SPORTING GOODS INDUSTRY SUPPLY CHAIN MANAGEMENT:

AGILITY IN THE POST-COVID-19 ERA

Bachelor’s Thesis
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Abstract

Due to the COVID-19, the whole world experienced change. The borders of the countries were closed, the movement of people was restricted, and eventually world trade and supply chains experienced severe disruptions. COVID-19 highlighted the vulnerability and sensitivity of global supply chains. Virus began to spread from China, which had a negative impact on other manufacturing countries in Asia. As a result of supply chain disruptions, it became more difficult to get products to the consumer market.

The behavior of people affected the sporting goods industry. Restricting movement and staying at home increased sales of home exercise equipment. After the first infection wave, sales of outdoor exercise equipment also increased. However, due to supply chain disruptions, the lack of finished products and raw materials was reflected in extended delivery times of finished products and the lack of finished products. This has led sporting goods companies to develop their supply chains to be more agile in the event of new shocks.

This literature review examines global supply chains, the impact of COVID-19 on global supply chains and the sporting goods industry, and the supply chains of sporting goods companies in the post-COVID-19 era. In the study, the literature review is supported by an interview with a Finnish importer of golf equipment company TaylorMade.

Keywords COVID-19, Global supply chains, Sporting goods industry
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1 Introduction

Well-being is a big part of people’s lives and has become a trend. As a result, the sporting goods industry has changed a lot in recent decades and continues to grow. Nevertheless, due to the COVID-19 virus that emerged at the end of 2019, the sporting goods industry suffered heavy losses like any other industry. Global supply chains experienced major disruptions and the flow of goods was partially halted. This exposed the vulnerabilities of global supply chains and drove manufacturers to develop their supply chains so that similar shocks would not affect operations in the same way in the future.

The sporting goods industry consists of sports equipment, sports apparel and footwear (Lipsey, 2006). Statistics show that sales of sporting goods have been rising over the years (See figures 3., 4. and 5.). High demand for various products and equipment has led to the growth of the sporting goods industry. With globalization and outsourcing, sports equipment manufacturers have spread their operations to many different countries. As a result, they use global supply chains to manufacture, distribute and to sell. Due to the changing market environment sporting goods manufacturers need to be able to adapt and improve their supply chains so that they achieve the best possible outcome.

Many companies have moved to manufacturing sporting goods in foreign countries to maximize production and profits. The most popular manufacturing countries are mainly in the Far East (Kohli et al., 2021). Globalization has made the supply chains of sporting goods manufacturers more complex, which brings challenges to achieving optimal performance. In particular, miscellaneous duration goods, which include medical equipment, jewelry, sporting goods, toys and office supplies, the challenges have been very similar (Nag et al., 2014). Challenges may arise, for example, from the length of supply chains, both geographically and in terms of stages, or from changing global situations, such as COVID-19 in 2019, which led to a global pandemic. Due to the changing environment, sporting goods companies must be able to continuously develop their operations.

COVID-19 disrupted global supply chains. Many exporting countries around the world had to close their borders, in whole or in part. This led to a worldwide cessation of trading at the time. In addition, many countries had mandatory lockdowns. In some
countries there were no mandatory lockdowns but people were recommended to stay at home to prevent the virus from spreading. When this happened, fitness products, especially for home use, grew in popularity. Later, after the lockdowns, outdoor sports equipment and apparel grew in popularity. It was difficult for manufacturers to get products for retailers and many stores were empty of products. Buying through e-commerce became more common but delivery times increased (Kohli et al., 2021).

The literature review and the case study revealed that in the future, the agility of supply chains will play an important role for sporting goods manufacturers. Increasing agility will help manufacturers ensure supply chain reliability in the eventual future shocks. What can manufacturers change in their supply chains to increase agility and maintain reliability? This research includes a literature review focusing on supply chains, the sporting goods industry and changes that make supply chains more agile and help maintain reliability in the future so that the flow of goods through supply chains is as efficient as possible. In addition, the research includes an interview with the Finnish importer of golf equipment company TaylorMade. The purpose of the interview is to examine the changes in TaylorMade's supply chains and the impact of COVID-19 on their operations.

1.1 Research objectives and research question

The aim of this research is to identify new opportunities and practices for the supply chains of sporting goods to make them more agile in the post-COVID-19 period. Many sporting goods manufacturers experienced problems in their supply chains due to the pandemic. Pandemic had a positive impact on demand but a negative impact on supply. Research focuses on the section of the industry that operates global supply chains.

The two main questions in the research are;

1) How did COVID-19 affect the sporting goods industry and its supply chains?

