foreign exchange conversion costs
Order quantities	Higher volume orders, involving vendor set MOQs	Higher flexibility on order quantities
Time considerations	Longer Lead times (35 days)	Shorter Lead times (7-14 days)
	Unforeseeable delays affecting customer	Less opportunities for delays
Supply chain structure	Complex supply chain and low visibility of goods	Relatively straightforward supply chain structure and easy tracking of orders
	Cancellations and returns unlikely	Cancellations and returns easier due to domestic location
Diversity of goods	Need to purchase various SKUs directly from each supplier	Access to more diverse items with a single distributor

Table 2 Summary: Direct Imports compared to domestic procurement

Chapter 4 Case Study: Wal-Mart: How do other companies make import decisions?

4.1 Wal-Mart's positioning in the retail sector

According to the Fortune Global List 2012 Wal-Mart is the largest retailer in the world. Wal-Mart is also the biggest importer of retail goods in the US. In 2010, approximately 15% of overall US imports from China, went to Wal-Mart (Basker 2008). In 2011, Wal-Mart imported 710, 000 TEUs of goods for sale in the US (18) compared with retail chain Target in second place at 472 000 TEUs. Wal-Mart's revenue for the year 2011 was 4.47 billion (18) while Target was approximately 7 times less at 70.4 billion. Wal-Mart has 8500 stores in 15 countries (19), with approximately 4200 stores in the United States. Wal-Mart extends its dominance in the retail sector in its ecommerce business, WalMart.com which provides another convenience of a one stop shopping medium for consumers via the internet. As of 2011, Wal-Mart carried about 142,000 unique SKUs or individual items in its supercenters (20). The 2011 top 15 US importers, their import volumes and revenue are shown in Figure 6.

Rank	JOC Top 100 Importers	Import TEUs in 2011	Sector	2011 Revenue ($Millions)
1	Wal-Mart Stores	710,000	Retail	446,950
2	Target	472,400	Retail	69,865
3	Home Depot	296,800	Retail	70,395
4	Lowe's	228,000	Retail	50,208
5	Dole Food	223,000	Diversified	7,224
6	Sears Holding	207,700	Retail	41,567
7	Heineken USA	129,000	Beverages	17,123 (Euros)
8	Philips Electronics North America	127,200	Electronics	266,000 (Euros)
9	LG Group	120,000	Conglomerate	-
10	Chiquita Brands International	117,500	Food	3,139
11	IKEA International	101,200	Retail	Private
12	Samsung America	96,100	Conglomerate	-
13	J.C. Penney	89,900	Retail	17,260
14	Jarden	85,600	Outdoor & Home Goods	6,680
15	Costco Wholesale	83,000	Retail	88,915

Figure 6 Top US Importers for 2011 (18)

Ted Fishman (21) talks about the rise of the next superpower and the challenges it creates for America and the world. Fishman approximates that over 70% of the merchandise sold in Wal-Mart stores comes from China. As he puts it"…there's a Chinese component in virtually every aisle you walk there in Wal-

Mart and Wal-Mart is the conduit for all of the output of the Chinese economy directly into American lives."

Wal-Mart defends its high import volume to its ability to follow its business model of offering the lowest prices for its consumers by "selling for less". In order to accomplish this, Wal-Mart relies on these inexpensive products that come out of China vs. higher priced items that are available and made in the US. Consumers are definitely eager to shop for less in the US and despite the growing criticism of Wal-Mart and its aggressive imports program, approximately 100M customers shop at Wal-Mart each week and about $36M is spent at Wal-Mart every hour. In addition, the amount per every US dollar spent at Wal-Mart is 8 cents (22).

How has Wal-Mart accomplished this? According to an article on PBS Frontline on the global impact of Wal-Mart, "Wal-Mart's power and influence are awesome," Smith says. "By figuring out how to exploit two powerful forces that converged in the 1990s--the rise of information and the explosion of the global economy--Wal-Mart has dramatically changed the balance of power in the world of business. Retailers are now more powerful than manufacturers, and they are forcing the decision to move production offshore." (23). The growth of Wal-Mart has definitely impacted the global economy and today also impacts how other competing retailers and customers can source goods by importing. Wal-Mart's prowess in supply chain technology and the sheer volume that it imports, gives it a huge advantage over any of its other competitors causing it to dominate in its execution of importing.

4.2 How Wal-Mart dominates imports- Information Technology and Volume

The infusion of technology in Wal-Mart's supply chain is definitely a factor in its efficiency. The founder of Wal-Mart, Sam Walton puts this sentiment in his own words: People think we got big by putting big stores in small towns. Really, we got big by replacing inventory with information." (24) The following sections will provide information on the history of logistics at Wal-Mart, which supports its import system.

4.3 Wal-Mart and the evolution of its supply chain- Logistics

In the early 1970s, Wal-Mart became one of the first retailing companies in the world to centralize its distribution system, pioneering the retail **hub-and-spoke** system (25). A hub and spoke system is one in which all the goods are received in bulk and assembled and located in a central distribution point or warehouse. This warehouse is the called the 'hub'. From here the goods are then sent out through a network of routes to retailers in different stores (spokes) when orders are received. The advantages of this type of system is that Wal-Mart increased its efficiency by developing and optimizing an infrastructure and logistics system in house at its hub and this increased its capability of processing the goods in a way that provided huge cost savings for the company.

There are studies which show that logistics cost between 10 and 35 percent of companies gross revenues (25, 26) and that 60% of this cost is used for transporting goods. A study conducted by PRTM also found that companies which are considered to be best practice organizations in moving product to market, have as much as 45% supply chain cost advantage over their median competitors. (25, 26)

4.4 The evolution of IT in the Wal-Mart Supply Chain

Wal-Mart has also been renowned for its IT systems. In the early 70s Wal-Mart leased computer systems from IBM in order to install electronic registers to track POS (point of sale) entries to keep an accurate record of its inventory (27). The IT capability was bolstered in 1977 by a computer network known as EDI (Electronic Data Interchange) procurement, a system which connected Wal-Mart to its suppliers. **EDI** enabled the suppliers to download purchase orders as well as store-to-store sales information relating to products that were sold. As the information for products sold were received by the suppliers, they estimated how much replenishment was needed by Wal-Mart and therefore they shipped new product to Wal-Mart distribution centers to restock diminishing inventory by being able to get access to EDI data. Wal-Mart increased the competency of its supply chain infrastructure by tracking inventory with the barcode system for scanning POS data in 1983 (27) which also enabled customers to have a fast and accurate checkout. In the late 80s Wal-Mart installed one of the largest satellite communication systems

in the United States. The system linked all operating units of the company and its headquarters with two way voice, data and one way video communication.

Wal-Mart also began using a system known as cross-docking in the late 1980s. Cross-docking is a logistics method of unloading materials from an incoming semi-trailer truck or railroad car and loading these materials directly into outbound trucks, trailers, or rail cars, with little or no storage in between. This may be done to change type of conveyance, to sort material intended for different destinations, or to combine material from different origins into transport vehicles (or containers) with the same, or similar destination (28). It definitely lowers inventory holding costs of any goods that are stored before being dispatched for consumer sale.

In the early 90s Wal-Mart further enhanced its IT capability with use of the internet as an application platform and introduced Retail Link (27). Retail link provided vendors with real time information on sale trends and inventory levels (27). The Wal-Mart website describes Retail Link as a decision support system and a bridge between Wal-Mart and its suppliers. It allows suppliers to retrieve sales data for any of its items and also allows then to monitor the inventory of these items.

Wal-Mart also started using RFID (Radio Frequency Identification) technology in the early 2000s. RFID is the use of a wireless non-contact system that uses radio frequency electromagnetic fields to transfer data from a tag attached to an object for the purposes of automatic identification and tracking (29). The technology was intended to provide fast track of inventory due to its wireless capability. Unlike a bar code where the scanner needed to be close to the item, RFID allows an item to be several feet away from its reading device. Wal-Mart implemented this technology with the intention of making its supply chain more efficient. However the advantage of the technology for business applications by Wal-Mart is still being challenged.

