A Process Improvement Framework for Achieving Agility for Replenishment Products

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Submitted to the MIT Sloan School of Management and the Department of Mechanical Engineering in Partial Fulfillment of the Requirements for the Degrees of Master of Business Administration and Master of Science in Mechanical Engineering In conjunction with the Leaders for Global Operations Program at the Massachusetts Institute of Technology June 2017

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By

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Abstract

With a goal of becoming a $50B company by 2020, Nike is improving current processes and using innovation to break barriers in technology, supply chain and manufacturing. The objective of the internship project with Nike’s North America Always Available team is to provide recommendations on how the company can reduce the lead time from when customer places a replenishment order to when the product is delivered to the customer’s stores. The project focused specifically on a direct shipping strategy for the socks category and accelerating the order flow process at the distribution centers (DC). These two areas provide tremendous opportunity for growth for Nike through improved transportation, on time delivery to customers, and alleviating product congestion at the DC.

Win Socks Back
In the last few years, Nike has been losing market share in the sock category to competitors who are using faster and more aggressive methods, such as air freight, to ship socks and other products to customers. This has influenced Nike to begin to look at a variety of strategies, such as improving supply chain responsiveness and relieving DC congestion, as potential solutions. The primary goal of this project is to provide strategies that will reduce the lead time from factory to customer store. The approach consisted of using analytical and business principles to help the company to review and reassess the capabilities of the factory and DCs, as well as the transportation methods for short lead time (SLT) products. The output of the socks project was a review of current capabilities, an assessment of the company’s ability to execute a direct shipping strategy, and preliminary recommendations on how to execute this strategy.

Accelerate Order Flow
In addition, Nike is also taking a closer look at the performance of the distribution centers. The order flow project will focus on improving the processing cycles and Call-for-Routing process for Nike’s biggest accounts at two distribution centers in Memphis. The project focused on all product categories for Nike’s Always Available product line. At this time, every account has a different ordering, processing and transportation, and this results in complexity for the DC and customer services teams because they are not able to plan for efficiency. The focus was on two initiatives: a quick win process improvement strategy and long term enhancement plan, for order writing, DC operations, transportation and routing. The final deliverable included a compilation of the current process for six strategic accounts, an analysis on the operational strategy for an ideal future state, and a model to review DC lead time performance monthly.

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To the LGO that may be reading this thesis and/or maybe starting to write a thesis of their own, congratulations on making it this far. The thesis is not going to make or break you! On the days where you may be annoyed and completely over the thesis – push through. You have made it this far, and this is only a small hurdle you have to overcome. In the tough times, tap into the moment when you received the call that you were admitted, and use the joy you felt in that moment to push through. I believe in you! Relax and truly enjoy the process of being an LGO.

A heart felt gratitude and thanks to everyone that has been part of my time at MIT. You have made this dream a reality that I will cherish forever!

“Happy are those who dream dreams and are ready to pay the price to make them come true.”

Leon Joseph Cardinal Suenens
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1. Introduction

This chapter introduces the importance of agility in a supply chain system for a replenishment business model in the retail industry. The work described in this thesis is motivated by Nike Inc.’s Always Available (AA) replenishment business; a business model inspired by the desire to fulfil orders weekly from Nike’s distribution centers in Memphis. This model is in direct contrast to the futures model, a model in which retailers place forecasts four to six months prior to the expected delivery date. In this model forecasts are considered final orders. Always Available fills order weekly, while futures fills orders well in advance of the delivery date. The motivation for the thesis work is to provide a new perspective on the current process of filling replenishment orders with the intent of making the supply chain more responsive to the market trends. The final recommendations will focus on identifying quick wins and long term solutions for the Always Available organization, and will also provide strategic recommendations for the organization. The thesis will explore the relationship with key retailers, target the processing inefficiencies, and provide options on how to improve the responsiveness of the supply chain. We will also explore the stakeholder relationships necessary for successful implementation. Additional details about the Always Available business model and the intricacies of the current system will be described in the chapter 1.2.

In section 1.1 we will learn about Nike’s supply chain structure and the evolving trends of the retail industry. Section 1.2 will discuss the intricacies of the Always Available business model: a review of types of products, highlight the current process, define speed-to-market, and introduce the novelties of the business. Section 1.3 will cover the literature review. Section 2.1 and 2.2 will present a high-level view of the overarching problem and motivation for the thesis. Section 2.3 will present the structure that the thesis will follow.
1.1 Overview of Nike Inc.

Improving the agility of the supply chain is a priority for Nike because of the company’s dedication to providing the retailer with exceptional service and quality. Making the supply chain more responsive is not only a desire for Nike, but also a goal for almost every company in the retail and consumer goods industry. With the evolution of companies like Amazon, consumers have become accustomed to the luxury of two-day delivery services and one-hour turnaround times at the click of a button from the comfort of their homes. Retail customers want convenience and speed, but with better quality and service than ever before. This level of service has become the norm, and that is no different for retailers like Nike. As a result, Nike in particular, has made improving their supply chain one of their key success factors to reaching the goal of increasing revenue from $30B in 2015 to $50B by 2020. Eric Sprunk, COO of Nike Inc., stated that Nike’s supply chain must be “smarter, faster, and more sustainable” to meet the expectations of retail customers [1].

Making the supply chain more responsive will be a challenge for Nike because Nike does not own any manufacturing plants. The company relies on its partnership with over 700 factory partners to support the apparel, footwear and equipment business. The majority of Nike’s manufacturing partners are located offshore, primarily in Asia - far from consumers in primary markets, e.g., North America. As a result of the distance between where products are manufactured and where they are sold, it takes months to ship products from manufacturing to Nike’s distribution center. This includes a few months of ocean shipping time, two weeks at customs, and a few weeks to move products from the port to the distribution center. Over 900 million units of products move through Nike’s distribution channels including two distribution centers in Memphis, and third party logistics (3PL) packing facilities on the West Coast [2]. It is especially important for a business as complex as Nike’s to have an agile supply chain.

The idea of making the supply chain more agile is not isolated to Nike. Traditional competitors such as Under Armor and Adidas are also exploring ways to make the supply chain more responsive. For example, Adidas recently opened a manufacturing plant in the United States, and Under Armor air freights products to retailers to gain speed – both with the goal of being more responsive to the market trends [3]. The benefit of an agile supply chain for Nike and its competitor is an increase in efficiency, value for the retailer and service quality- these metrics signal that the company is proactive and consumer-driven [4].
The consumer marketplace is changing. Consumers expect, and even require, products to be in stock in the style, color and size that they want it in, at all times. This discovery motivated Nike to create an internal replenishment business with the mission of supplying a segment of products to wholesale that are “always available”, hence the name Always Available. The mission of Always Available is to provide that level of service for retailers and end consumers.

1.2 Overview of North America Always Available

The Always Available business line is a replenishment model that ensures that certain styles, sizes and colors are always in stock at the retailers; see examples of the Always Available product offering in the Figure 1 below. Products in this category are “in season” for 18 months instead of the traditional 3 to 6 months. A sample includes t-shirts with basic colors, black tights, shorts, bags, socks, and the famous Air Monarchs. These items are products that consumers buy with higher frequency than traditional Nike products. Always Available products can be found at retailers like Academy, Footlocker, Kohls and, Nike stores.

![Figure 1: The product portfolio for Always Available consists of apparel, footwear and equipment.](image)

Although a newer model for Nike, Always Available generates 11% of the revenue in North America. Nike is known for implementing a “futures” model; with this model, retailers provide a forecast six months in advance of the required delivery date [5]. Always Available implements a weekly ordering cycle – the retailer places an order at the beginning of the week with the intent of receiving the order in stores within seven days.

Despite the weekly ordering nature of Always Available, retailers are required to place six month forecasts. Retailers are not typically held to the forecast, but are encouraged to provide a
forecast that represents what they may need in six months. This strategy is to help the Inventory and Demand Planning teams at Nike determine the approximate number of products to have in inventory. The Inventory and Demand Planning team have to ensure that the products are available to manage the fluctuating trends of the weekly ordering cycle. This role is especially important because when products are not available at the distribution center when a retail customer orders them, it can negatively impact the speed-to-market metric. Nike diligently works to minimize the probability of stock outs by having a Performance Innovation team that uses data analysis tools and visuals to track historic trends, make futures estimates and provide reporting about the health of the business. The thesis work was done in conjunction with the Performance Innovation team. The Performance Innovation team tracks the health of the business and provides data necessary so decision-makers can ensure that the company maintains high service levels and appropriate speed-to-market.

Speed-to-market is correlated to revenue and service level. Speed-to-market affects revenue because the higher the number of orders, or inventory turns, in a season, the higher the sales for the season. For example, if Always Available had an order-to-delivery time of seven days for a product that generates $100 in revenue per week, we could achieve $1200 in a twelve-week season. Based on the example, an order-to-delivery time of three weeks would result in a loss of 66% in potential revenue because instead of obtaining $1200 in revenue we would receive $400 (this example is not based on actual Nike data, but the conclusions are applicable). In addition, retail customers equate speed to service level because the longer it takes to receive a product the higher the probability of stock outs. To achieve the optimal revenue and service levels, the supply chain must be efficient, swift and highly responsive.

Currently, Always Available retail customers claim that the order-to-delivery time is closer to the 3-week time period than 1-week periods. This thesis examines data to validate the claims, analyze the root causes, and recommend ways to shorten the order-to-delivery times. This study provides a portfolio of recommendations for Nike and six key retailers.
1.3 Literature Review

This chapter will present a summary of the literature that provided the context for the research completed in this thesis. The summary will focus on process improvement with lean manufacturing, and Supply chain agility and adaptability. These topics were selected because of the relevance to the goal and methodology of the thesis work. Section 1.3.1 will focus on the process improvement strategies that are derived from lean manufacturing. We will learn about the three lean steps that can be implemented in Nike’s distribution center, the application of Six Sigma by reviewing the SCOR model, and the emphasis on continuous improvement. Section 1.3.2 will review the definitions of supply chain agility and supply chain adaptability. The section will also highlight the benefits of both concepts.

1.3.1 Process Improvement with Lean Manufacturing

This section will focus on leveraging lean manufacturing techniques to improve the functionality of a distribution center. A distribution center operates very similarly to a traditional manufacturing plan, consisting of a flow of inventory, assembly lines to process orders and the production of a final product. Lean manufacturing has been used to optimize productivity in manufacturing for years. In this section, we will extract some of the primary process improvement techniques in lean manufacturing and apply them to a distribution center. We will begin by referring to *Lean in Six Steps* by Walter Garvin to identify the lean transformation steps that are applicable in this context, and then we will review and apply the SCOR model.