2) How sporting goods manufacturers can increase agility in their supply chains and reduce disruption from potential shocks in the post-COVID-19 era?
1.2 Structure of the research

This study consists of two parts. First, a literature review of supply chains, the sporting goods industry, the impact of COVID-19, and practices to increase agility in supply chains. Second, an interview aimed at exploring how COVID-19 affected TaylorMade’s supply chains and what actions they have taken and will take in their supply chains to improve them.

The rest of the thesis is structured as follows. Chapter 2 reviews the literature on global supply chains and how they work. Chapter 2 also looks at the impact of COVID-19 on supply chains. Chapter 3 discusses the literature on the Sporting goods industry, its global trade and supply chains, and the impact of COVID-19 on the industry. Chapter 4 examines supply chain opportunities for post-COVID-19 era. Chapter 5 examines the supply chain of golf club manufacturer TaylorMade and the impact of COVID-19 on operations through an interview. Finally, chapters 6 contain conclusion of this thesis, respectively.
2 Supply Chain Management

Especially in manufacturing industry, managers are trying to better manage supply chains. Important techniques and methodologies like just-in-time, total quality management, lean production, computer generated enterprise resource planning schedule and Kaizen have been embraced. The concept of supply chain management (SCM) represents the most advanced state in the evolutionary development of purchasing, procurement and other supply chain activities. At the operational level, this brings together functions that are as old as commerce itself—seeking goods, buying them, storing them and distributing them. (Gunasekaran et al., 2004)

Analytically, a typical supply chain is simply a network of materials, information and services processing links with the characteristics of supply, transformation and demand (Chen & Paulraj, 2004). Global and domestic supply chains operate on the same basic idea. The difference between these is that there may be more levels in the global supply chain and they are longer. Figure 1. below shows Chen and Paulraj’s illustration of the company’s typical supply chain.

![Suppliers](image)

Figure 1. (Chen & Paulraj, 2004)

Depending on what the company produces, they need to find the right supply chain model for themselves. Fisher (1997), developed two supply chain strategies that are used depending on what the product is. Functional products are characterized by a long-life cycle, stable and predictable demand and their stability often calls for competition leading to low profit margins. Innovative products are characterized by short life cycle, large variety, unpredictable demand, but offset by higher profit margins. Next, company need to decide whether their company’s supply chain is physically efficient or responsive to the market. In the case of a functional product, an efficient supply chain is the best option. This can improve capacity utilization, reduce
inventory costs and achieve significant cost savings. In the case of an innovative product, the best supply chain model is a responsive supply chain. This focuses on speed, flexibility, and mass customization, among other things.

![Matching Supply Chains with Products](image)

Figure 2. (Fisher, 1997)

### 2.1 Global supply chains (GSCs)

As companies globalize, so do their supply chains. Global configurations provide companies with cheaper labor and raw materials, better access to finance, a larger product market, the opportunity for arbitrage, and additional incentives provided by the host government to attract foreign capital (Manuj & Mentzer, 2008). Manufacturing abroad has become much more common in recent decades. This has led to the diversity of GSCs. GSCs meet the new dynamic needs of emerging markets and customer segments, manages the risks posed by economic and political uncertainties, and manages cost complexity (Gong Yeming, 2013). Multinational companies are considering different options in their GSCs. Examples of such opportunities include global outsourcing, global distribution, global supply chain strategic alliance, and global coordination. For example, Apple’s complex GSC. Apple designs in the US, purchases components and parts from Korea and Japan, assembles in China, distribution in China and the US and do global retailing (Gong Yeming, 2013).
GSCs faces a lot of challenges and there is always room for improvement to achieve the most efficient operations possible. Challenges emerge typically due the complexity, length and several stages in supply chain. The longer the supply chains, the more likely they are to be disrupted. Issues have been identified in GSCs, which has driven manufacturers to continuously improve the performance of their supply chains as globalization increases (Meixell & Gargeya, 2005)

To reduce costs, increase revenue, and improve reliability, manufacturers have begun to use international manufacturing sources. By setting up foreign factories, manufacturers tend to benefit from capitalized, reduced logistics costs, cheaper labor, and trade concessions. Despite this, foreign manufacturing brings challenges to supply chains. Global supply chains are harder to manage than domestic ones, and the longer the distances, more challenges can arise. Long distances increase transportation costs, but at the same time cause uncertainty in storage and warehousing costs due to longer lead times. In addition, different cultures, languages, and practices can undermine the efficiency of business processes. Also, there are unique risks associated with global supply chains. These risks may include, for example, exchange rate fluctuations and uncertainty, economic and political instability and changes in the regulatory environment (Meixell & Gargeya, 2005).