4.5 Transportation- Wal-Mart's Distribution System

Wal-Mart distribution system is unparalleled by any other retailer in the industry. It has a fast and extremely responsive transportation system. Jay Fitzsimons, Wal-Mart senior vice president and treasurer

says, "The misconception is that we are in the retail business, but in reality we are in the distribution business. It'sWal-Mart's job to bring product from the dock to the customer's trunk in as little as 72 hours" (24). Figure 7 shows a model of Wal-Mart's distribution system.
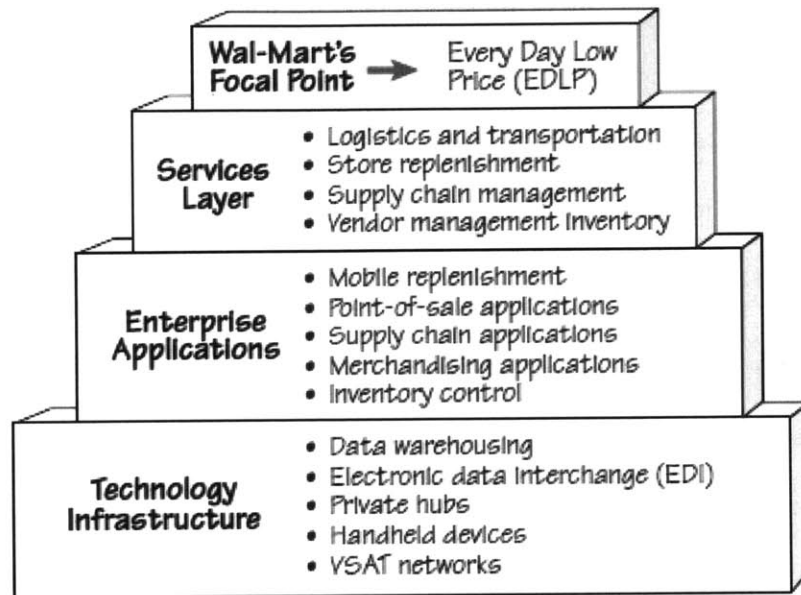
Figure 7 Wal-Mart's Distribution System (30)

Wal-Mart owns a huge majority of its transportation network and has over 7000 drivers (3). The company also has over 6500 trucks that pick up goods directly from warehouses and also 50 000 trailers, reducing the need for intermediaries (31). Since 2007 the Wal-Mart fleet has delivered **361 million more cases** while driving **287 million fewer miles** and Wal-Mart has announced plans to double its efficiency by 2015(3). Wal-Mart also invests extensively in hiring and training their staff to do the best at their jobs, further increasing their efficiency and lowering costs.

As far as emerging technologies, Wal-Mart in partnership with truck and component manufacturers, has already built a number of prototype tractors, including hybrid assist, wheel-end hybrid assist, full propulsion hybrid, and natural gas, with the goal of learning from testing in a real-life environment to improve the technology and further optimize its supply chain(3).

Imports-Wal-Mart and ocean containers

Wal-Mart receives most of its consumer goods in the US by imports and it capitalizes on volume in addition to its supply chain capability. The latest ship that Wal-Mart ships product on is the Emma Maersk (Figure 8) which is also one of the biggest container vessels in the world. This ship move goods from China faster and more economically than presently possible with standard merchant vessels.

Figure 8 The Emma Maersk Ship (32)

The cost of the Emma Maersk is approximately $145,000,000 (32). The Emma Maersk can hold up to 15,000 containers or TEUs (32). Given that Wal-Mart shipped 710,000 TEUs in 2011, this is equivalent to shipping approximately 59,100 TEUs a month which can be estimated to 4 trips a month from China to Long Beach California in 2011. The Emma Maersk is a transpacific ship which has a 207' beam and is 1,302' long. It is not designed for the Panama or Suez Canal. The cruise speed of 31 knots means the goods can arrive 4 days before the typical container ship (18-20 knots) on a China-to-California run (32). According to an article in the Bloomberg business week (33), Wal-Mart announced plans to carry out its own freight forwarding services in order to continue to decrease its supply chain costs. It has plans to assume transportation services for a select group of US based suppliers. Their goal by doing this would be to handle supplier deliveries when Wal-Mart's transportation teams feel that they can do the same job for less, most likely having its private fleet take maximum advantage of backhauling opportunities at supplier sites.

4.7 DC Bypass for shorter lead times and lower transportation costs

Wal-Mart and many other companies employ the use of DC Bypass, a technique designed to keep inventory moving. It expedites the time to market by eliminating distribution centers from the shipping process. Whereas a typical supply chain requires multiple handoffs to move product from the international port of origin to the final destination, DC bypass moves products from international manufacturers directly to the door of the retailer or customer. The items that are shipped are deconsolidated at the port of origin before delivery. This method allows companies to eliminate significant transportation costs including labor, cost for damages, cost for errors. It also allows companies to shorten the lead times for transportation while improving order to cash cycles and inventory turns. Because there are fewer legs in the import process, there is also enhanced visibility and tracking of the goods.

4.8 Size of a retail chain as it relates to imports

Basker and Van (2008) present a theory to prove that there is a two way relationship between the size of a dominant retailer and the imports of consumer goods. In their model, the relationship between chain size and imports emerges from an interaction between economies of scale in retailing and economies of scale in the import process. The first source of economies of scale comes from the marketing, which is modeled as a declining marginal cost. Their second source of economies of scale arise due to two input markets, one domestic and one foreign, with a fixed cost associated with purchasing input from the foreign market. Their conclusion is that the chain needs to reach a threshold size before it begins to import. They further elaborate that these factors combine to generate an equilibrium that depends on the chain's technology. Technological improvements increase the chain's optimal size, reducing its marginal input cost; the lower retail price that results in increases in quantity demanded in each of the chain's stores. When the chain becomes sufficiently large it switches from domestic to offshore suppliers. The movement of production overseas further reduces marginal cost, increasing the chain's profit per store and giving it an added incentive to expand.

Furthermore, Basker and Van state that "the relationship between these two scale economies amplifies the effect of trade liberalization on import volume. A lower tariff not only expands imports through the usual effect on price but also causes the retailer to expand the chain. The expanded chain brings imports to more locations and reduces the retailer's marginal cost, causing a further expansion of the market for imports. Accounting for these additional effects due to the chain's expansion more than doubles the effective elasticity of demand for imports relative to standard models that only consider the direct effect of a tariff reduction."

There is a lot of validity to the presentation of these findings and smaller retail companies that try to make the transition to importing may be challenged by choosing which goods to import and also need to meet some MOQ (minimum order quantity) requirements set by suppliers, a constrain in the demand for these items by their customers as well as the added constraint of trying to fill containers with these imported goods in order to maximize on the costs of importing vs. their margins needed for profit. These decisions need to be further supported by technology and accurate calculations of landed costs. This technology is invaluable. Landed costs can easily change depending on the volume of the shipments and the logistics decisions that are made to get the goods to the final destination.

The next chapter will introduce the methodology used to address the retailer with a small imports program.

Chapter 5 Method and Approach

5.1 Initial analysis

To assess the financial benefit of importing, data points for actual landed costs were sourced from a retailer. Approximately 3500 dual sourced SKUs (identical SKUs that were sourced both domestic and imported) representing 7 million units across 16 product categories were compared. For many of these SKUs the result showed that it was better for the retailer to source domestically vs. importing, to avoid loss. Preliminary analysis showed that the total import costs outweighed the equivalent domestic costs. Further analysis, described in the sections that follow, take a closer look at the variables contributing to total landed cost and how they change based on what is being imported. The product categories referred to hereafter in this document are taken as examples of categories from figure 1 in order to make illustrations around the discussion.

5.2 Additional Data collection

In order to understand the impact of landed costs on profit margins of imported vs. domestic goods, a landed cost calculator was designed and built. The calculator was designed by programming in SQL and then feeding data from the SQL program into an excel model. The data that is fed includes the physical dimensions of each item, how many fit into a carton and the weight. The SQL program then extracts data needed to sum up costs for imports and then feeds the data into one location through the excel model. Programming in SQL helps to speed up the computing of the various elements, making it seamless and relatively fast for the end user to get results. In this model, the retailer inputs four variables: item SKU, the quantity to be shipped, the origin port and the final destination in the US. When these inputs are received by the calculator, it will automatically populate the product category of the SKU, how many SKUs fit in a carton, the volume and the weight of each SKU/carton. After the SKUs and quantities are inputted, it will choose a container for the shipment, 20S, 40S, 40H or 45H. It calculates the total Cubic Meter (CBM) and how much the container is being utilized by % as well as the total container weight. The calculator outputs how full a container is and the total cost to ship each item at SKU level. The

transportation $ amount/item changes based on the physical dimensions of the items that are shipped and the quantity of the items that are shipped. The total cost /item also changes based on the type of container selected by the calculator, which is dependent on total quantities.

The data inputted into the calculator was obtained by aggregating all the actual costs for the import process from several sources. These included cost of goods, ordering costs, all transportation costs from the port of origin to the port of destination, duties costs, customs brokerage costs, freight forwarder costs, US transloader costs, bunker fees and other import fees as outlined in Chapter 3. Variable costs such as demurrage, pallets, storage costs and packaging costs were not added to the landed cost model but could be added if desired.

In summary the total landed cost is therefore:

TOTAL COST= COGS + Ordering Costs+ Transportation + Customs + Duties + Fees/Container + Inventory holding costs

5.3 Ordering method and inventory holding costs

As part of the analysis performed after the total landed costs are calculated, inventory holding costs are also factored in to get the true landed costs of the goods. The ordering method assumed in the shipping of imported goods was that goods would be shipped on a periodic basis using the Periodic Order Quantity Method (POQ). The method is to use an order quantity based on using the average demand rate $\bar{D}$. The period used to calculate the average demand rate in this analysis is based on a replenishment period of 3 months consecutively occurring in a 12 month period, not including lead time. The EOQ (economic order quantity) is expressed as a time supply using $\bar{D}$(Silver, Pyke, Peterson), namely

$$\text{Demand } \bar{D} = \frac{EOQ}{T_{EOQ}}$$

where T_{EOQ} is the number of periods and replenishments are made large enough to cover this number of periods. This method assumes that the forecast changes for every 3 month period. The advantage of this approach is that arrivals to the retailer's warehouse will be regular even though order quantities will be different from order to order (34). In addition, for many retail goods, demand varies throughout the year

which makes this method even more appropriate. For example, for toys, the demand in the peak months September to December is higher and using the POQ method is more accurate as demand in this period can be adjusted. Contrasted with a method such as FOQ (fixed order quantity method), dividing demand equally throughout the year, causes higher than expected inventory costs earlier in the year, and also means that goods sit in warehouses for a longer time before being sold. Allowing for an adjusted forecast to be implemented, allows the imminent decision for the demand or a rolling schedule to be implemented and an import program to be strategized around this.