*Lean in Six Steps* by Walter Garvin states that there are six best practices in lean manufacturing that can result in complete transformation for a company [6]. We will focus on three steps that are most applicable to the subject of this thesis. The first step of focus is to “Adopt a standard approach”. The analysis in the thesis proved that variability in the process and with the retailers is the reason for the current performance. Adopting a standard approach will minimize the moving parts, make assessing performance more meaningful and easy to track. Although difficult, standardization is possible, but will require the collaboration of retail partners and stakeholders at Nike.

The second step is the use of Six Sigma tools. Six sigma tools can be used to identify failure modes by defining, measuring, analyzing, improving and controlling defects in the system [6]. Six sigma tools are especially useful for improving performance at the distribution center, and in understanding the processing capabilities of the factory partners.
Last but not least, it is especially important to share lessons learned across the organization, between the world headquarters, the distribution centers, and even with factory and retail partners [6]. In the research, we discovered that there is not a streamlined process of sharing lessons learned, especially with factory and retail partners. In a system as integrated as the Accelerate Order Flow process and the socks supply chain, it is not efficient for each node to function in silos. The lessons learned can also be easily applied to other replenishment business units in Nike, such as the NFL, NBA, In-Season-Response and even the digital business.

In *The Supply Chain Operations Reference Model*, Bolstorff and Rosenbaum highlight the benefit of using the Supply Chain Operations Reference (SCOR) model to predict the cost, benefits and timeline of projects by a defining process, and leading practices and metrics. The SCOR model can be an essential component in Nike’s supply chain strategy; it can be used to lower defect rates, thereby resulting in higher customer satisfaction. The SCOR model as shown in Figure 2 below.

![SCOR Model](source-1996-2011-supply-chain-council-inc-all-rights-reserved-used-with-permission)

*Figure 2: The framework of the SCOR model*

Plan refers to planning the supply resources, specifically planning inventory for manufacturing, production and distribution. Sourcing is the process of procuring the raw materials and finished goods. The Make process involves manufacturing and testing the
product. Delivering is using order management techniques to receive, pack and ship products to customers. The last step is Return, this includes managing defects, warranty, inspection and replacing products. The work highlighted in this thesis focuses on Make and Deliver.

The last lean manufacturing technique that can be applied to a distribution center is the dedication to reviewing for quality and leveraging best practices to ensure continuous improvement. Nike’s distribution center can leverage best practices from the pharmaceutical, automotive and textiles industries.

1.3.2 Supply Chain Agility vs Adaptability

In this thesis, we focused on the concept of Supply Chain Agility to respond to changes in the marketplace, and disruptions in the supply chain. Supply Chain Agility is especially relevant for the Always Available business model because this concept is most applicable for short term changes in market trends [7]. However, as the industry begins to evolve and responsiveness becomes the industry norm, it is important for Nike to begin to think of the long-term solutions, specifically how to make the supply chain more adaptable to changes. Supply Chain Adaptability focuses on long term fundamental changes to the supply chain and market. Adaptability predicts possible scenarios and organizes the company’s supply chain accordingly [7]. It is becoming the industry norm for companies to design their supply chain systems to adapt to permanent shifts in the market, changes in technology and even socio-political and demographic changes [7]. Companies known for their responsive supply chains, like H&M, Zara and Wal-Mart, have committed to building agility into every node and link in their supply chain, to enable quick responses to fluctuating supply and demand, manufacturing delays, and new technology [7]. Agile supply chains respond smoothly to disruptions, synchronize supply and demand better, and effectively reduce the cost of transportation [8]. Last but not least, Supply chain agility positively affects operational performance, and equips firms with the flexibility to meet delivery deadlines, guarantee dependability and precision in service [9].
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2. Project Introduction

We have established the important role agility plays in a replenishment business model. Agility for replenishment models can result in an increase in revenue, and an improvement in services levels and customer satisfaction.

Nike’s wholesale retail customers claim that the current order-to-delivery process is inefficient – there have been claims that orders arrive well after the scheduled delivery date. The ideal state for a replenishment business is to deliver products to stores in an order-to-delivery timeline of seven to ten days. However, retailers have claimed that Always Available orders take up to four times more than the ideal timeline. As a result, the Always Available leadership team identified a need to investigate the claims, and improve on the feedback. The team made the decision to focus on improvements in the supply chain from production to retail store with a focus on: improving the feedback, reducing the long lead times in the distribution centers, investigating a strategy to bring production closer to the end customer, and reviewing the relationship with the retail customer.

The work extended to stakeholders outside of the Always Available organization, including supply chain planning, customer service operations and distribution center transportation teams. We will take an in-depth look at the order-to-delivery process for Always Available, understand the strategic levers in place to implement change – for the retailer and for Nike, analyze the current state, and provide a set of quick-win and long term strategic recommendations.

The thesis will focus on two processes: the order-to-delivery time at the two main Nike’s distribution centers in Memphis, and a new factory-to-store strategy for socks, referred to as Accelerate Order Flow, and Socks Process Improvement, respectively. The thesis will specifically focus on the process for six wholesale retailers in the United States, and four nearshore sock factories. In this thesis, wholesale customers will be referred to as retail customers, accounts and customers. End users or consumers are individuals that purchase the products in retail store. Section 2.1 and 2.2 will provide an overview of each process.

2.1 Accelerate Order Flow

Accelerate Order Flow (AOF) will focus on understanding and improving the order-to-delivery time for six of Nike’s wholesale retail customers. The order-to-delivery time for this scenario is defined as: from when an order is sent to the distribution center in Memphis to when
the order arrives at the customer’s retail store. The order-to-delivery process for Accelerate Order Flow consists of: ordering, distribution center operations, routing, transportation, and the processes executed after the products leave Nike’s distribution center – we will refer to the process as “account processes”. See Figure 3 for an overview of the high-level process flow.

Figure 3: The overview of the Accelerate order flow weekly process.

Retail customers place orders at the beginning of the week. The distribution center team receives the order, and collaborates with the world headquarters customer service team to determine the priority and expected delivery date for the order. The distribution center team
processes the order, and submits the order for routing. The retailer optimizes the routing based on order size, space allocations and final destination. Carriers are sent to pick up orders, and the orders are shipped to the retailers’ distribution center or directly to the retail store.

Initial analysis revealed a major failure point for this process - each of the six accounts had a very different process. The overarching consequence is that variability results in complex and unstandardized operations for the distribution center, the customer service teams, the retailers, etc.

See section 4 for an in-depth analysis of the problem, current state, results and recommendations for Accelerate order Flow.

2.2 Socks Process Improvement

The Socks Process Improvement initiative was motivated by an effort to shift the production of socks closer to the end customer. Nike has always been dedicated to exploring ingenious ways to improve the delivery time for socks in key seasons, e.g.: back-to-school and holiday. The objective of Socks Process Improvement project is to investigate the feasibility of multiple capabilities that could enable the goal of making the socks supply chain more responsive to the end customer. Several projects were considered at the beginning of the internship, including:

- **Delayed Packaging:** The initiative would investigate the possibility of delaying the packaging of socks until concrete orders are collected. At this time socks are packed by style (bagged versus banded), size (1 pack, 3 pack or 6 pack), and color (single color versus multicolored packs) during the production process at the factory. This process may occur months before the retailer places an order. Despite the very robust inventory planning techniques, demand often shifts resulting in excess inventory for Nike.

- **Direct Ship from factory:** This initiative would investigate the possibility of shifting sorting, packing and transportation from Nike’s distribution center(s) to the factory distribution center. The project will focus on four sock factories with distribution centers in the United States. This idea was formulated with the assumption that shifting these key processes to the factory distribution center would result in leveraging capabilities of the factory better, and will increase capacity at Nike’s distribution center.

The Direct Ship from factory initiative was selected as the focus of the internship project. The project was selected for the following reasons:
• Similar initiatives have been explored by other business units at Nike, and the thesis can leverage the learnings from those initiatives.
• The assumption is that the project will provide quick and tangible benefit in a shorter timeline than other projects.
• The project will achieve the goal of bringing production closer to the end user.
• The initiative will result in additional storage and resource capacity at Nike’s distribution center(s).
• Nike can better utilize the capabilities of the factory partners, as a part of a strategic partnership.

See Section 5 for an in-depth analysis of the problem, current state, results and recommendations for the Socks Process Improvement project.

2.3 Thesis overview
This thesis is a review of the findings and results from a six month internship with the Performance Innovation team on Nike’s North America Always Available team. This thesis will highlight the full end to end cycle of the order-to-delivery process. We will understand the problem, review the current state, identify a methodology for the analysis, and provide recommendations for Nike and the retailer partners. This thesis is a collection of the main highlights, analysis and insights discovered throughout the six months.

The format of the thesis will replicate the two workflow structure of the internship project. Section 3 will introduce the high-level methodology for the two projects. The methodology for the two projects is discussed in one section because both projects followed very similar processes and analysis structures. Section 3 will define key terms, describe the structure of the analysis, and highlight the project constraints.

Section 4 will focus on the providing an in-depth description of the problem statement and describe the intricate processes of the Accelerate Order Flow. We will also review the hypothesis of the project, current state process, review the analysis, introduce the results, and provide recommendations for the Accelerate Order Flow project.

Section 5 will introduce the Socks Process Improvement project. We will introduce and define the goals of project, review the approach, analyze the current state for the factories of focus, review the flow of inventory, and review the results and the recommendations.

Section 6 will summarize the overall intuitions and insights generated from the project, including next steps for Nike and food-for-thought for the industry. Suggestions for pilot projects and future work will also be discussed.
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3. Methodology/Approach

The objectives for Accelerate Order Flow and the Socks Improvement Project were achieved by investigating the current state, analyzing the problem with data and interviews from key stakeholders, developing initial recommendations, and developing a plan for future implementation. This section will present the methodology that was used to conduct a meaningful research study, and to provide tangible insights for the Always Available team, refer to Figure 4 below.

![Figure 4: The methodology designed for the Accelerate Order Flow and Socks Process Improvement project](image)

### 3.1 Accelerate Order Flow Methodology

The strategy for the Accelerate Order Flow process was to develop an understanding of the process that would result in the most useful recommendations for Nike and Nike’s retail partners.