When companies go global, they are exposed to more natural, economic, political, and social risks. Multinational companies can formulate a speculative strategy, hedge strategy, flexible strategy, and safety strategy to control its material flow risks, financial flow risks, and information flow risks. Firms are struggling to manage the complexities of global risks by coordinating global supply management, demand management, finance management, information management, and product management (Gong Yeming, 2013).

2.2 Impact of COVID-19

Due to the COVID-19 virus found in Wuhan, China at the end of 2019, the World Health Organization declared a global pandemic in March 2020. This damaged the entire world economy. Many countries closed their borders, leading to a stifling international trade at the time. The virus caused problems in many different industries. It was believed that the virus would not spread from China. However, the virus spread through the movement of people (Ozili & Arun, 2020). In their article, Ozili & Arun examines the effects of COVID-19 on the global economy. For many import-dependent
countries, COVID-19 brought a lot of problems and uncertainty. Many import-depended countries import their products from Asian countries such as China, India and Japan. China, the world’s largest producer, responded to the virus by closing many of its factories. This led to a shortage of products in import-depended countries. In addition, the prices of the remaining imports rose, causing inflationary pressures. After the closure of China, it was difficult to find alternative imports because many countries had also closed their borders. This partially stifled international trade (Ozili & Arun, 2020).

Supply chain channels are the network through which COVID-19 had a negative impact on the global economy. Evidence from different markets confirms that the current crisis has disrupted global supply chains. This creates spill-over effects at different levels of the supplier network (Fernandes, 2020). According to Fernandes, supply chain disruptions increase costs for companies. For example, companies that are dependent on China have been struggling to get their products to market due to factory closures and the collapse of transportation routes in China. There is a shortage of raw materials and finished products. In addition, the lack of air and sea freight facilities makes it difficult to move products around the world. This calls into question the just-in-time strategy used by many companies to manufacture to meet demand and minimize inventory. Overall, COVID-19 revealed fragility and supply chain vulnerability and poor flexibility. As distance and supply chain stages increase, it is more prone to disruption. Therefore, long global supply chains are more likely to be disrupted (Fonseca & Azevedo, 2020).
3 Sporting goods industry

From its beginning to the early 1970s, the industry was primarily defined as sporting goods equipment. Apparel was largely limited to uniforms and casual wear for athletes and coaches. The footwear market was also limited. Adidas dominated the footwear and apparel market at the time. Equipment market included leading companies like Spalding, Titleist and Wilson. In the early 1970s, the industry underwent a major transformation as Nike began to compete against Adidas in the footwear and apparel market. After that, the industry became the sporting goods industry, which included all three of these product groups (Lipsey, 2006).

With leading companies, the sport goods market divides into two sub-universes; Manufacturers, who design and produce, and the retailers, who sell products to consumers. The sporting goods industry consists of three different product groups (Desbordes et al., 2019):

- Footwear, for anything from running to flip-flops, which account for 25% of world supply
- Sports apparel, from specialist clothing through to sportswear and backpacks, estimated at 35% of the market
- Sports equipment, (snowshoes, balls, bicycles, etc.) which represents 40% (in value terms) of the total market

The sporting goods industry includes a wide range of products in different types of sports and activities. Marketing and distribution methods vary widely depending on the product group and activity or sport for which the product is used. According to Lipsey (Lipsey, 2006), there are 6 basic types of activities that construct the industry:

- Extreme sports (skateboarding, surfing, etc.)
- Fitness (all types, including martial arts)
- Individual sports (golf, tennis, boxing, etc.)
- Indoor games (billiards, darts, table tennis)
- Outdoor recreation sports (hiking, backpacking, climbing, fishing, etc.)
- Competitive team sports (basketball, ice hockey, football, etc.)

Statistics shows us that revenues of these three different product groups have been
steadily rising during the past decade. The only exceptions are a small decrease in footwear sales in 2020 from 2019 and a smaller than usual increase in sports equipment in 2020 from 2019.