Imports- Inventory Holding Cost Calculations

The cost of capital associated with goods is assumed to be 0.3$/$/year.

For example for 152 items which cost $13.00 each, the total holding cost for 3 months is:

152 items-month * $13/ item*.30$/ $/12months *3 months = **$148.20**

Therefore, for each item in a 3 month period, the inventory holding cost = **$.975**

Domestic Goods- Inventory Holding Costs

For domestic goods as mentioned in Chapter 4, items can be ordered every 2 weeks. The analysis assumes that the holding costs associated with these goods are close to being negligible as just enough quantity is bought to meet the demand. For conservative estimates though, the holding period before sale for all inventory purchased is assumed to be 1 month. As in the calculation shown above, the same quantity of items purchased domestically will have a holding cost of:

152 items-month * $13.00/ item*.30$/ $/12month *1 months = **$49.40**

For each item that is purchased domestically, the holding cost is approximately **$.33**

Using these assumptions for both domestic and imported goods, the holding costs of goods purchased were factored into the total landed cost of the goods.

The calculator included goods from various product categories to understand the impact of total landed costs for imports across diverse items and to ascertain whether there was any correlation of profit margin to specific characteristics of the goods that were imported. In addition to finding the total landed costs, variability of volume was factored in by integrating the size of items into the landed cost calculator and

simulating the filling of containers. In a fuller container, the total landed cost per item is less as the items bear the cost of transporting the container. If a container is less than full then the total shipping cost for each item is costlier as the cost of shipping the items surpasses the container shipping costs. The calculator accounts for the cost of transporting each item based on how full the container is loaded. Consolidation of orders can fill containers, lower transportation costs, lowering the total landed cost per item. As the container becomes fuller, the cost to import each item decreases, however the quantity must increase in order to fill a container. This is where the **tradeoff** in the import process occurs. Even though more volume can mean a lower landed cost for each good, it also means higher risk in terms of having too much inventory and risking markdowns or obsolescence. Too much inventory also means higher holding costs over a longer period of time as the goods sit in warehouses waiting to be sold. Data for domestic costs were also gathered from the same source used to collect import costs. The calculator will provide information which will address the question of whether for lower volume and hence smaller retail businesses, there are certain types of goods that are better to import over others for better profit margins. The output of the calculator and analysis around the total landed costs is used to determine what the characteristics of these goods are.

Shipment Summary

Total Quantity
300

Revised Quantity
306

Total Cartons
17

Total Volume (cbm)
39.58

Container size
40S

Utilization
60%

Weight (lbs)
38,495

Within weight limit?
TRUE

DUTY

Figure 9 Landed Cost Calculator Summary

5.3 Model- Landed Cost Calculator

The summary of the output of the calculator is shown in Figure 9. The calculator sums the total quantity of items to be shipped. If the quantity to be shipped is indivisible by the number of items/carton, the quantity is revised to match the amount that can be shipped per carton in the cell "Revised Quantity". The calculator shows the total cartons to be shipped. The total volume shows the total cbm included in the shipment. After the total volume is calculated, the calculator, which has the maximum capacity for each type of container, chooses a container based on the volume that can be shipped in the container. For the example in the summary shipment

Figure 9, the utilization for the container is displayed. Companies have different utilization goals for containers and seldom use 100% of container volume due to packing constraints. For this container, the utilization is 60%. This means that the container still has 40% of free space to its maximum capacity. It also gives the weight of the container based on the total amount of items that are in the container and displays whether the container is overweight or not. If the container is within the weight limit it will display as "TRUE", if it is overweight the calculator will display as "FALSE". The retailer can then choose different items that will allow the container to be within the weight limit that is allowed. A final category, duties, shows the duty amount per item and adds this to the shipping amount of the item to get the total transportation costs.

5.4 User Interface of calculator

The calculator needs four user inputs: SKU, quantity to be shipped, origin port and destination port. The calculator has a pull down menu (Appendix 3) that allows the user to select any port of origin. Based on the port chosen, the calculator adjusts the rate to ship a 20S, 40S, 40H and 45H container by aggregating different costs which are housed in the calculator. Additional types of containers such as reefers can be easily added to the container. The costs are taken from set market rates for items such as processing and harbor maintenance fees, bill of lading fees, the rates for the carrier and are housed in the calculator. These rates can be inputted based on a contract that a retailer signs with specific carriers. The yellow areas shown in Appendix 3 are where the user inputs information for each item. The user then inputs the SKU to be shipped, the quantity and the destination location and then the calculator automatically calculates the details of the shipment at SKU Level. The inputs are in yellow and the outputs are in green. The advantage of this tool is that the retailer has minimal inputs which give results with no time lag.

ASIN	QUANTITY	Revised Qty	Qty per Carton	Cartons	IS PROXY Carton	IS_SORTABLE	UNIT Volume	20S	40S	40H
B....	300	306	18	17	N	N	0.1293	$ -	$ 15.49	$ -
		-	-	-			-	$ -	$ -	$ -
		-	-	-	-	-	-	$ -	$ -	$ -
		-	-	-	-	-	-	$ -	$ -	$ -
		-	-	-	-	-	-	$ -	$ -	$ -

Figure 10 Calculator Output: Import cost/SKU with low utilization

The calculator works as shown in Figure 10. When 300 of the items are shipped, the calculator puts the goods in a 40S container, this results in 60% utilization at a cost of **$15.49** per SKU. If the quantity is increased to 400, this drops to **$11.45** per unit as shown in Figure 11 and the container is now 81% utilized. This leads to a shipping cost savings of **$4.04** per unit with a higher quantity, hence higher utilization and lower costs/item.

ASIN	QUANTITY	Revised Qty	Qty per Carton	Cartons	IS PROXY Carton	IS_SORTABLE	UNIT Volume	20S	40S	40H
B	400	414	18	23	N	N	0.1293	$ -	$ 11.45	$ -
		-	-	-		-	-	$ -	$ -	$ -
		-	-	-	-	-	-	$ -	$ -	$ -
		-	-	-	-	-	-	$ -	$ -	$ -
		-	-	-	-	-	-	$ -	$ -	$ -

Figure 11 Calculator Output: Import costs/ SKU with higher utilization

The calculator can also calculate the shipping cost for goods from different product categories as shown in figure 12 (first column showing sports, home, baby products, toys) and take multiple inputs at the same time. With multiple inputs, the calculator will factor in the size of each item, the quantity to be shipped and calculate transportation costs according to other items in the container. The last column, labeled "40H", shows how much it costs to ship each item.

GL desc	ASIN	QUANTITY	Revised Quantity	Qty per Carton	Cartons	IS PROXY Carton	IS_SORTABLE	UNIT Volume	20S	40S	40H
gl_sports		1000	1,002	6	167	N	N	0.0082	$ -	$ -	$ 0.46
gl_home		600	100	6	100	N	Y	0.0082	$ -	$ -	$ 0.46
gl_sports		800	200	4	200	N	Y	0.0079	$ -	$ -	$ 0.45
gl_baby_product		1000	500	2	500	N	N	0.0079	$ -	$ -	$ 0.45
gl_sports		1200	1,200	1	1,200	N	N	0.0079	$ -	$ -	$ 0.45
gl_toy		1200	400	3	400	N	Y	0.0079	$ -	$ -	$ 0.45
gl_toy		1400	350	4	350	N	Y	0.0079	$ -	$ -	$ 0.45
gl_toy		900	150	6	150	N	Y	0.0026	$ -	$ -	$ 0.15
gl_toy		300	38	8	38	N	Y	0.0026	$ -	$ -	$ 0.15

Figure 12 Landed Cost calculator with multiple product categories

5.5 Landed cost calculator for planning purposes

The calculator can help in the planning of shipments. If a retailer has a given yearly forecast, they can estimate how many containers will be needed by the volume of units purchased and the total costs for transportation. This can be used to negotiate contracts and plan ahead of time for logistics of receiving containers or overhead needed to unload containers. The calculator can also be used to negotiate better

COGS if the total landed cost calculated does not create a profitable or sufficient margin for the retailer or if the calculator shows that purchasing domestic goods is more profitable than purchasing imported goods. It will also help the retail teams to understand how to optimize freight costs by closing in on the margin between COGS, transportation by ordering efficiently and further optimizing on POQ methods. Current landed cost models output decisions about whether to import or not but don't involve how importing can be done efficiently to increase margins for example, by utilization of containers. For any new items that have never been imported, the calculator will give an estimate of how much that SKU will cost to transport from a specific port to a destination in the US.

Validation of the model

To determine whether the calculator accurately calculated cbm volume based on the SKU inputs, actual import container loads were obtained along with the SKUs that were shipped. The SKUs in these shipments were inputted into the landed cost model to compare the total volume of cbm with the actual reported supplier volume that was shipped in order to determine the accuracy of the calculator. The model compared with actual import container loads is found to be **92-97%** accurate when calculating cbm shipped compared to the actual total container cbm loads computed by the supplier.