#### 3.1.1 Phase 1: Investigate Current State
The first stage of the Accelerate Order Flow project consisted of understanding the project from the perspective of the Always Available team. The investigation began with a review of the process to understand the weekly and monthly process – from when a retailer places an order to when the order is received. A significant portion of this work involved engaging with subject matter experts, reading process documents, and becoming familiar with the terminology. It is especially important to understand the tasks and how issues are resolved by engaging with the people that perform the daily, weekly and monthly tasks. This insight is especially important when recommending a process change. This stage took 1 month to complete, but additional data was collected throughout the project.

3.1.2 Phase 2: Analyze Data

The next step in the process was to use data analysis, and the perspective of external stakeholders to understand the problem. To begin, a series of stakeholder interviews were conducted to understand the problem from the view of stakeholders that engage directly with the retailers on a daily basis. This includes interviews with customer services teams, transportation (World Headquarters and Distribution Center), and multiple supply chain teams in the organization. The intent of the external interviews was to extract qualitative data to understand the reasons for the retailers’ feedback, the history of the relationship with the retailers, past initiatives to improve performance, and the levers in place to drive decision making. It is important to mention the complexity of Nike’s matrix organization structure and its role in the priorities of various stakeholders. See below for a sample of the interview questionnaire:

- What is the Accelerate Order Flow?
- How does the current process impact your organization?
- How does your team engage with the Always Available team?
- What is the retail customer’s perception?
- What is the root cause of the current performance?
- What recommendations would you make to improve the process?

This process was especially beneficial during the first stages of the project, and a significant portion of the feedback influenced the final recommendations.

The second portion of the analyze data phase was to review the historic data to understand the trends. We investigated two years’ worth of data – we used this data set because it was the most relevant and available data for the project. We reviewed the historic ordering patterns, order-to-delivery date, inventory patterns, point-of-sale, order confirmation,
etc. This activity began to unveil the bottlenecks in the process, and the primary opportunities for improvement in the process. We focused on six main retailers, with a special focus on Account X – the names of the retailers will be excluded from this thesis as a part of the non-disclosure agreement.

The last phase of the data analyze phase was to start tracking the performance at the distribution center throughout the duration of the internship. The intent was to compare current state to prior performance, and to identify whether the incremental changes resulted in positive improvements at the distribution center— it is important to mention that some of these improvements were not directly related to the thesis work.

The data analyzed were derived from SAP, Warehouse Management System and Customers Service dashboards. The analysis tools used for the thesis work include Alteryx, Excel and Tableau. This stage lasted throughout the duration of the internship.

3.1.3 Phase 3: Develop Initial Recommendations

The initial recommendations were derived after the first stage of the data analysis and stakeholder interviews. The intent of the initial recommendations phase was to present a set of recommendations based on the analysis and the stakeholder interviews, and to begin to from focus groups with multiple stakeholders to review and revise the recommendations based on business need and previous experience. This phase was especially important for the project because stakeholders across the matrix had to agree on solutions that are mutually beneficial for all parties. This activity was very successful, and led to recommendations that were suitable for multiple stakeholders and retailers. This phase lasted for a month.

3.1.4 Phase 4: Present final recommendations

The final recommendations were divided into the following categories: Order-writing, Distribution Center processes, Call-for-Routing, and Transportation. These sectors proved to possess the greatest opportunities of improvement for the scope of the internship.
3.2 Socks Process Improvement

The strategy for the Socks Process Improvement research study was to understand the capabilities required to implement a direct from factory to retailer capability for Nike’s equipment business, specifically the socks SKUs. This project is different from the Accelerate Order Flow project because instead of identifying process improvement strategies at the Distribution Center, the goal is to conduct a capabilities study for the new initiative.

3.2.1 Investigate Current State

The current state analysis for the Socks Process Improvement project consisted of understanding the capabilities required to implement a direct ship from factory to store strategy for Nike. The project scope consists of the sock factories that have distribution centers that exist nearshore or onshore. We selected the onshore/nearshore sock factories because the volume of sock styles produced at these factories, in addition to close proximity to the end consumers.

This process of understanding the current state involved meeting with the North America Always Available Inventory Planning team, Global Always Available Safety Stock team, factory liaisons to understand the day to day activities of the current process. These teams were ideal because they understand the sock production to distribution process from the perspective of the Always Available team. Collaborating with these teams set the structure of the thesis work.

3.2.2 Analyze Data

We focused on analyzing the inventory data for the nearshore/onshore factories to understand the variance between quantify forecasted and ordered. Understanding the difference, including the reasons for the variance, established a base for understanding the amount of inventory that could shift from Nike’s distribution center to the factory.

In addition, we analyzed the inventory levels at the factory for two years to segment the seasons into high and low inventory required. High levels of inventory seasons are seasons in which there is a significant increase of inventory required to meet demand, e.g.: back to school and holiday. These are the seasons that may require a dual sourcing inventory model, assuming the factories are not able to hold inventory above a certain threshold – the threshold varied by factory and is still to be determined. Low level inventory seasons are seasons with inventory levels closer to the average demand.
We also began the work of collecting data on how other teams made a direct ship strategy work for other business models. These teams include the NFL and In-Season-Response. This involved meeting with NFL factory partners, NFL inventory teams and In-Season-Response Inventory Planning teams to understand the system requirements, inventory planning strategies, and transportation processes. This process was crucial to the success of the thesis work because it set the base for the feasibility of the final thesis recommendations.

### 3.2.3 Develop initial recommendations

The initial recommendations were focused on how each node in the supply chain would be affected by the direct ship model. We conducted a feasibility study that combined the analysis from stakeholder interviews, existing capabilities, and the potential impact on each node to determine that the primary nodes of focus are: transportation, order management system and factory capabilities.

### 3.2.4 Present final recommendations

The final recommendations extended the feasibility study to look at the potential impact of the inventory shift on the factory, Nike’s distribution center and transportation. We also conducted a quick review of the potential implementation costs to get a high level understanding on if the project would result in gains or losses for Nike.

### 3.3 Project Constraints

The primary constraint of the thesis project was the inability to visit the Distribution Center or sock factories to collect data and run experiments. The primary sources of data were from interviews and data collected in Nike’s SAP, Warehouse management and Electronic Data Exchange systems. The data was reviewed throughout the internship, but relied heavily on the assumption that the data was validated by individuals external to the thesis project. The data used in the research was not robust due to fact that each source of data varied based on the team that the data was obtained from.

This constraint impacted the outcome of the Accelerate Order Flow project because we were unable to record data on each transaction, review the intricacies of the process, and test recommendations. A visit to the socks factory for the Socks Process Improvement project would have provided an opportunity to conduct a feasibility study to assess the inventory and process capability of the factory. As a result of the assumptions and statements rely heavily on the data collected through interviews.
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4. Accelerate Order Flow

This section will provide an in-depth description and analysis of the Accelerate Order Flow process. The description and analysis will include a detailed review of the problem statement and current state. It will also provide an overview of the analysis, results and recommendations derived from the thesis work.

4.1 Problem Statement

4.1.1 Objective

The purpose of the Accelerate Order Flow initiative is to provide insights on the current order-to-delivery performance for Always Available products. The analysis for this project includes calculating the order-to-delivery time, understanding the process, and uncovering the bottlenecks in the order flow process in Nike’s two primary distribution centers in Memphis. This scope of work will include apparel, equipment and footwear for the men’s training, women’s training, youth, basketball and running product categories.

4.1.2 Approach

The approach for the thesis work will include reviewing the current state, working with key stakeholders to identify opportunities for improvement for Nike and its retail partners, and providing a framework for recommendations.

The thesis will focus on the following processes:

- **Order writing**: Orders are sent from retailer to Nike Customer Service teams either electronically or manually, most orders are placed electronically through an Electronic Data Interface (EDI). Majority of the order transactions are made between Sunday and Wednesday.

- **Distribution Center (DC) Operations**: DC operations begins when an order moves from the Customer Service teams to the Distribution Center – this process is done electronically. The process also includes picking, sorting, value added processes (VAS) and packing.

- **Call-for-Routing**: After (and in some case as) an order has completed the DC Operations process, Nike submits a routing request to the retailer’s operations team. This process is required for the six retailers this thesis focuses on because the retailers have chosen to manage the transportation process themselves. Routing must be placed before orders are shipped to the retailer.
**Transportation:** Transportation is managed by the retailers and may occur in the following forms:

1. **Call for carrier:** Retailers send carriers to Nike’s distribution centers after routing is placed and orders are ready to be shipped.

2. **Drop Ship:** Every week retailers assign dedicated carriers for Nike. In the drop ship process, trailers for carriers are packed as orders are processed. With this process, Nike does not wait for the retailers carriers to arrive after routing is placed, the trailers for dedicated carriers are already staged on Nike’s yard, prior to routing.

3. **Nike manages transportation:** In the rare occasion that Nike manages the transportation process for the retailer, routing is not required. Nike coordinates the carrier for the retailer, and the retailer receives a notification that the delivery is on its way.

Refer to Table 1 for an overview of the cost benefit analysis for the transportation options listed above.

**Table 1: Cost benefit analysis of transportation options**

<table>
<thead>
<tr>
<th>Routing Process</th>
<th>Benefits</th>
<th>Cons</th>
<th>Estimated Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call for carrier</td>
<td>• No extra trailers at the Nike DC (less congestion)</td>
<td>• Orders are placed in temporary carriers until the carrier arrives</td>
<td>Up to 7 days</td>
</tr>
<tr>
<td>Drop Ship</td>
<td>• Orders are packed as they are processed</td>
<td>• Nike has to receive the approval of the retail customer before the carrier is shipped • A mix of approved and un-approved carriers</td>
<td>3 to 5 days</td>
</tr>
<tr>
<td>Nike manages the transportation</td>
<td>• Order are packed as they are processed • Access to Nike approved carriers</td>
<td>• Increase in transportation costs</td>
<td>1 to 2 days</td>
</tr>
</tbody>
</table>

*Note: These figures are rough estimates the non-disclosure agreement prevents the use of actual data. Although the numbers are fictitious they provide a “close to accurate” representation of the current performance.*

**Account Relationships:** Managing relationships with retailers are an important, yet often overlooked, part of the order flow process. At this time retailers hold majority of the power in the order flow process, specifically Call-for-Routing and transportation.
4.2 Current State

This section will define key terms, introduce the hypothesis, and describe the procedures and performance of the order flow process during the internship. The flow will describe the process both analytically and qualitatively—highlighting historical data when relevant. We will review the root cause for the current performance, and will discuss the six retailers in detail—with a focus on the retailer known as Account X.