5.6 Analysis Methods using Outputs of calculator

The previous section illustrated the design and development of a landed cost model and how this model was built by aggregating all the costs of the import process to get total landed costs. The model was further enhanced by incorporating container utilization to estimate total landed costs. The retailer can input the SKU, quantity, origin and destination location and easily get $/item cost to ship the imported unit. The purpose of the model was to quickly aggregate landed costs to determine whether it is better to source the item by importing than to source the item domestically. But why do some items show up as better to import vs. other items that show up as better to source domestically? Does the retailer understand the outputs and which variables are driving them in order to create a better import strategy? What are the

characteristics of the goods that are better to source domestically and what are the characteristics of the goods that are better to import?

This section will look at some analysis around the landed cost calculator outputs. It will then use various methods to analyze the results of the outputs and look for characteristics of good import candidates vs. good domestic candidates for the small retailer.

A subset of toys from the SKUs in section 5.1 with known yearly demand were entered into the calculator to find out the full landed costs of shipping the items by importing vs. sourcing the same item domestically. The specific variables examined were, Volume of item, COGS of imported item, COGS of domestic item, Delta domestic to import COGS as a %, Inventory holding cost of imported item, Inventory holding cost of domestic item, Transportation cost of domestic item in 53' container, Transportation cost of imported item in 20S, 40S, 40H and 45H containers and yearly demand for each item. The purpose of using different sized import containers was to evaluate how decisions between sourcing domestically and sourcing by importing change based on more volume. The results are illustrated in Figure 13.
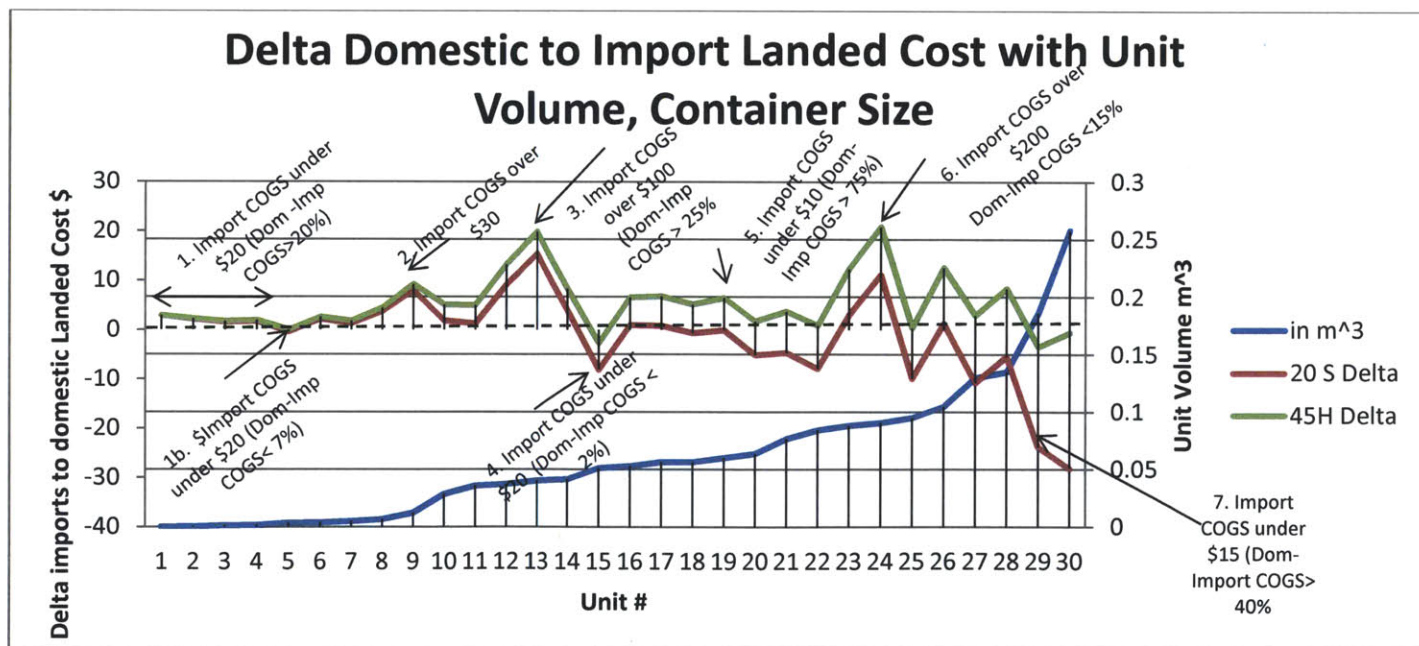
Figure 13 Landed Costs- Domestic to Import Delta

Figure 13 shows many interesting trends as a result of the analysis and will be discussed by highlighting

the behavior of points 1-7. The axis on the left shows the delta between total domestic landed and import

costs in $. Above the point $0 it is better to import an item than to source it domestically. Below the

point $0 it is better to source an item domestically. The green line represents this delta for a 45H container

while the red line represents this delta for a 20S container. One trend that is clearly visible is that as the

container size increases, therefore higher capacity there are more items above the $0 delta line where the

decision to import is better than the decision to source domestically. This trend was discussed in Chapter

3 under container pricing. A retailer that has substantially more volume can ship in larger containers vs.

smaller retailers that ship in 20S containers at higher cost due to volume constraints. The axis to the right

represents the unit size per item in m^3. The chart is organized so that the unit with the smallest size is to

the left, while the unit with the largest size is to the right. How does the size of the item affect whether the

delta axis is above or below the $0 point? i.e. whether to source goods by importing or whether to source

domestically? The chart shows that as the size of the item increases, the delta between domestic and

imported goods increasingly trends downward further to the right. A quick conclusion would be to

assume that volume is the only variable that affects the decision between import and domestic goods but

this is not the case. A closer look will more thoroughly explain this trend. In addition to the volume is the

COGS of the imported item and also the delta between the COGS of domestic vs. imported item. The

delta % between the import and domestic COGS is variable. This delta is negotiated by the retailer based

on landed cost estimates or other tools that the retailer may use and is one of the most critical points in the

decision of whether to import or not. This will be explained further below using examples.

Point 1 on the graph shows a region of items that are very small in physical size and have an import

COGS of less than $20. The graph shows that these items are more profitable to import even when

shipped in 20S containers. As the container size changes from 20S to 45H the delta changes only by a few

pennies. A possible hypothesis is that item is so small that the total transportation costs of these items

(which are pennies) is close to being negligible therefore the delta between domestic and import COGS (

>$1 in all cases) always supersedes the cost of transportation, making it a better option to import based

solely on total cost. **Point 1b** shows a small dip and a closer push towards the zero line. For this item, even though slightly bigger in size, the delta between domestic and import COGS is very low at under 10%. For the units in point 1, this delta is above 20%. In this case the close gap between the import and domestic COGS makes it less desirable to import when aggregated with transportation and other costs. For this item better import COGS can be negotiated with the supplier. If the supplier does not want to negotiate for better COGS, a decision can be made to source this item domestically until the retailer has more import volume in order to drive total costs down. Also with extremely small sized items, even though the total landed cost shows that it reasonable to import these items, the issue is that it takes many units to fill a container. For example, for a unit in point 1, the unit size is 0.00039 m^3. Even though it shows that it is better to import based on the delta of import vs. domestic goods, it takes 67,000 units to fill a 20S container and 175,000 units to fill a 45H container. Importing this many units is constrained by yearly demand which may not be as high as 67,000 for a small retailer. In contrast, there are items available where 500 units can fill an entire container however the total landed cost may not show imports as favorable due to other variables. A sensitivity analysis performed later in this section shows the weight of variables on the total landed cost of the items used in this analysis. **Point 2** shows a peak in the graph. At this point the cost of the imported good is $30. This good has a higher COGS, small size and roughly the same delta domestic to import COGS % compared to all items to the left (Point 1 region). For example if the retailer agrees to give a 30% delta difference for an import unit with COGS of $20 and $30, 30% of $20 is **$6.67** whereas 30% of $30 is **$10**. The item with the higher COGS gets a bigger $ delta of domestic to import COGS because the cost of that good is higher. For this reason, the item becomes more desirable to import as the higher cost combined with the delta % domestic to import COGS allows it move further north of the delta $0 line. In summary, the transportation costs are still negligible, size is still small but the delta domestic to import COGS % yields a higher $ delta.

Point 3 shows another data point that is farther away from the $0 delta line. As shown in the previous section, the cost of the good plays a part in whether an item should be imported or not. For this item, the

cost of the good is very high at over $100 and it shows that the delta COGS to import COGS is 20% or more. 20% of $100 is a $20 delta. This looks highly promising but still does not mean that the item is a perfect candidate to import. An item that has COGS of over $100 is a more risky item because markdowns can mean that this item can drop significantly in price range or liquidations will cause a new lower price (e.g. $60) to consume more than the delta of $20. The volume is however relatively reasonable as it takes 650 units to fill a 20S container and less than 2000 to fill a 45H container. The cost is high only relative to the other cost of goods in this analysis. For some retailers the cost range of the goods may be much higher for example cost of goods may range from $100 -$1000, making a low cost good one that is $100. Even then, the same considerations apply.