4.2.1 Initial hypothesis

The hypothesis at the conception of the thesis project is that delays in the order-to-ship time is primarily due to inefficiencies in the Call-for-Routing process. This hypothesis was formulated from feedback and initial research conducted by the Distribution Center transportation team. The thesis project attempts to confirm or disprove this hypothesis, and to review the entire process to identify other potential causes.

4.2.2 Definition of order to ship time

Order-to-ship time will be defined as follows: order receipt to carrier pickup. The goods receipt process includes the SKU and quantity of the products that the retailer intends to order for that week. The carrier pickup process occurs when a retailer assigned carrier arrives at Nike’s distribution center. This definition of order-to-ship time is used across the Always Available team, and teams across the organization.

4.2.3 Process Overview

The process for Accelerate Order Flow consists of four major categories: Order Management, DC Processing, Transportation and Account Processing.

I. Order Management

The first step in the process occurs when retailers submit orders for the week. The order is sent either electronically through an Electronic Data Interchange (EDI) system or manually through a customer service/market place team representative. Order management takes, on average, less than a day to process. The figure below shows a process map of the Order Management process after the order is received.
When an order is received, the order is assessed for issues, including: mismatched delivery dates, orders that deplete inventory, missing data, etc. The issues are then categorized and allocated to the appropriate teams. The time required for issues processing varies by the type of error. Simple errors like mismatched ordering dates are resolved quickly, while orders that constrain inventory take longer to resolve. After issues are resolved they are transmitted to the Distribution Center during daily batch runs. This process is handled electronically and the lead time is negligible; the efficiency, however, depends on when the batches are ran relative to when an order is submitted.

Overall, upon analyzing the data, we determined that this process is not the primary constraint in the system because the process is fairly automatic and over 80% of issues are resolved in less than a day. However, there are opportunities for process improvement that will be discussed in the recommendations section.
II. Distribution Center (DC) Processing

The Distribution Center Processing segment starts after Order Management and ends when the retail customer picks up the order from Nike's Distribution Center. The Distribution Center process is one of the more variable aspects of Accelerate Order Flow. The variability is a result of the differences in order types, quantity and special requirements associated with each order. Members of the Distribution Center team have stated that it takes the DC less than four days to process an order. This performance is affected by the special requirements of an order (e.g.: value added services) and availability of inventory.

The flow of the Distribution Center can be compared to an assembly line in a manufacturing plant because the processes occur in cells or stations. After an order is sent to the DC, the order is reviewed and allocated into buckets based on priority and customer request date. After the orders are categorized they are then picked from storage (inventory can be found in storage units at the Distribution Center, in containers on the yard, and in third party logistics storage facilities close to the Distribution Center). After the picking process, orders flow through the Value Added Services (VAS) station. Value Added Services for an order may include pricing labels, retailer specific labels, sorting orders in case packs, etc. After Value Added Services orders are packed and staged, the Distribution Center team sends the retailer a routing request. Figure 6 below shows a high level process flow.
The data for Call-for-Routing and Transportation is embedded in Distribution Center Processing, but will be discussed separately because of their significant role in the success of Accelerate Order Flow.

III. Call-for-Routing

Call-for-Routing is the process in which Nike sends retailers a notification of a completed order, and the retailers allocate carriers to pick up the orders. Ideally, an EDI request is sent once or twice a week to allow the retailers transportation system to optimize the amount of space allocated to Nike. This process can take between 3 days to two weeks, depending on when routing is submitted and the availability of the carrier. It is important to note that not every Nike retailer partner has Call-for-Routing embedded in their process. Call-for-Routing is initiated by the retailer. This process allows retailer to have the leverage on how and when they receive
products. Retailers with a Call-for-Routing requirement traditionally have longer order-to-ship times. Despite the benefits for the retailers, Call-for-Routing results in major pain points for Nike, including:

- **Inefficient use of resources**: Call-for-Routing results in inefficient use of resources because every order is touched at least two times by the DC team. Orders are processed based on carrier arrival dates instead of priority because there are strict consequences for Nike when carriers spend more time than allocated at Nike’s distribution center. For example, most carriers expect to spend one to four hours picking up orders at Nike’s distribution center, for each additional hour after the allocated time the retailer is charged a fee by the carrier, and the fee is then charged back to Nike.

- **Double packing**: Call-for-Routing orders (not including drop ship or Nike owned transportation) are typically staged in temporary trailers prior to the arrival of the retailer assigned carrier(s). This requires extra labor resources and trailers.

- **Limited routing**: For some retailers, routing occurs infrequently and is limited to only one to two times a week, and in some cases routing is only allowed on specific days of the week.

IV. Transportation

As stated in a previous section, Nike’s top retailers are responsible for providing and managing the transportation process, including identifying and allocating carriers. The benefit to the retailers is that it allows the retailers to use non-asset based carrier system to reduce costs, schedule inbound shipments, etc. [10] [11] [12]. Table 2 describes and highlights the pros and cons of a few of the transportation methods investigated for the thesis.
<table>
<thead>
<tr>
<th>Transportation Method</th>
<th>Definition</th>
<th>Benefits</th>
<th>Cons</th>
</tr>
</thead>
</table>
| Drop Trailer          | A truck trailer is dropped at a pickup location before routing request is placed (e.g.: distribution center) [13] | - Trailers can be packed when shipments are complete, and at the convenience of the vendor (e.g.: Nike)  
- Optimizes picking and packing time, this allows orders to flow through distribution centers efficiently  
- Retail customers are not typically charged for driver wait time  
- Allows for full truckload and less than truckload shipments [14] | Expensive for retailer |
| Call for carrier      | A non-asset based carrier is requested after the routing is complete [15] | - Lowest cost option for the retailers  
- Allows for full truckload and less than truckload shipments  
- Allows for multi-stop pickups for retailers | Difficult to predict arrival time  
- Variability in the carrier type and quality  
- Slowest transportation option |
| Parcel Shipments/ Direct to Store | Orders are shipped in parcels through third party logistics partners such as UPS/FedEx [16] | - Allows for small shipments that can be sent directly to retail stores  
- Fastest transportation option | Depending on the quantity of orders, may be a very expensive option for the retailers and Nike |
V. Account processing

Account processing is defined as any activity that occurs after the responsibility of an order shifts from Nike to the retailer. This process may include shipments sent directly to retail stores or to distribution centers, see the figure below for a high level overview of the process. Unfortunately, we were not able to obtain copious amount information on the activities that occur after an order shifts from Nike’s responsibility. Majority of the information we were able to acquire about the Account processing section is based on anecdotes from the retailers and assumptions made about the process. The assumptions were made with the assistance of subject matter experts and from the customer service operations team.

![Flowchart](image)

*Figure 7: The flow of activities in the retailers supply chain after an order is shipped from Nike’s distribution center*
The high level summary of the allocation of time for the order flow process can be seen in the figure below. The figure illustrates that majority of the lead time is spent in Account Processing.

![Diagram of order flow process](image)

**Figure 8:** The combined view of Accelerate Order Flow and the average time it takes in each process.

See Figure 9 for a percentage breakdown of the main categories of the order-to-delivery process: Order Management, DC Processing and Account Processing. Transportation is included in the data for DC processing because the data available does not separate DC processing from transportation.
4.2.4 Current performance

Upon initial analysis, and based on customer feedback, we discovered that order-to-delivery for Always Available products takes up to 33 days with a fill rate of between 50 and 95%. Fill rate is defined in equation 1.

\[
\text{Fill Rate} = \frac{\text{Shipped Qty}}{\text{Forecasted Qty}} \times 100\%
\] (1)

In contrast, consumer goods companies' boast of order to ship times of less than 5 days with fill rates of 99% [17]. Based on this comparison, it is evident that Nike has room for improvement.

4.2.5 Focus on Nike's top 6 accounts

The thesis work focused on analyzing the performance of the top six retail partners for Always Available. These retailers were chosen because they contribute to a significant portion of the units ordered per week and/or greatest revenue earned for Nike. To protect the identity of
the retailers, they will be referred to as Account 1 to 5, and a special focus on a sixth account which we will refer to as Account X. Retailers categorized as sporting goods sell functional sporting apparel and equipment for youth and sports teams. Moderate department stores sell sports apparel, footwear and some equipment (socks and bags), in addition to a variety of other products including kitchen goods, fragrances, fashion clothing, etc. Specialty sports and footwear stores sell urban and fashionable sports merchandise. Table 3 below categorizes the retailers by type.

Table 3: Retailer Categorization

<table>
<thead>
<tr>
<th>Retailer</th>
<th>Account Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Account 1</td>
<td>Specialty sports and footwear</td>
</tr>
<tr>
<td>Account 2</td>
<td>Sporting Goods</td>
</tr>
<tr>
<td>Account 3</td>
<td>Moderate department store</td>
</tr>
<tr>
<td>Account 4</td>
<td>Sporting Goods</td>
</tr>
<tr>
<td>Account 5</td>
<td>Moderate department store</td>
</tr>
<tr>
<td>Account X</td>
<td>Moderate department store</td>
</tr>
</tbody>
</table>

Table 4 below highlights the special characteristics and process requirements that are specific to the Accelerate Order Flow process for the six accounts.

Table 4: Profile of the performance for six accounts

<table>
<thead>
<tr>
<th></th>
<th>Account 1</th>
<th>Account 2</th>
<th>Account 3</th>
<th>Account 4</th>
<th>Account 5</th>
<th>Account X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order to Ship Performance ranking</td>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
<td>4th</td>
<td>5th</td>
<td>6th</td>
</tr>
<tr>
<td>Mode of Delivery</td>
<td>Direct to store</td>
<td>Drop Trailer</td>
<td>Direct to DC</td>
<td>Direct to DC</td>
<td>Direct to DC</td>
<td>Direct to DC</td>
</tr>
<tr>
<td>Multi-Stop?</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Frequency of Routing (per week)</td>
<td>Unlimited</td>
<td>Unlimited</td>
<td>Unlimited</td>
<td>2X</td>
<td>Unlimited</td>
<td>1X</td>
</tr>
<tr>
<td>Call for Routing?</td>
<td>Yes *</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Allowable Shipment Days</td>
<td>Unlimited</td>
<td>Unlimited (upon FIL)</td>
<td>1X</td>
<td>2X</td>
<td>Unlimited</td>
<td>Limited (1wk after Order)</td>
</tr>
</tbody>
</table>

The section below will provide the definition of the categories shown in the table above.
- **Order to Ship Performance Ranking**: The ranking was derived from the order-to-ship time for each retailer. Order-to-ship time consists of the amount of time spent in Nike’s Order Management and Distribution Center process. We have chosen to mask the actual order-to-ship data for the retailers as a part of the NDA agreement, and will rank them by performance instead. Account 1 had the best performance of the six retailers over the course of a year. This account achieved an order-to-delivery time of 3 to 7 days. However, Account X, consistently placed as the retailer with the greatest opportunity for improvement, with an order-to-delivery time of 9 to 15 days.

- **Mode of delivery**: The mode of delivery describes the trucking process available for each retailer, and determines the space allocated for each shipment. The three modes are full truck-load (FTL), less than truckload (LTL) and small parcel shipments,

  a. **Full truck load**: These are shipments in which the carrier is “full” or meets the weight and volume specified by the retail customer. This transportation option is typically cheaper on a per unit basis. Full truck load shipments typically take longer to leave the distribution center because of the weight or volume requirements. The amount of time required to fill a truck depends on the units shipped; for some retailers it takes 1 day for others it may take up to 1 week [18].

  b. **Less than truck load**: This type of shipment option allows for shipments that are less than the full truck load requirements. Less than truck load requirements are specified by the retail customer. Retailers select the less than truck load option for a variety of reasons including: to obtain shipments faster, and to make multiple stops at other vendors. To obtain this faster option retailers typically pay more for transportation on a per unit basis [19].

  c. **Small parcel**: Small parcel shipments give retailers the flexibility of shipping through logistics partners like UPS or FedEx. The benefit of small parcel shipments is that retailers can ship pallets, typically less than 150 pounds, directly to a retail store or distribution center. This option provides flexibility and convenience for a higher per unit cost. Small parcel shipments require an additional use of distribution center resources to pack orders in to small packages, mark packages for store, and value added services specific to a store location. This option is beneficial for retailers with smaller weekly orders (e.g., less than 50,000); extending this option to retail customers with larger orders may lead to significant resource constraints in the distribution center [20].
• **Method of delivery**: The method of delivery indicates where shipments are sent to. We analyzed two methods of delivery for the thesis work: direct to DC and direct to store.

  a. *Direct to DC*: This option is for retail customers that choose to receive orders at their distribution centers. These retail customers typically receive orders in large pallets, then separate and allocate orders for specific stores in their portfolio. This option also allows retailers to perform value added services, manage the inbound process and customize shipments for specific stores. In some cases, this process minimizes the amount of time orders spend at Nike’s distribution center, however the additional services that have to be performed at the customer’s distribution center may increase the amount of time spent in the Account Processing portion of the order-to-delivery time.

  b. *Direct to store*: Retailers that prefer orders shipped directly to their retail store typically opt for the direct to store shipments. Orders are usually sent through small parcels shipped via UPS and/or FedEx. This mode allows for the most flexibility for the retailer, but may be more complex for Nike due to the amount of processing required.

• **Multi-stop**: Multi-stop is the process in which a retailer optimizes the transportation route by including stops at multiple vendors before and/or after a pickup at Nike. This is typically done to optimize the FTL packing process. However, multi-stop is fairly complex and may result in delays in the order-to-delivery lead time.

• **Frequency of routing**: The frequency of routing is the number of times the retail customer allows Nike to place a routing request. Some retailers only allow one routing request a week, others allow for unlimited routing.

• **Call-for-Routing**: Call-for-Routing is a process that is required for most of Nike’s top retailers. Call-for-Routing lets retailers dictate the day and frequency in which they want to receive orders. Retailers can request routing once a week, on specific days, or an unlimited amount. See the Call-for-Routing section above for more information.

• **Allowable shipment days**: This is the frequency in which retailers send carriers to Nike’s distribution center. Allowable shipment days are typically synchronized with the routing date.

A quick glance at Table 4 will reveal that there is a significant amount of variability that exists for these retailers. There is variability in both process and performance. At the time of the internship, it was difficult to pinpoint the cause of the variability. The most consistent conclusion that we were able to gather is that the variability is caused by the procedures the retailers
dictate to Nike, and the special requirements Nike assumes for each retailer. This thesis work provides an opportunity for Nike to work with retailers to review and revise current procedures.

4.3 Results

The initial goal of the thesis was to review the order-to-delivery process for the Always Available leadership team, and provide a suite of options to improve the current performance. The results in the following sections will describe the results that inspired the final recommendations of the project. This section will highlight the inefficiencies in the current process, and will provide the analysis on the root cause of variability for the retailers, specifically Account X. This section will also highlight the variance between the desired goal and the current state, and the actions necessary to bridge the gap.

The initial hypothesis stated that the primary culprit in the long lead time was the Call-for-Routing process. However, upon investigating the data for the top six accounts, the data shows that the primary culprit is not just Call-for-Routing, but instead the variability in the processes specifically: 1) the lack of standardization of processes for each retailer and across all of the top, and 2) the variability in the weekly process that occurs each week.

Analysis of the order-to-ship time, shows that only 40% of orders (one month sample data) are shipped within seven days of ordering, and a majority of orders are shipped in the 9 to 14 day time frame, refer to Figure 9. The lateness rate in this scenario is defined as the percentage of orders are not shipped in the expected timeline.

\[
\text{\% lateness rate} = 100 - \% \text{ of orders shipped during the expected time frame} \quad (2)
\]
Figure 10: The distribution of the quantity of orders shipped by order-to-ship time

Achieving an order-to-delivery time of 7 to 12 days will require an order-to-ship time of 3 to 5 days; only 10% of orders are shipped in this time period, resulting in a lateness rate of 90%. This does not include the time spent in transportation, and in the retailers' distribution center. As a result, the current state is significantly longer than the seven day order-to-delivery goal for Always Available.

In the following section, we will review the results of the four segments of the process that were the primary focus of the thesis work.

4.3.1 Order management

In the research we discovered that the average time it takes to submit and receive an order is one day. Most orders are sent electronically through a data interchange system, the orders are then reviewed by the customer service and Always Available team. This process takes up to 4 hours to process. The amount of time varies by the type of retailer, and the order size. A few of the retailers researched require a special process of reviewing and approving every single order; this process requires more time and resources than other retailers that have an instant approval process. At this time we believe that this process is efficient – with the exception of the retailers' that have the special requirement. However, there are a few opportunities that would significantly improve the current performance, including:
• **Shifting the days that orders are submitted.** Most of Nike's retail customers submit orders at the beginning of the week. We assume that customers prefer to place orders at the beginning of the week because they expect orders to be shipped by the end of the week (2 - 3 day turn time). However, the high volume of orders concentrated in the first two to three days of the week overloads the distribution center, and makes this goal unachievable.

• **Reviewing the issues resolution process.** Resolving issues consumes most of time in the order management process. Reasons for issues include errors on the purchase orders, inventory constraints, pricing errors, etc. Depending on the severity, issues may take between 4 hours and a few days to resolve.

• **Infrequent batch processing for orders.** A batch process is run to move orders from the customer service system to the distribution center system. A distribution center does not receive the order until the batch process occurs. At this time, the batch is ran once a day. The impact of once a day batch processing is that it delays when the distribution center receives an order. Orders that are sent after the cutoff time are delayed until the next batch process, the following day.

4.3.2 Distribution Center Processing

Distribution Center (DC) processing includes the time spent sorting and packing orders, executing value added services, and staging orders for transportation, refer to Table 5. Several assumptions had to be made to obtain the final results on the time spent on each segment because the data available did not separate the time for each segment.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time spent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packing</td>
<td>Up to 2 days</td>
</tr>
<tr>
<td>Value added services</td>
<td>1 hour to 2 days</td>
</tr>
<tr>
<td>Staging</td>
<td>Up to 1 day</td>
</tr>
<tr>
<td>Wait time for routing and transportation</td>
<td>1 to 5 days</td>
</tr>
<tr>
<td>Loading (on the carrier)</td>
<td>Up to 1 day/carrier</td>
</tr>
</tbody>
</table>

From Table 5 we can observe that majority of time is spent in wait time. This result is consistent across the six accounts of focus. The wait time is unpredictable, and varies by retailer and carrier. This is also out of the control of Nike's distribution center team. The time
spent in this area can be significantly improved, and additional details will be discussed in the Call-for-Routing section below.

4.3.3 Call-for-Routing

Call-for-Routing is the process in which Nike notifies the retailer to send carrier(s) when an order is ready. The initial hypothesis states that Call-for-Routing is the main culprit of the current order-to-delivery performance. To test the hypothesis, the retailers were separated into two categories, Call-for-Routing and non-Call-for-Routing. Figure 11 below shows the variability in order-to-ship time for the year of data collected. The various lines show the average for a sample set of the accounts. The solid black line shows the average for the accounts that have Call-for-Routing, and the grey dotted line is for the accounts who do not. This data set shows that the non-Call-for-Routing accounts will perform more consistently and better than Call-for-Routing accounts. This result was consistent for every month that was analyzed, and for every style and order combination. Overall, Call-for-Routing is a major constraint in the system, and is one of the main contributors to the current order-to-delivery time. The process should be revised to achieve the desired order-to-delivery goal.

For future analysis, it would be beneficial to track the Call-for-Routing process at an order size and retailer level, preferably at the distribution center. The data available was included in the DC processing time, and it was difficult to segment the data. In addition, understanding the reason for the timing would have been beneficial; for example understanding what led to the late arrival of a carrier, and what are the scenarios in which a carrier arrives in one day versus 4-5 days? It is important to understand the levers that motivate better performance on a weekly basis—at this time the information is only collected informally.
Due to the fact that Call-for-Routing is a significant time constraint, we investigated the option of eliminating Call-for-Routing. Initial analysis showed that to eliminate Call-for-Routing potential setbacks must be addressed, including:

- **Inbound receipt**: Call-for-Routing is the preferred option for retailers because it allows the retailer to manage and predict the inbound receipt process at their distribution center. Eliminating Call-for-Routing will disrupt this process for the retailer, but will improve Nike’s ability to predict the outbound process. It is important to work with the retailer to identify a mutually beneficial solution for eliminating the Call-for-Routing process because at this time it is a significant constraint for Nike.