Point 4 is an item where the import COGS is more than $10 but less than $20. It also has a relatively reasonable size where 525 units fill a 20S container and 1350 units fill a 45H container. However the total outcome shows that the item is better to source domestically regardless of the size of the container. It is slightly better with a 45H container but not enough to make the decision to import. The reason for this is that the delta between domestic and import COGS for this particular item is very low at less than 5%. This could have been an item where the supplier was not able to negotiate for a lower import COGS due to specific reasons. The vendor may prefer to sell this item domestically or there may be other variables which are unknown. This example shows that even with a higher $COGS the delta domestic to import COGS% still needs to be high enough to cover all the other costs of the import process.

Point 5 further reinforces this hypothesis. The item in this case is less than $10 but still shows promise in terms of importing over domestic. A closer look shows that the delta % between import and domestic COGS is > 60% so this delta covers a great amount of the transportation costs of the good, making it better to import than to source domestically. This shows that the higher delta to import COGS that the retailer can negotiate, the better that the item will be to import.

Point 6 shows an interesting trend. This item has an import COGS of over $200, however the delta domestic to import % is almost the same level as point 3, the item with an import COGS close to $100.

For point 3 the delta is approximately $20 whereas for point 6 the delta is around the same amount. Point 6 has a lower delta domestic to import COGS at less than 15% which is approximately $20 dollars, almost the same as point 3. In this case the bigger size of the item prevents it from having a higher delta even with a higher cost. Approximately only 250 fit in a 20S container and only 650 fit in a 45H container. Because of this, both items have the same delta domestic to imports difference. Which item is better to import, point 3 or point 6? This will depend on many other variables including the demand. If the demand is the same for both, the retailer may choose the cheaper item given that the profit margin opportunity is the same in terms of dollars. The more expensive item may take a large $ hit for markdowns, therefore the cheaper item may be more desirable to import. If the demand is more certain for the item that is $200, the retailer may take the risk of buying more of the $200 item knowing that sales are guaranteed and the delta domestic to import landed cost is constant.

The final **point #7** shows an item that is less than $20 for import cogs and the output shows that the item should be purchased domestically. The delta domestic to import COGS is over 40% however the item is not a good option to import. This is because as the size gets very big, the transportation costs get quite large as well. The large transportation costs combined with low COGS causes the delta domestic to import COGS to be easily superseded, making it better to source domestically. An item of this nature will only benefit from an import program when the retailer has so much volume that the cost of shipping containers greatly decreases. In this case, the transportation costs are so low, that the size of the good doesn't matter and the lower transportation cost can make up for some of the cost due to the large size of the item. This item is .19m^3. Only 140 fit in a 20S container and 365 fit in a 45H container.

This analysis shows that the decision to import or to source domestically depends on many variables and an interaction between these variables. To support the analysis performed in the last section a correlation will first be completed followed by an analysis that takes into account the weight of the costs.

Correlation Analysis

Correlation coefficient to Delta between total domestic and import landed cost				
Volume	Import COGS	Delta COGS	Holding Costs	Transportation
-0.76	0.23	0.32	-0.21	-0.75

Table 3 Correlation coefficient of Delta Domestic to Import Landed Cost variables

Table 3 shows the correlation for the different variables in reference to the delta between total domestic landed costs and total import landed costs. For each variable there is an expected correlation since many of these costs were factored in to the total landed cost. Volume is independent from the calculation of total costs and has a high negative correlation to the delta between domestic and imports costs. This means that as an item becomes larger in physical size, the item becomes better to source domestically.

5.7 Sensitivity and weight of different costs factored into import decision

Given an import COGS from the supplier and the domestic COGS, the retailer can only benefit from an import program if there is room left in this delta when all the import costs are taken into consideration. The retailer must therefore understand, for different items which of the costs are holding the most weight. After all landed costs are obtained, an analysis will show which costs are taking up most of the delta between domestic and import COGS and therefore this will give the retailer sufficient information to make decisions about whether the costs can be improved or not. The considerations of these weights were completed as follows:

The gap between import and domestic cogs is assumed to be X. The different legs of cost are therefore taken as a fraction of this gap as % of X. The X value is 1 as shown by the shaded region in Table 4. If all the costs add up to be less than 1, it means that the retailer can import this good with a gap to the equivalent cost of sourcing the same good domestically. If all of the costs add up to be over 1, then the retailer is losing by importing. The last column "Room for profit over 1" shows the gap to 1 that

represents the opportunity for profit. The retailer can then observe which of the costs are taking up the largest fraction of the delta and determine why. The items are arranged in ascending order of size so that the retailer can see how size affects these decisions. The smallest item in the data set is X (second column) and all the subsequent items are relative to this X; for example 2X means that the item has twice the volume of X. The third column "20S capacity" shows how many items fill a 20S container. The import COGS is shown in the next column as a multiple of a number Y which is a random constant.

Item #	Size	20S capacity	Imp COGS	Dom-Imp COGS	Import Inventory Cost	Transportation	Trans/Inv	Room for profit /1
					Sensitivity of Costs			
1	X	67000	$2.43Y	1	0.18	0.02	0.10	0.81
2	2X	50000	$1.25Y	1	0.12	0.03	0.23	0.86
3	4X	19000	$1Y	1	0.12	0.10	0.87	0.78
4	5X	16500	$1.10Y	1	0.12	0.10	0.86	0.78
5	10X	7500	$1.6Y	1	0.77	0.90	1.16	-0.67
6	10X	6900	$1.52Y	1	0.12	0.18	1.55	0.70
7	14X	5200	$1.75Y	1	0.18	0.30	1.69	0.52
8	18X	4000	$2.09 Y	1	0.09	0.19	2.06	0.72
9	32X	2200	$5.36Y	1	0.12	0.16	1.39	0.72
10	73X	900	$3.49Y	1	0.12	0.62	5.26	0.26
11	92X	750	$3.65Y	1	0.12	0.71	6.00	0.17
12	96X	700	$5.77Y	1	0.08	0.35	4.42	0.57
13	103X	650	$17.89Y	1	0.18	0.23	1.34	0.59
14	106X	650	$5.96Y	1	0.13	0.53	4.19	0.34
15	131X	525	$3.34Y	1	2.43	18.88	7.78	-20.30
16	135X	500	$7.56Y	1	0.18	0.73	4.10	0.09
17	145X	470	$4.03Y	1	0.09	0.83	9.16	0.08
18	145X	475	$11.41Y	1	0.29	0.78	2.71	-0.06
19	154X	435	$5.01Y	1	0.12	0.89	7.56	-0.01
20	163X	410	$1.07Y	1	0.04	2.05	48.71	-1.09
21	196X	340	$3.75Y	1	0.11	1.47	13.06	-0.58
22	215X	320	$2.13Y	1	0.10	2.48	24.79	-1.59
23	225X	300	$25.60Y	1	0.30	0.57	1.92	0.13
24	232X	290	$16.22Y	1	0.14	0.48	3.42	0.39
25	244X	275	$2.51Y	1	0.12	2.76	23.87	-1.88
26	269X	250	$39.04Y	1	0.38	0.57	1.49	0.05
27	333X	205	$5.11Y	1	0.13	1.95	15.57	-1.07
28	345X	200	$16.00Y	1	0.23	1.06	4.70	-0.29
29	476X	140	$2.09Y	1	0.09	5.44	59.21	-4.53
30	660X	102	$6.39Y	1	0.13	3.13	25.01	-2.25

Table 4 Weight Distribution of different Import Costs on the Total Delta Landed Cost

The analysis shows the trend explained in section 5.6. The columns highlighted in green, show the delta weight of costs such as inventory holding costs and transportation. It also takes a ratio of transportation over inventory to see which one is influencing the import decision more. Most of the goods that have negative deltas (last column) are the goods that are bigger in size. The two anomalies that defy this trend

are units 5 and 15. For these units the delta COGS between import and domestic goods is too small to account for transportation costs. For the larger goods that still have a room for profit (Unit #23, 24, 26) shown by the last column that is still positive, the cost of the item is very high therefore the $ delta difference is higher and this can make up for most of the costs.

5.8 Weight of inventory holding costs on the decision to import or source domestically

The analysis also shows that the % of inventory costs for most goods is very low at < 20%. This means that for the goods performed as part of this analysis, the concern of holding goods longer due to importing actually makes up a small weight of the total costs; compared to other costs such as transportation. 3 months was assumed to be the holding time. If the retailer is holding the goods longer in warehouses, the weight of inventory costs will change. For the goods that have a high inventory holding cost for example unit 23, 24, 26 ,28, the cost of these goods are very high hence the high holding cost which is taken as a percentage of the COGS. For goods that have a high cost, for example > $100, in addition to risking higher markdowns, these goods also have an additional risk of higher inventory costs if held in the warehouses over a longer period of time.