- **Cost**: The ability to predict when orders will arrive at the distribution center also allows the retailer to manage labor and resources. The retailer also benefits from Call-for-Routing because it allows the retailer to save costs on transportation because it allows a retailer to use non-asset based transportation. Eliminating Call-for-Routing may significantly increase the cost for the retailer because it will result in implementing a different transportation and labor process.

- **Impact to the distribution center**: At this time, Call-for-Routing is directly tied to the customer managed transportation. Eliminating the Call-for-Routing process may require Nike to provide transportation and/or manage the transportation for the retailer, resulting in an increase in cost and resources for Nike. However, the benefit of managing the transportation process may be more beneficial in the long run.
4.3.4 Transportation

Currently, transportation is managed by the retailer. The consequence of this strategy is that the type and quality of carrier is variable. Retailers often use non-asset based carriers, which means that they use brokers to secure carriers, and a carrier may be selected primarily because they are the lowest cost option. A non-asset based carrier system optimizes cost for the retailer, but results in high variability in type of carrier. The assumption is that the better the quality of the carrier the better the service. There is also a higher probability that Nike has an existing relationship with the carrier. Knowing the carrier ahead of time allows the Nike team to prepare the right equipment ahead of time which results in a faster packing process. In addition, while observing the transportation process we discovered that low quality carriers tend to arrive late, resulting in delays of up to 3 days or more. Depending on the quantity of orders in a week, retail customers can send between 2 to 20 carriers a week. This data includes full truckload (FTL) and less than truckload shipments (LTL). Managing this quantity of carriers, in the current state, can introduce a significant amount of variability for the distribution center team – this assertion was validated by the distribution center transportation team.

4.3.5 Focus on Account X

Account X is one of Always Available largest retailers, based on the weekly order quantity. Account X was selected because it has one of the most complex processes, and the retailer expressed interest in conducting a pilot project. The order-to-delivery time, at the time of the internship, was 33 days- this includes an order-to-ship time of 9 to 14 days. The goal is to significantly reduce the order to delivery time, if possible. Analyzing the current process for Account X revealed that the current performance is most impacted by Call-for-Routing and multi-vendor pickups.

The Call-for-Routing process for Account X is special in the sense that the retailer has approved once a week routing submissions that must occur only on Thursdays. This retailer typically places orders on Monday, making the three day turn around process very difficult for Nike given that it takes the distribution center 3 to 5 days to process an order. For retailers like with order quantities like Account X processing typically takes close to 4-5 days. The impact of Thursday only routing is that if orders are not processed by Wednesday the order is delayed until the next routing date, one week later. This results in a non-negotiable seven day addition to the order-to-ship and order-to-delivery time. This is seven more days in Nike’s system and distribution center. However, the benefit of once a week routing is that the research has shown
that it allows Nike to consolidate the orders into fewer FTL carriers. However, a Thursday routing schedule gives the retailer flexibility to add and change orders before Wednesday night.

Account X is also one of the only accounts that has a multivendor pick up strategy. A multivendor pickup is when a carrier stops at multiple vendors in the area or on the route of delivery. Despite being economically efficient for the retailer, multi-vendor pickups lead to an increase in the number of LTL shipments. For a retailer as large as Account X, this means an increase in the number of carriers that arrives at Nike’s distribution center. For example, a retailer without multivendor pickups and approximately the same number of units sends 10 carriers to the Nike distribution center. Account X sends between 20 to 30 carriers a week. Multi-vendor pickups are one of the primary contributors to carrier delays, and carriers that are overcapacity. The benefit of the multi-vendor strategy for the retailer is that it minimizes transportation costs and optimizes pickup routes [21].

Based on the research, the current process of routing and pickups will make it especially difficult for Account X to reduce the order to store lead time by 50% without significant changes to the routing and transportation process.

4.3.6 Learning from an exemplary account

Thus far, we have discussed the results of the overall process, and the process for Account X. It is important to review the best performing retailer to understand that how the retailer is able to achieve the best performance. We must also understand the potential gains that could be achieved from revising the current strategy. For this analysis we will compare the performance of Account 1 to Account X’s to understand the difference in processing patterns. For the months reviewed, Account 1 consistently performs the best out of Nikes top wholesale retailers. Account 1 achieves an order-to-delivery that is over 60% less than Account X’s. Table 6 summarizes the primary differences between the two retailers.

<table>
<thead>
<tr>
<th>Table 6: A comparison of Account X and top performing Account 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Account 1</strong></td>
</tr>
<tr>
<td><strong>Order-to-delivery time</strong></td>
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<tr>
<td><strong>Average order size</strong></td>
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<tr>
<td><strong>Method of Delivery</strong></td>
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<tr>
<td><strong>Mode of Delivery</strong></td>
</tr>
<tr>
<td>Frequency of routing</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Multi-stop</td>
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<tr>
<td>Allowable shipment days</td>
</tr>
</tbody>
</table>

The figure below shows that Account 1 has simplified the order-to-delivery process by shipping directly to store and bypassing the distribution center – the two areas that result in the most delays in the process. Additionally, shipping in small parcels allows Account 1 to bypass the traditional Call-for-Routing process.

![Flowchart](image)

*Figure 12: This figure describes the order-to-delivery process flow for Account 1*

**4.3.7 Summary**

Overall, the analysis shows that variability in the end to end process is the root cause of the long lead time to retail store. A primary realization is that isolated fixes will not lead to substantial gains. The biggest gains will be achieved from incremental changes to every segment of the process. For example, improving Call-for-Routing by 50% will only lead to a small gain if the retailer does not shorten the time spent in their supply chain or improve the transportation process.
The current order-to-ship time not only affects the supply chain for the retail customer and for Nike, but also contributes to long lead times; long lead times have shown positive correlations to lost sales, slower inventory turns in the marketplace, and unproductive inventory. The impact of the current performance makes it difficult for retailers to replenish inventory at a predictable pace. This directly impacts the end consumer experience because when an end consumer attempts to find a product in the marketplace they are unable to find the right product, at the right place, at the right time. Retailers want to maximize profit and as a result they cannot risk the possibility of not making a sale. When Nike products do not arrive in stores on time, retailers have to fill the empty space with products from Nike’s competitors – a risk that Nike cannot afford to take as the top sports apparel company in the industry.

Figure 13: A marketplace example of the impact of slow inventory turns caused by long lead times

Within the realm of Nike’s top retailers, the best performing retailer is able to achieve significant gains by transforming the process and executing very differently than other retailers. The other retailers have the ability to achieve and surpass Account 1’s performance, but it will require a transformation in the current process. Overall, the analysis shows that variability is the culprit of the current performance. The primary question that the leadership team should be asking is not “how do we fix Call-for-Routing” but instead “how much are we willing to transform the current process to achieve desired results”? 

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4.4 Recommendations

The primary learning from the Accelerate Order Flow project is that to achieve the greatest level of success, collaboration is key. Only deliberate collaboration between Nike and the retailers will yield successful results across the supply chain. The analysis and results have inspired the recommendations below. The recommendations will provide suggestions on how, with collaboration, Nike can improve the lead time in Order Management, Distribution Center operations, Call-for-Routing and Transportation.

4.4.1 Order Management

The issues resolution and the order receipt process are the primary pain-points in the Order Management process. The first recommendation is to improve the issues resolution process by including more visibility across the supply chain, as well managing the allocation of inventory. Suggestions for future development include an order management system in which Nike has visibility into the retailer’s point of sale data. Access to the point of sale data will allow Nike to have the ability to predict the quantity a retailer will and should order. This functionality may also lead into a process in which Nike tells the retailer what to order based on past history, and allocates inventory/delivery dates based on availability, and the retailer reviews and approves the order – completely automating the order submission and resolution process. Retail and consumer goods companies are increasingly relying on point of sale data to streamline the business and integrate seamlessly with vendors [22]. Procter and Gamble and Walmart recently integrated their forecasting and replenishment systems to enable a seamless order management process [23]. Integrating the process may also result in reducing bullwhip.

4.4.2 Distribution Center Operations

In the results section, we concluded that Call-for-Routing is the primary culprit of the current Distribution Center processing time – recommendations for this issue will be discussed in the Call-for-Routing below. However, the distribution center can also benefit from improving the processing time of orders – specifically by separating Always Available orders from orders with less sensitive timelines. Always Available orders require faster turn times, but are processed in the same assembly line as orders with less urgency. To achieve a faster turn time, it will be beneficial to either prioritize replenishment orders or develop a separate and accelerated assembly line. Restructuring the distribution will require significant investment and process change – costs that may not be feasible at this time. As an alternative, we suggest using “assembly cells” or dual lane processing instead of assembly lines for replenishment.
orders. Assembly cells are typically used in the manufacturing industry, and dual lane processing is popular in the electronic industry [24] [25].

4.4.3 Call-for-Routing

The primary constraints in the Call-for-Routing process is the inflexibility of shipping and routing dates. An improved Call-for-Routing strategy will require increasing the frequency of routing and shipping days in a week. The primary recommendation is to revise the Call-for-Routing agreements to provide a strategy that is beneficial for all. Nike and the retailers must collaborate to identify a strategy that will reduce the constraints caused by Call-for-Routing at Nike’s distribution center, but will minimize costs for the retailer. It is also important to consider the option of eliminating the Call-for-Routing process. This will be a long term strategy because of the impact to the system, labor and costs for Nike and the retailer. Eliminating Call-for-Routing will require the following systemic changes:

- **New transportation strategy:** Eliminating the Call-for-Routing process will need to be accompanied by transforming the transportation process. Call-for-Routing is supported by a retailer managed transportation process. Call-for-Routing allows retailers to reduce transportation costs by bidding for carriers with the lowest cost. The new transportation strategy will disrupt the bidding strategy, and may also require Nike to manage the carrier process. This will result in an increase in labor and transportation cost for Nike.

- **IT infrastructure:** The IT infrastructure will also be disrupted by eliminating Call-for-Routing. The current system is designed to synchronize with the retailer’s transportation optimization system. The extent of the changes required are unknown, but can be identified with a review of the retail customers transportation and logistics infrastructure.

The primary recommendation is to revise the Call-for-Routing agreements to provide an option that is beneficial for all. Eliminating Call-for-Routing may not be feasible given the costs and time constraints, however, it is important to revise the current process because it significantly impacts the ability to shorten the current lead times. It is difficult to identify the exact strategy for Call-for-Routing because the solution may vary by retailer; the ideal strategy will require on adjustments made to order management, distribution center processing, and especially transportation.

4.4.4 Transportation

Transportation is closely tied to the Call-for-Routing process; improvements in Call-for-Routing process will require changes in transportation. The research focused on the portion of
transportation that exists between Nike's distribution center and the retailer's distribution center and/or store. We will focus on four recommendations for transportation: eliminating multi-vendor pickups, consolidating shipments, drop trailers, and Nike managing transportation.

- **Eliminate multivendor pickups**: With this strategy retailers will dedicate carriers only for pickups between Nike’s two distribution centers instead of carriers that stop at multiple locations on the delivery route. Encouraging customers to dedicate carriers solely to Nike will reduce the occurrences of capacity issues, the risk involved with multiple stops, and the quantity of LTL shipments. Customers without multivendor pickups have the ability to consolidate shipments into full truck loads, minimize the number of carriers required, and save costs.

- **Consolidate AA shipments**: Always Available products are shipped with products that are not replenishment products or do not have metrics tied to the number of turns in a season. An analysis of the number of orders per customer revealed that each of the six customers in review order enough units per week to have carriers, FTL, LTL and small parcel, dedicated to Always Available orders.

- **Drop Trailer**: A review of the order patterns of the biggest customers, including Account X, unveiled the benefits of a drop trailers strategy. Retailers with a drop trailer transportation strategy experienced 30% shorter lead times than retailers without drop trailer. A drop trailer strategy also aides in the reduction of redundant work at the distribution centers. A drop trailer strategy will minimize the need for double processing and staging products in temporary trailers prior to the arrival of a carrier.

- **Nike manages transportation**: As mentioned in prior sections, retailers use non-asset based carriers for transportation. Non-asset based carriers contribute to variability and inefficiencies in the transportation process. Retailers with a Nike managed transportation system experience order-to-delivery times of less than 7 days. This assessment is based on the assumption that all things are equal. Transitioning to a Nike managed transportation system will reduce the variability because there will be more consistency with the carriers used. The strategy will also allow Nike to utilize its leverage to improve the service level of carrier companies; assuming the carriers used already have existing relationships with Nike. Despite the many benefits, this strategy will result an increase in transportation costs for Nike, which may be recoupable by billing the retailer, and will require a revision in the pricing and billing contracts.
The final recommendation is for Nike to use its leverage with retailers, and to play an active role in working with retailers to identify solutions that are mutually beneficial. The current strategy is structured primarily to benefit the retailer, but results in redundancy and inefficiencies for Nike. The analysis and recommendations provided in this thesis will provide a good first step for the conversations. Towards the end of the internship, the thesis work began to achieve this goal and contributed to the conversation the leadership team was beginning to have with the retail partners. The thesis work supported the conversation and presented the data necessary to understand the current state.

In conclusion, the work described in this thesis focused on presenting the problem to the leadership team and retailers, and began the process of understanding and identifying potential solutions, however this is just the beginning. Additional work must be done to better understand the retailer’s supply chain, the impact of the recommendations, and the implications of transforming the system. Overall, the thesis achieves the goal of the Accelerate Order Flow project by revealing that variability is the root cause of the current order-to-delivery times, and by showing that strategic collaborations will lead to the most successful improvements.
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5. Socks Process Improvement

This section will provide an in-depth overview of the work that was done for the Socks Process Improvement project. We will state the problem the project intends to solve, the current state of the socks process for Always Available, the results, and the final recommendations.

5.1 Problem Statement

5.1.1 Objective

The purpose of the Socks Process Improvement initiative is to conduct a high level feasibility study on the viability of direct shipping socks from on-shore sock distribution factories to a retailer’s distribution center and/or stores. The project was motivated by an attempt to improve the order-to-delivery time for socks, and to remove redundant inventory buffers in the socks supply chain. At this time socks have four stops before reaching a customer’s store, and three of the stops are redundant. Redundancy in this scenario is defined as an inventory buffer that does not add any additional value from a processing standpoint, besides serving as a temporary storage facility. The objective of the direct ship project is to improve the cycle time of socks by shipping directly from factory distribution centers to the retailers’ distribution center— for Nike’s strategic accounts. The intent of this thesis is to provide the leadership team with a review of existing capabilities that will support a direct ship from factory distribution center initiative.

5.1.2 Approach

This thesis will focus on four factories that produce over 90% of the best performing Always Available socks SKUs. The approach is to review the current process, identify the services at each node, and identify the actions required to employ a direct ship process. The project will focus on understanding the motivation for the project, reviewing the current state, working across functions to identify the constraints of a direct ship strategy, and leveraging lessons learned from Nike’s NFL and In-Season-Response teams.

We also conducted a marketplace review, inventory analysis, system capabilities, and investigated cases in which orders were shipped directly from factory to customers in emergency situations.
5.1.3 Motivation

Nike has experienced a loss in market share in the socks category in key seasons, e.g.: back to school and holiday. The true reasons for the loss in market share are unknown, but the assumption is that it may be caused by the inability to respond swiftly to changes in the market and/or disruptions in the process.

![Figure 14: Nike market share in the socks category for 2014 and 2015](image)

The Socks Process Improvement project was designed to target the responsiveness of the supply chain by investigating a direct ship strategy. The direct ship strategy has been tested by other business units at Nike, and the leadership team was inspired to explore this option for socks.

5.2 Current State

The section will review the current process, and will focus on introducing the idea of using a direct shipping capability. We will introduce the reader to the overall process for socks from inventory to transportation. The current state review will include the implications for the improvement project, including the impact of the factory location, inventory in the supply chain, and transportation process. The primary takeaway for this section is to introduce the reader to the level of complexity in the current process that may impact Nike's ability to react swiftly to changes in the marketplace.

5.2.1 The life of socks

The thesis will focus on socks produced in factories located in Honduras, Pakistan and the United States. These factory locations were selected because the styles produced at these
factories equate to over 80% of the socks sold by Always Available, and they have distribution centers located in the United States.

Figure 15: Location of the factory distribution centers located in the United States

After production, socks move through the supply chain from the factory to the first storage and sorting facility after production. The initial storage facility is located near the site of production. The socks then flow through a consolidator, and are shipped to an additional holding facility in the United States. Then socks are then packed in pallets for Nike's distribution center, and a percentage of the inventory is stored as safety sock or excess inventory. The Nike transportation team transports the socks to Nike's distribution center in Memphis where the socks are stored or shipped to customers. Most sock orders are shipped to a retailers' distribution center. The retailer sorts and packs the socks for specific retail stores, and also holds a percentage as safety stock. Then socks are sent to stores, and sold to end customers.

Figure 16 below provides a high-level view of the process for Always Available socks.

Note: the lead time data used is not the exact, but instead a rough representation
1 Time spent at the factory's distribution center is unknown, time spend depends on the amount of inventory pulled, but a maximum of 6 months
2 Time spend at Nike's distribution center is a factor of the demand of socks requested

Figure 16: Process flow for the life a sock in the Always Available supply chain. The current flow of socks from production in off shore factories to the retail store. The green boxes represent the redundant hubs in the supply chain

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The process flow also shows the number of redundant inventory buffers in the existing supply chain. In the research we discovered that the quantity of inventory buffers has contributed to more excess inventory in the supply chain than necessary. The benefit of a direct ship strategy for socks is that socks require less processing than most products, and the processing can occur at any node in the supply chain.

5.2.2 Factories, Inventory and Transportation

The four factories that will be the focus of this thesis manufacture only socks. One factory is located in Pakistan, one in Honduras and two in the United States. The Pakistan and Honduras factories have distribution centers located in the United States. The factories are contracted by Nike, but also produce for Nike’s competitors. This further complicates the recommendations that can be proposed because the production, processing and storage capacity must be managed carefully. The onshore distribution centers are set in place to buffer the long lead times. The inventory stored at these onshore factory distribution centers are owned by Nike. The inventory is used to replenish inventory at Nike’s distribution center and/or to complete existing orders.

The function of factory distribution centers is to store inventory, pack bulk orders for clients, and ensure that products are shipped to clients. At least, one of the socks factories profiled currently performs direct shipping capabilities for Nike’s competitors. This factory, at the request and collaboration of the client, direct ships individual orders to a retailer’s distribution center and/or store; thereby proving that this distribution center has the ability to perform the same activities for Nike.

The lead time for socks manufactured offshore, in Pakistan, or near shore, in Honduras, is harder to predict because of shipping methods and customs. Ocean based shipping methods can take months for the factory in Pakistan, and up to two weeks for Honduras. Customs takes an average of 2 – 3 weeks, at minimum. Although, this is not a new concept for Nike or manufacturing, the longer lead times add complexity to the process.
Figure 17: The location of on-shore factories distribution centers and location of the retailers' distribution centers

The map shows that, in some cases, the factory distribution centers are in close proximity to the retailers' distribution center. This insight further validates the benefit of a direct ship strategy for Always Available socks styles. In addition, we discovered that the total miles traveled would increase by less than 10%.

Socks manufactured in the United States, are produced in North Carolina. Socks manufactured onshore are stored in warehouses close to the factories. Similar to offshore and near shore factories, when socks are manufactured they are owned by Nike.

Approximately 30% of the inventory at Nike's distribution center for Always Available is socks. Nike uses an order-up-to inventory model, this type of model is beneficial for inventory with short life cycles and unlimited demand [26]. Equations 3, 4, and 5 allow one to calculate safety stock, target and actual inventory – these equations were used to calculate the inventory in the supply chain and to test the impact of shifting inventory to the factory distribution center.

Safety Stock = \( z \) * \( \text{STD} \sqrt{R + L} \)  \( (3) \)

\( z \)=z-score
\( R \)=order to delivery time (weekly)
\( L \)=lead time for forecasts (weeks)

Target Inventory = 6 month Forecasted Customer demand + 10% safety stock levels \( (4) \)

Actual Inventory = Target Inventory + excess inventory \( (5) \)
For equation 3 we used a safety factory of 85% (Z score of 1.04), +/- 10%, and an R of 1 week (standard deviation of 2.14 days) and an L of a minimum of 4 weeks. There is a standard deviation of 2.14 days for the order-to-delivery time, and a standard deviation of 0 for lead time to forecasts because we assume that orders are always placed 6 months in advance. The customer demand for socks is fairly predictable, and Nike maintains a safety stock levels of approximately 10%. However the excess inventory levels are unpredictable. Excess inventory is defined as inventory that does not include pipeline, base stock or safety stock inventory. Excess inventory is the variance between the forecasted demand and the actual demand. Actual demand is defined as the quantity of products ordered by customers in a specific time period. Managing the right levels of inventory to minimize the amount of excess inventory in supply chain is especially important because Nike only keeps socks in inventory for 6 months due to the fact that white cotton turns yellow when stored for long periods of time.