5.9 Combining variables with Demand to decide on import decisions

In figure 14, the x axis shows the demand for the good, the y axis the physical size of unit and the Z axis is the total landed cost delta.
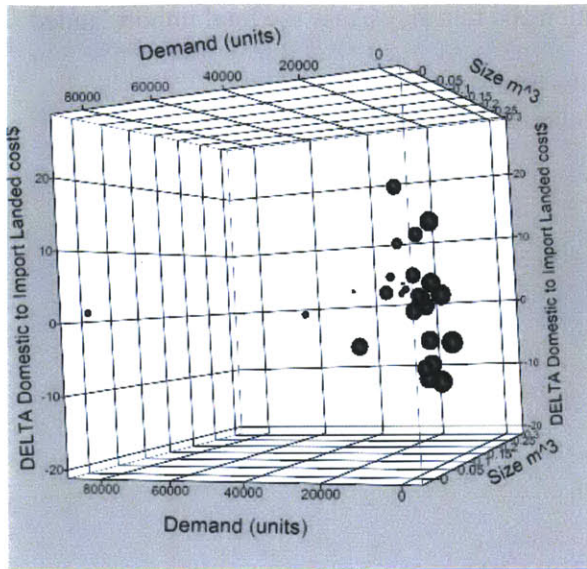
Figure 14 Total Landed Cost vs. Item Size and Demand

This must be drawn on three dimensions in order to ascertain the characteristics of the best items to import. It also shows the varying sizes of the item by weighted markers. Bigger markers have higher physical volume vs. smaller markers. One trend is clear on this graph. The demand for most of the items are low except for one item that is very small. Demand cannot be controlled by the retailer until they increase in size but ideally the best candidates to import will be those toward the left side of the graph, with higher demand.

5.10 Summary/Overview of Results

The analysis shows that there is a correlation between the size and cogs of an imported item and this bears a decision on whether the item should be imported or not. Additionally, the delta between the domestic item and the demand of the item are highly critical and also correlated to the decision of whether to import or not. This is further compounded by the size of the container that is used for the shipment and how full the container is. As the utilization of the container decreases, the total landed cost of the imported item increases making it more profitable to source the item domestically rather than by importing it. Very similar to the analysis shown, this changes based on category. For example, an item

may have more duties costs based on its customs classification and this may cause the total import landed

cost to change and the weights of the most influential costs to be distributed differently.

Chapter 6 Recommendations

6.1 Key variables that impact import decisions, optimum imports region

There are five significant variables that the retailer should take into consideration when deciding on whether to import an item. These are:

1) **Size of the item to be imported-** As the size gets larger the item becomes more conducive to domestic sourcing due to transportation cost/cbm considerations. If the item is too small, high quantities will be needed to fully utilize container space.

2) **Import COGS-** As the import COGS gets more expensive, the item becomes more risky to import due to the possibility of markdowns. The inventory cost also goes up. Alternatively, as the COGS goes toward zero, the size of the item factors into whether the transportation cost outweighs the profit margin. A bigger item has higher transportation costs vs. a smaller item.

3) **Delta (Domestic-Import) COGS-** This delta is one of the more critical elements and should be sufficient to cover all the costs of the import process with a gap to the total domestic cost, depending on the desired profit margin. If this gap is insufficient, COGS should be negotiated otherwise domestic sourcing will be better.

4) **Demand-** Items with higher demand and a longer history of demand are more favorable as import candidates.

5) **Duties** or other costs that change the distribution of import costs

The decision to import or to source domestically depends on an interplay between the above variables to find an optimum output among the items to be imported. Based on the analysis completed, there is a region of optimization in which the best import candidates can be recognized. Procuring items with medium physical size in the shaded area in Figure 15 avoids the occurrence of buying more risky items on one end of the spectrum that are bigger/higher cost items which incur higher transportation costs and too many items on the other end due to small physical size. Due to the size of the items on the right of the

region, transportation costs are higher, and the delta between domestic and import COGS is not high enough to cover transportation costs even with average COGS. If the COGS of the items are high, the delta will cover the transportation costs, but the total $transportation amount/item will be higher, the inventory holding costs will also be higher and these items will have a higher $ markdown risk if consumer purchasing changes. On the other end of the optimization region, the items are so small in size that the retailer will have to buy many of these items in order to fill a container. The retailer in this case is constrained by demand and items will need to be consolidated in order to fill a container otherwise less than full import loaded containers will drive up the landed cost per item.
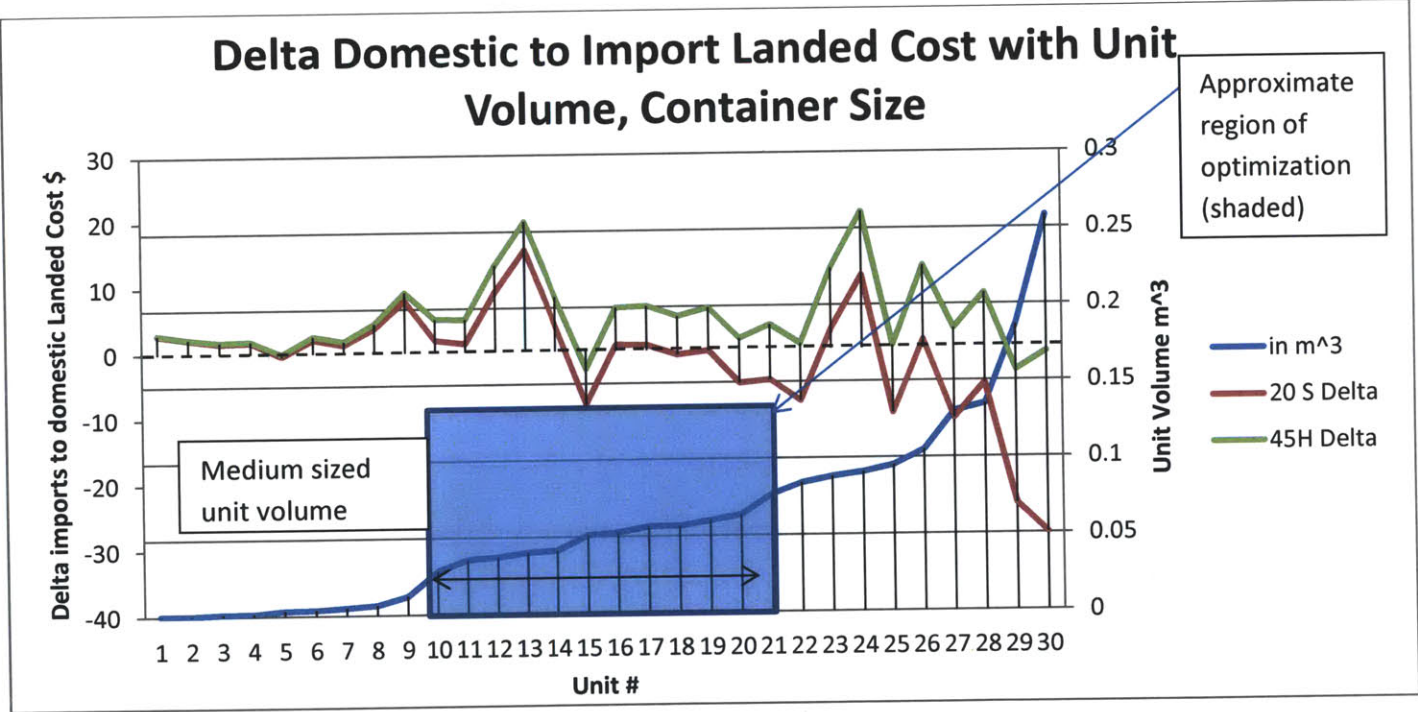
Figure 15 Approximate region of optimization for imported goods

For items in the optimization region that have medium physical size, the importer will choose the items that have medium range COGS so that the delta between domestic and import COGS covers all the import costs including duties leaving a gap to the equivalent domestic cost. The bigger this gap, the higher the profit margin opportunity and the further north the item is in reference to the $0 delta line. For items in this region that are below the $0 delta line, the retailer can negotiate import COGS with the

supplier to see whether better COGS can push the item above the $0 delta line. How far above the $0 delta a retailer wants to be depends on the target profits that the retailer has decided on as a part of the business goals.

In the region of optimization, the unit size is big enough so the supplier can fill containers without the risk of overstocking by over-purchasing, items have medium COGS values, which minimizes inventory holding costs and candidates in this region also have a higher demand. The region including demand is shown in Figure 16. As the supplier increases the volume of the import program by shipping items with the characteristics described above, the retailer has the opportunity to bargain for lower costs on containers due to higher import quantity. As the costs are driven down, the retailer can gradually widen the optimum region to include on one end smaller items, and on the other end bigger items which now have lower transportation costs. As the import volume becomes extremely large, the retailer starts to develop economies of scale and transportation costs move closer to zero. At this point the optimum region continues to widen and the retailer can import most of the goods that are sourced domestically. The retailer should be aware that other fixed costs such as duties still plays a part in import costs and should be factored in. Also, as the retailer grows, higher consumer demand may also increase the velocity of sales, making higher cost goods less risky for markdowns and long inventory holding periods.
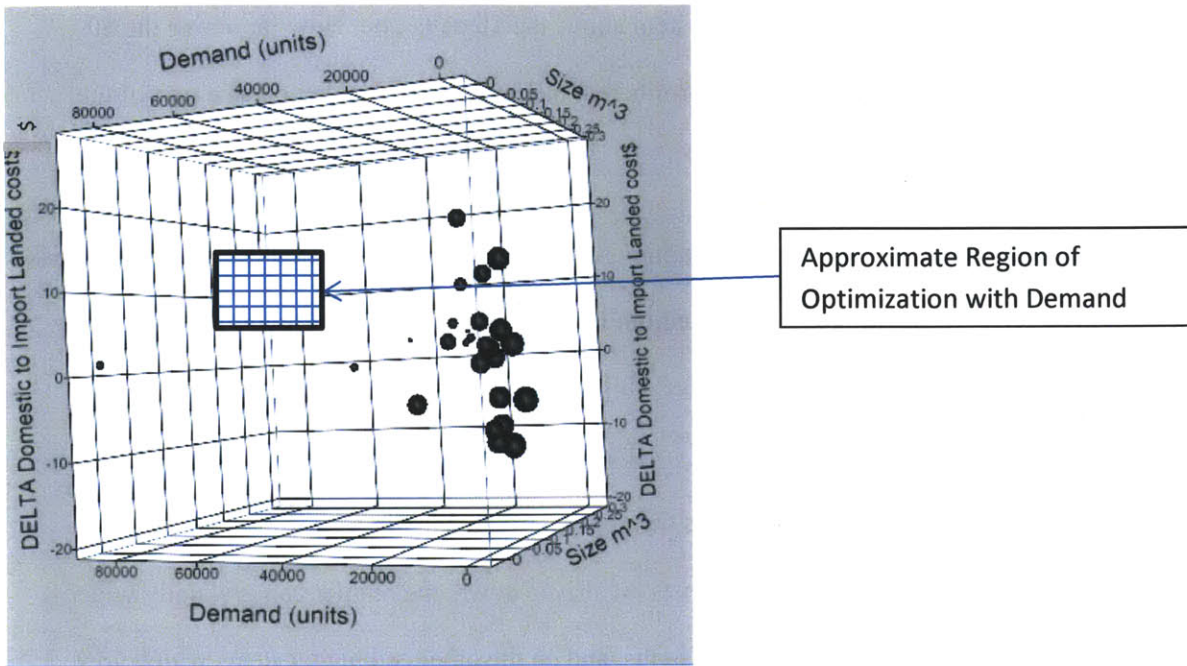
Figure 16 Approximate region of optimization for imported goods with demand

In addition to the recommendations on finding the optimum import unit based on variables such as size, volume and COGS, the following recommendations are outlined in three sections:

Infrastructure, Strategy, Landed Cost Freight Estimator Model

6.2 Infrastructure: Systems and Data

An **ordering system** that can automate import orders will be crucial to increasing and optimizing import volume. The system should have the capability to dual source units and make the best decisions on whether to import or not, while requiring minimum manual input. Decisions should be designed with logic specific to each product category. As import volume increases, a blended ordering approach to imports, where imports are the majority and domestic orders supplement shortages, is ideal. The system should monitor inventory levels and design a ship window to account for when items are needed at the retailer's locations. Along with an ordering system, IT and **technological systems** that reduce the manual tasks related to imports should be addressed. Navigating between different applications in order to get one output is time consuming and not lean enough for higher import volumes. Integration of technology,

including ordering systems, transportation management, inventory tracking and shipment visibility will enhance the overall process if centralized.

6.3 Dual source ordering system- Blending domestic and import procured goods

Dual sourcing items can help with the transition from buying items fully domestic vs. buying them by importing only. This approach can be taken to minimize the possibility of stocking out and depending entirely on an imports program. Most domestic items can be sourced within 2 weeks and also unpredicted demand can be sourced within two weeks from domestic suppliers. Seeing that a POQ ordering system will allow imported goods to arrive at the retailer's site every 3 months, any shortages between this time period, can be supplemented by domestic ordering. Initially in order to mitigate risk, the retailer can decide on a distribution let's say a 60% imports, 40% domestic ordering system and increase the imports % as the system is trialed and improved for any other process defects which cause reliability issues initially. A dual source metric, designed around this ordering system will measure how effective it is by taking into account the impact to the customer as well the profit margins than can be made by importing.

6.4 Variable ordering patterns- Newsvendor method for seasonal items

If a dual source ordering system is implemented, ordering patterns should be taken into consideration. For example the analysis assumes that goods can be procured in time to meet the next three month demand period through the POQ ordering system. In reality, for some goods such as toys, lawn and garden, advance buys need to take place before the peak season. For these goods, orders must be placed months ahead of time. For example, most toys are sold around the November / December time period, but international suppliers may need to have orders submitted by May of the same year. This is done partly because suppliers have to fulfill multiple orders to several different retailers and they need to schedule production lines in advance. Therefore capacity is reserved ahead of time. In this case, instead of the POQ method, a newsvendor method can be applied (Pyke, Silver, Peterson) to find the best quantity in order to maximize possible profits. This method is outlined in Appendix 4.

6.5 Infrastructure: Organizational Structure

1) A data integrity team is a must for an imports program. Imports needs the capability to record an imported item from overseas locations to the time it sells at the retailer's location and house this information in a centralized location. This will help to determine actual lead times and actual landed costs, which will allow better decision making in the long term. Centralized and readily retrievable data is the key to understanding the potential for growth, profitability and scalability.

2) The organizational structure around imports should be addressed to ensure that there is sufficient communication within relevant teams in order to meet goals. A strong organizational structure ensures that data is shared, awareness of procedures is heightened and people within the organization spend less time inquiring about where to find information that they need. The organizational structure should foster interconnection through various team functions. Attributes of the organization will address reporting structures, team roles and possibly a specialized standalone imports team that makes import decisions.

6.6 Strategy

1) To increase import volume, it is necessary to create processes that will enable import buyers to understand the variables related to imports and which vendors are best. Some of these variables include shipping windows, factory production schedules and capacity, vendor lead times and possibly vendor chargebacks as a consequence of non-compliance. Implementation of a vendor operations team will help to analyze and quantify these decisions. The main role of these teams will be to create a process to define the measurement of vendors i.e. fill rates, MOQ requirements on vendor selection and how to onboard new vendors into the import process. The team will also manage import POs that are placed to ensure vendors meet ship windows. In addition to this team, a similar vendor partner team should be set up in overseas locations to have first-hand input and develop supplier relationships.

2) Choosing the best SKUs to import and determining their profit margins is another element that should be built into decision making systems. In addition to choosing the best SKUs to import, the inventory health metric for imports should be re-assessed to ensure that it is accounting for longer lead times,

quantities to import and should also weigh the profitability margin of specific SKUs, sales velocity and inventory holding costs to determine a break-even point in reference to inventory health.

6.7 Landed Cost model

A landed cost model should be readily accessible by the retailer. Having a reliable landed cost calculator is central to making the best import decisions. Similar to the landed cost calculator designed in this research, a landed cost calculator should be able to visualize these decisions with minimal input from the user. The calculator should also have the capability of being dynamic in that as market trends change, or contracts change, the calculator is constantly updated. Having out of date inputs in a calculator causes the wrong decisions to be made hence this should be monitored and up kept by a dedicated team. This model should have the capability of helping import buyers to make the best decisions on items that they need to import.

Chapter 7 Conclusion: Closing Remarks, Globalization and Trade Effects on Importing

This research examined and attempted to answer questions around the best decisions that a retailer could make when choosing which items to import and some of the considerations around an import program. It examined some of the key information that the retailer needs in order to make these decisions. This included the size of the item, the cost of the item, the demand, the delta between the domestic and import COGS. It showed how having a landed cost calculator integrated with the size of the item can help to improve the accuracy of making import decisions along with container utilization. Using these variables the research also identified an optimum region where the retailer should focus in on to identify the best import candidates. Even with these tools, the retailer must also be aware of some of the global trends that may cause shifts and impact import decisions. For example, due to the recession around 2008, the international merchandise trade dropped significantly, rebounded sharply in the beginning of 2009 and then slowed again in 2010. The velocity of this trade has not returned to pre-recession levels as shown by figure 17 (35). A global crisis such as a recession can cause the import climate to shift, making it cheaper to import containers but more risky as recessions usually mean that consumer spending is generally decreased.
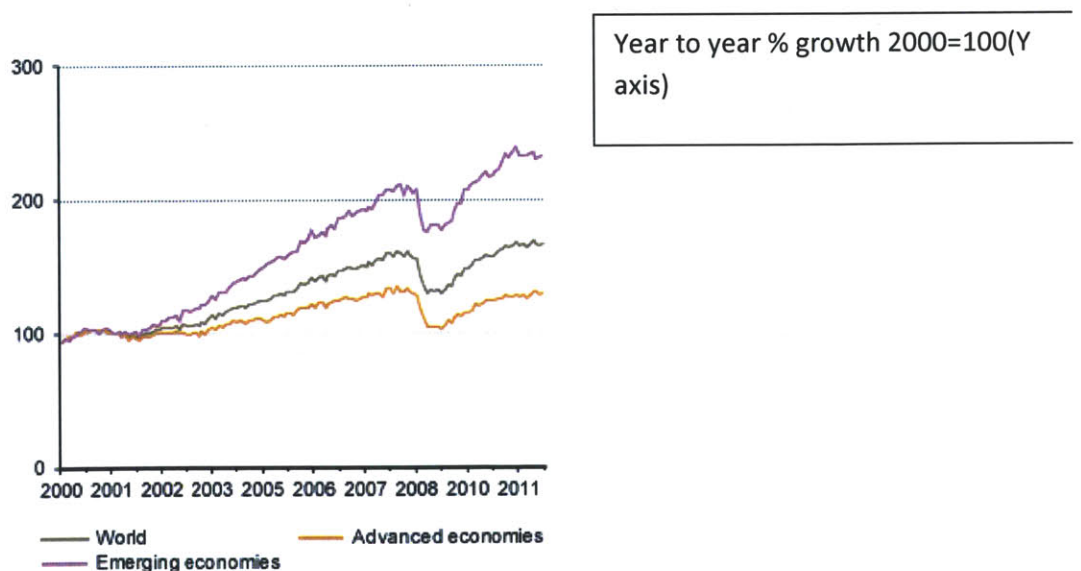

Figure 17 World Trade trends 2000-2011 (35)

The price of oil is also another global market factor that can influence the retailer's decisions on whether to import or not. Higher oil prices usually mean that container shipping prices increase and this affects the entire import sector. Oil prices react to global economic trends, natural disasters and other unique events that cannot be predicted ahead of time. Given that the import sector is a highly unionized industry, strikes by ocean carriers may cause the goods to be delayed or held up in ports for unforeseen periods of time. This can result in unrecoverable costs for the retailer. Similar losses can occur with containers that are damaged on the water, destroying goods or goods stolen from containers along the import route.