The Nike portion of transportation for socks consists of transporting inventory from the factory’s onshore distribution center to Nike’s distribution center. In the results section, alternative transportation options will be explored.

5.3 Results

Thus far, the reader has been introduced to the motivation, approach and current state of socks. The results section will provide the results inspired by the analysis and the goals of the project – to conduct a feasibility study on a direct from factory to retailer initiative for socks. The proceeding sections will provide a review of the results, and will highlight opportunities for further review.

5.3.1 Factory capabilities

As stated in earlier sections, conducting an in depth capabilities study of the factory was out of the scope for this thesis project because of the constraint of not visiting a factory. The results of this section will be inspired by stakeholder interviews and research on factory processes. The results will focus on the factory’s ability to hold inventory, and to process direct to retailers orders.

Based on historical data we were able to deduce that the four factories have the ability to hold the amount of inventory required to implement a direct to retailer from factory capability. This conclusion was drawn based on the factory’s history of holding a certain level inventory in the US factory distribution centers. Shifting the inventory from Nike’s distribution center to the factory distribution center will lead to an increase of 50 to 100%. The capability exists, but is not preferable. The instances in which the factory has held that level of inventory have been in
emergency situations and for short periods of time. However, this process may be more streamlined with an intentional partnership between Nike and its factory partners. It is also important to note that this initiative may not require an inventory shift of 50 to 100%, lower levels of inventory may be achieved with careful inventory planning, streamlining the shipping process, and a clearly defined procedures.

It is difficult to make a conclusion on whether the factories will be equipped to manage the additional processing required to pack direct to retailer orders. The direct ship initiative will require factories to accept orders by retailer instead of an aggregated order from Nike. At this time, factories receive a consolidated PO for all of the Nike socks orders, the orders are then separated by customer at Nike’s distribution center. This process will also require a change in Nike’s order management system because the current method of sending retailer specific orders to factories is ad-hoc and manual. The current process will not be feasible for weekly orders and for the number of retailers. Fortunately, Nike is currently building an order management system that is capable of sending retailer specific orders to factories. We reached out to the technology team to discuss the process of extending the capability to socks.

Overall, the research proved that the capability exists or can be built. However, in-depth on-site analysis must be conducted to understand the true factory capabilities. Nike must take an active role in training factory resources on how to process orders by retailer. It will be important for Nike to maintain the same level of service for the retailer with the new direct shipping capability. Any impact to the service level may significantly affect the success of the initiative. Further cost benefit analysis and financial implications should also be conducted.

Additional questions to understand the implications of the new initiative for the factory partners and Nike include:

- What will additional value added services cost for Nike?
- Will the new order management system be expandable to finished good products?
- What value added services do the factories currently execute for competitors? Can Nike leverage the same capability?
- Will factories charge for the increase in inventory?
- How will the shift in inventory affect the supply chain?

5.3.2 Transportation

An effective and streamlined transportation process is an important component of the Sock Process Improvement project. In the research and analysis phase, we discovered that
Nike manages the transportation from factory distribution center to Nike’s distribution center, and the retailers manage transportation from Nike’s distribution center. The impact of a retailer managed transportation process is that shifting to direct ship from factory will mean two things for the current process:

1) The retailer will have to shift transportation to the factory or,
2) Nike will manage transportation

The impact of option 1 is that the retailer will have to revise their current logistics plan. The benefit of picking up orders from Nike’s distribution center is that the retailer has the ability to pick up multiple orders for all product types in one carrier. Shifting transportation will only allow the retailer to pick up orders for socks—this may increase costs significantly and may complicate the transportation process. However, the benefit of shifting transportation to the factory distribution center is that the factory distribution centers are located in close proximity to retailer distribution centers, cross dock locations and stores.

An initial cost benefit analysis revealed that the transportation costs would significantly decrease for Nike. Hypothetically, if shipping 1 million units of socks a year costs Nike $500M, the possible reduction in costs transportation costs will be equal to or less than $500M; resulting in almost 100% reduction in costs for Nike’s transportation team — this is assuming that Nike holds no inventory at its distribution center and none of Nike’s resources will be used to co-coordinate the process. We would not recommend this option because the analysis proves that this will not be a beneficially strategy in terms of quality and customer satisfaction. Nike must maintain the interactions to ensure a smooth process. As a result, reduction in cost here is not reflective of the savings in the entire cost structure.

Overall, the results of the transportation analysis are inconclusive at this time due to a lack of expertise and process level data. The high-level analysis shows that the trend is positive, however this conclusion is based on assumptions that may not be plausible long term. A collaboration between the finance and transportation teams is highly recommended to perform an in-depth cost benefit analysis of transportation.
5.4 Recommendations
The goal of the thesis was to identify the capabilities that are required to implement a direct ship from factory capability. The work mentioned in this thesis achieved this goal by providing most comprehensive assessment, accounting for the constraints of not working directly with factory partners or having the expertise in transportation and finance. We believe that the initial work described in this thesis will serve as a first step for future analysis and pilot projects. The thesis introduced the roadmap necessary to implement a direct ship from factory capability that will result in a more agile supply chain, and will increase storage and resource capacity at Nike’s distribution center.

The current state and results of the project accomplish the mission of the project to identify the capabilities required to implement the new initiative. The recommendation for the Always Available team and stakeholders is to pursue the direct ship from factory initiative. In addition to the factory, inventory and transportation topics discussed, Nike must also continue to work with the technology team to further develop the order management system. The order management system will be key to automating the order receipt process for the factory. An automated process will be most beneficial for the quantity of orders that will be processed every week. Overall, these recommendations will be a valuable experiment, resulting in:

- A potential reduction in overall costs for Nike
- An opportunity to review and negotiate procedures with retailers
- Better utilizing the capabilities of the factory by leveraging their processing expertise and learnings from current direct ship projects for competitors
- Relieving the inventory constraints at Nike’s distribution center by reducing up to 30% of the Always Available inventory and up to 15% of overall inventory
- A significant reduction in transportation costs for Nike

5.5 Next steps
An essential next step is for Nike to conduct an in-depth assessment on the current factory capabilities. Lean tools and Six Sigma practices will be an important first step in the process. A simple diagnostic tool, as see Figure 18, will provide a rating of the lean health of the factory [27]. These tools are not comprehensive, Nike must include compare the performance of the factory to the performance of the distribution center to ensure that the current service levels provided to customers are met or exceeded.
In addition, it is important to leverage the lessons from other divisions at Nike that successfully transition factory partners to a direct ship from factory. The knowledge of these teams significantly helped with the capabilities assessment conducted for this thesis. The lessons learned, process documents, and success with negotiating with factory partners and retailers will be especially beneficial.

Overall, the thesis work has determined that Nike currently has or is building the capability necessary to implement a successful direct ship program, and it is important to continue to build on this work. Executing on this strategy will help Nike achieve its objectives and will inspire a new standard in the industry – a new way to bring production closer to the customer.
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6. Future work and primary insights

We have established the current state, results and recommendations for the internship research. This section will consist of the intuitions and the insights generated through the project, and will include food-for-thought for Nike’s long term strategic plans.

The intent of the thesis was to identify new strategies for how Nike can improve the order-to-delivery time for its wholesale retail customers, sections 4 and 5 provide the recommendations for the Accelerate Order Flow and Socks Process Improvement projects. In addition to improving the order-to-delivery time Nike should also consider the process of obtaining forecast. Always Available relies on forecasts to ensure that the right amount of inventory is available for customers each week. As soon as the customer service team identifies an order that is tied to constrained inventory they must notify the retailer of the potential delay - giving the retailer the option to wait or cancel the order.

At this time, Nike obtains forecasts six months in advance to fill weekly orders. The forecasts are used to estimate the amount of inventory that will be required each month, but the retailers are not tied to ordering exactly what was forecasted. The current process is such that retailers can order as much –even over their forecasted amount, or under –even not ordering at all. The risk of this process is that a customer can decide to over order, dipping into the forecasts of other retailers, or under order, leaving Nike with excess inventory. Nike can circumvent the risk of cancelled orders and excess inventory by transforming the forecasting process.

Recommendations for future work with forecasts includes using point-of-sale data to predict the market trends, and taking ownership for the forecasting process. Point-of-sale data has proven to be more accurate and more predictable than forecasts submitted by the retailers demand planning team [28]. Using point-of-sale data to drive ordering patterns, and influence processing time can significantly improve Nike ability to decrease excess inventory and reduce the possibility of stock outs [28].

Secondly, Nike has stated that agility in supply chain is important to achieving its projected financial and growth goals. The underlying reason for wanting to achieve an agile supply chain is the need to be able to bring production closer to the end customer. Bringing production closer to the end customer will circumvent the need for 6 month forecasts, and will enable Nike to better predict the needs for the retailer and the end customer. That is the goal. To achieve this objective, we suggest that Nike begin to think about having more factory
partners in the United States, and close to the customer base. Manufacturing close to the retail customer will significantly reduce the time required for shipping, eliminate the constraints of import taxes and customers, and most importantly will enable the ability to order based on actual demand; thereby shortening the order-to-delivery time.

In addition, with regards to the Socks Process Improvement project, in the research we discovered the redundancies that exist in the current supply chain for socks. However, an additional complexity is the number of factories and styles that exist for socks. At this time, there are over 100 socks styles for Always Available, produced in over 8 factories. It is important for the leadership team to review the necessity of the number of sock styles and factories. The recommendation is that the long-term process improvement strategy for socks should include consolidating factories and sock styles. Currently, capacity at socks factories is shared with some of Nike’s competitors, and consolidating the factories will allow Nike to focus on maximizing the capacity in one to two factories. It is more difficult to manage relationships and execute process improvement strategies with over 8 factories, but by consolidating the factories Nike can focus on maximizing performance with one to two factories; in addition to protecting intellectual property and better utilizing the capacity at factories (Ng, 2012).

Overall, Nike and competitors should embrace the concept of supply chain agility as a solution to adapting to changes in demand and disruptions in the supply chain. Companies should begin to strive for supply chain adaptability – a solution in which companies can respond to long term changes to the supply chain. Additional information on supply chain agility vs adaptability will be discussed in the chapter on literature review.
References