Apart from losses due to strikes or other circumstances, there are also future initiatives that can positively impact the import sector. The expansion of the Panama Canal is a project that intends to double the capacity by 2015. Through this project, more and larger ships will transit the Panama Canal. This can tremendously change the global climate for importing and allow more goods or commodities to be transported between global ports. Manufacturing and production is another global factor that could affect the climate of importing. Outsourcing increased drastically in the late 2000s, pushing many production lines to China. Many US retailers are beginning to bring production lines back into the United States. The global impact of reversing outsourcing trends is not yet felt but this may create a shift in the global economy in the near future, causing a shift in importing trends.

Glossary

INCOTERM- International Commercial Terms predefined by the international chamber of Commerce

SKU- Stock Keeping Unit

PO-Purchase Order

COGS- Cost of goods sold. The cost of a retail good from the supplier that sells it

20S, 40S, 40H, 45H container- Container sizes uses in ocean shipment of goods 20 represents the length i.e. 20 feet long. The"S" represents standard. "H" represents high or taller container

Freight forwarder A **freight forwarder, forwarder,** or **forwarding agent,** is a person or company that organizes shipments for individuals or corporations to get goods from the manufacturer or producer to a market, customer or final point of distribution (36)

Appendix

Appendix 1 Incoterms (5)

EXW (Ex Works) - (factory, mill, warehouse: your door) Title and risk pass to buyer including payment of all transportation and insurance cost from the seller's door. Used for any mode of transportation.

FCA (Free Carrier) - (pick a place after your origin to start) Title and risk pass to buyer including transportation and insurance cost when the seller delivers goods cleared for export to the carrier. Seller is obligated to load the goods on the Buyer's collecting vehicle; it is the Buyer's obligation to receive the Seller's arriving vehicle unloaded.

FAS (Free Alongside Ship) - (port, after all origin port charges) Title and risk pass to buyer including payment of all transportation and insurance cost once delivered alongside ship by the seller. Used for sea or inland waterway transportation. The export clearance obligation rests with the seller.

FOB (Free On Board) - (port-same as FAS) Risk pass to buyer including payment of all transportation and insurance cost once delivered on board the ship by the seller. Used for sea or inland waterway transportation.

CFR (Cost and Freight) - (destination port-paid to arrival at destination port) Title, risk and insurance cost pass to buyer when delivered on board the ship by seller who pays the transportation cost to the destination port. Used for sea or inland waterway transportation.

CIF (Cost, Insurance and Freight) - (destination port-same as CFR, but includes insurance) Title and risk pass to buyer when delivered on board the ship by seller who pays transportation and insurance cost to destination port. Used for sea or inland waterway transportation.

CPT (Carriage Paid To) - (place at destination-includes all destination port charges) Title, risk and insurance cost pass to buyer when delivered to carrier or seller who pays transportation and insurance cost to destination. Used for any mode of transportation.

CIP (Carriage and Insurance Paid To) - (place at destination-same as CPT, but includes insurance) Title and risk pass to buyer when delivered to carrier by seller who pays transportation and insurance cost to destination. Used for any mode of transportation.

DAF (Delivered to Frontier) - (border of country-same as paid by seller to border-all other charges to buyer) Title, risk and responsibility for import clearance pass to buyer when delivered to named border point by seller. Used for any mode of transportation. (border of country-same as paid by seller to border-all other charges to buyer) Title, risk and responsibility for import clearance pass to buyer when delivered to named border point by seller. Used for any mode of transportation.

DES (Delivered Ex Ship) - (on board ship to destination port) Title, risk, responsibility for vessel discharge and import clearance pass to buyer when seller delivers goods on board the ship to destination port. Used for sea or inland waterway transportation.

DEQ (Delivered Ex Quay i.e. Duty Paid) - (destination port-includes duties and taxes, but not destination charges or delivery) Title and risk pass to buyer when delivered on board the ship at the destination point by the seller who delivers goods on dock at destination point cleared for import. Used for sea or inland waterway transportation.

DDU (Delivered Duty Unpaid) - (consignee door-excluding duties and taxes) Title, risk, and responsibility for vessel discharge and import clearance pass to buyer when seller delivers goods on board the ship to destination port. Used for sea or inland waterway transportation.

DDP (Delivered Duty Paid) - (consignee door-includes all charges origin to destination) Title and risk pass to buyer when seller delivers

Appendix 2 Bill of Lading (37)

Date	BILL OF LADING – SHORT FORM – NOT NEGOTIABLE	Page 1 of 1

SHIP FROM	Bill of Lading Number:
[Name] [Street Address] [City, ST ZIP Code] SID No.:	BAR CODE SPACE

SHIP TO	Carrier Name:
[Name] [Street Address] [City, ST ZIP Code] CID No.:	Trailer number: Serial number(s):

THIRD PARTY FREIGHT CHARGES BILL TO	SPAC:
[Name] [Street Address] [City, ST ZIP Code]	Pro Number: BAR CODE SPACE

Special Instructions:	Freight Charge Terms (Freight charges are prepaid unless marked otherwise): Prepaid ❏ Collect ❏ 3rd Party ❏ ❏ Master bill of lading with attached underlying bills of lading.

CUSTOMER ORDER INFORMATION

Customer Order No.	# of Packages	Weight	Pallet/Slip (circle one)		Additional Shipper Information
			Y	N	
			Y	N	
			Y	N	
			Y	N	
Grand Total					

CARRIER INFORMATION

Handling Unit		Package		Weight	HM (X)	Commodity Description Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation with ordinary care. See Section 2(e) of NMFC item 360	LTL Only	
Qty	Type	Qty	Type				NMFC No.	Class

Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property as follows. "The agreed or declared value of the property is specifically stated by the shipper to be not exceeding _____ per _____

COD Amount: $
Fee terms: Collect ❏ Prepaid ❏ Customer check acceptable ❏

Note: Liability limitation for loss or damage in this shipment may be applicable. See 49 USC § 14706(c)(1)(A) and (B).

Received, subject to individually determined rates or contracts that have been agreed upon in writing between the carrier and shipper, if applicable, otherwise to the rates, classifications, and rules that have been established by the carrier and are available to the shipper, on request, and to all applicable state and federal regulations.	The carrier shall not make delivery of this shipment without payment of charges and all other lawful fees. **Shipper Signature**

Shipper Signature/Date	Trailer Loaded:	Freight Counted:	Carrier Signature/Pickup Date
This is to certify that the above named materials are properly classified, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the DOT.	❏ By shipper ❏ By driver	❏ By shipper ❏ By driver/pallets said to contain ❏ By driver/pieces	Carrier acknowledges receipt of packages and required placards. Carrier certifies emergency response information was made available and/or carrier has the DOT emergency response guidebook or equivalent documentation in the vehicle. Property described above is received in good order, except as noted.

Appendix 3 User Interface- Landed Cost Model

PORT
CNSHA ▼

CNYTN ▲
CNNGB
CNSHA
CNXMN
CNFOC
HKHKG
CNDLC
VNSGN ▼

Pull down menus to choose Port of origin is shown in yellow

ASIN	QUANTITY	Revised Qty	Qty per Carton	Cartons	IS PROXY Carton	IS_SORTABLE	UNIT Volume	20S	40S	40H
...........}	400	414	18	23	N	N	0.1293	$ -	$ 11.45	$ -
		-	-	-	-	-	-	$ -	$ -	$ -
		-	-	-	-	-	-	$ -	$ -	$ -
		-	-	-	-	-	-	$ -	$ -	$ -
		-	-	-	-	-	-	$ -	$ -	$ -

User inputs shown in yellow

Appendix 4 Newsvendor Method for advance ordering

Based on a newsvendor method:

V= acquisition cost or COGS $

P= selling price of the item $

B= penalty (beyond the lost profit for not satisfying demand) $/unit

g= salvage value in case of overstock $/unit

Q= quantity to be stocked in units,

And $p_{x<}(x_0)$ represents the cumulative distribution of total demand, the probability that total demand x

takes on a value less than x_0.

A decision rule used to select the quantity to be purchased Q is then

$$p_x < (Q^*) = \frac{p-v+B}{p-g+B}$$

where the cost of underage= c_u= p-v+B (c_u the cost associated with not meeting demand or stocking out)

And the cost of overage (the cost associated with each unit that is not sold or overstocking) is

$$C_o = v\text{-}g$$

If this Q value is ordered, the supplier can still expect to still maximize the expected profit is :

$E[P(Q^*)] = -B\bar{x} + (p\text{-}g\text{+}B) \int_0^{Q^*} x_0 \, f_x(x_0) \, dx_0$

where $\bar{x}$ is the mean demand

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