Figure 3. Revenue of global athletic footwear market from 2012 to 2025 in million U.S. dollars (Statista, 2020b)

Figure 4. Revenue of the global sports apparel market from 2012 to 2025 in million
As noted earlier, the sporting goods industry consists of a wide variety of products. As other industries, also sporting goods industry is constantly developing more innovative products due to fierce competition. The demand for innovative products is unpredictable and the product life cycle is short. On the other hand, functional products can be high-volume products for which demand is predictable and meets basic consumer needs (Fisher, 1997). It is possible that one product section can contain innovative and functional products. For example, if running shoes are bought by a marathoner, it is very possible that he or she wants customized top shoes. However, a customer who goes for walks on the weekends may want running shoes, but he or she does not necessarily need more expensive custom shoes but something ordinary which can be purchased off the store shelf (Roscoe & Baker, 2014). It is therefore possible that large volumes of functional products are produced and sold, for example, in sports shops. An efficient supply chain would be appropriate for these products. In the case of innovative products like a custom product, a responsive supply chain works better. If these product types are applied to the Fisher matrix (Figure 6.), it is possible for manufacturers to use both efficient and responsive supply chains. If a manufacturer manufactures both product types, it would be highly recommended that they have their own supply chains for different product types. However, customers have shifted to
more e-commerce and product customization. Also, fashion has become a big part of the sporting goods industry for a large number of customers (Kohli et al., 2021). Therefore, manufacturers have moved to more responsive supply chains.

<table>
<thead>
<tr>
<th>Effective SC</th>
<th>Functional product</th>
<th>Innovative product</th>
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<tr>
<td></td>
<td>• Sporting goods that are usually sold in stores off the shelf to the customer</td>
<td>Mismatch</td>
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<td>• High volume products</td>
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<td>• Demand for the products is predictable</td>
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<tr>
<td>Responsive SC</td>
<td>Mismatch</td>
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<td></td>
<td>• More advanced, customized and high-end products</td>
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<td></td>
<td>• The volume is smaller and the product is often manufactured according to the customer's wishes</td>
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<td>• Demand for the products can be unpredictable</td>
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Figure 6.

Even before the pandemic, the sports equipment industry supply chains adapted to new practices and business models. In the past, emphasis was placed on wholesale-driven product cycles, but then there was a shift to a more agile supply chain model that focuses on the direct-to-consumer (DTC) trend in both e-commerce and retail. This has led to shorter delivery times and a higher level of response to market trends. The growth of the online sales segment requires faster response and flexibility, and this is what sports equipment manufacturers have been striving for in their supply chains. For example, Nike has raised its DTC sales by 20% from 2010 to 2020. The net effect of digital trends is that companies have become more agile and produce smaller quantities of products on faster cycles (Kohli et al., 2021). According to Kohli et al., it is possible that because of this shift, lead times have shortened, with Asian suppliers of large sporting goods companies moving initially from 120 days often eventually down to 30 days. Kohli et al., estimates that COVID-19 has further fed the DTC model. According to their estimates, the DTC model vaulted by two years in the first months of Pandemic as e-commerce progressed by up to four years (See figure 7.)
Most of the manufacturing in the sporting goods industry takes place in Asia. China, Japan, Taiwan, South Korea and India being some of the largest producer countries (Lipsey, 2006). Major manufacturers such as Nike, Rebook and Adidas manufacture most of their products in Asia, especially footwear and sport apparel (Andreff, 2006). For example, Nike, the world's number one manufacturer of sporting goods, have 103 factories in China and 101 factories in Vietnam. These two countries are Nike's largest manufacturing countries and together account for 31% of Nike's total manufacturing (Nike, 2021).

### 3.2 Impact of COVID-19

Because of the COVID-19 people were advised to stay home and avoid unnecessary human contacts. Working from home and self-isolation became part of people’s daily lives. At the beginning, when not much was known about the virus, group sports venues such as gyms had to close their doors to prevent the virus from spreading. Restrictions on outdoor exercise and the need to stay home led to reduced physical activity (Yeo, 2020). Sports and exercise became more challenging and ways to exercise had to be found at home. Staying home and self-isolation led to an increase in sales of home fitness equipment (Nyenhuis et al., 2020).

In their article, Dominski and Brandt (2020), discusses about the benefits of exercising indoors and outdoors during COVID-19 and do the benefits outweigh the risk of...
infection. According to them, the risk of infection is greater in indoor activities because of the larger density of people. Indoor exercise in places with a higher number of people, for example gyms, was an activity with a high risk of infection at that time. Therefore, according to Dominski and Brandt, it is wise to exercise outdoors if the form of exercise allows people to keep safe distance from other people. People wanted to do outdoor exercise as long as the form of exercise allowed for physical distance. Popular ways to exercise were, for example, jogging, hiking and golf. In the United States, sales of golf equipment in June 2020 were $223 million more than the same time in 2019 (See figure 8).

Figure 8. Sales of golf equipment in United States June 2019 and June 2020 in million U.S. dollars (NPD Group, 2020).

Because of COVID-19, global supply chains experienced major issues. Many industries were damaged when the availability and supply of raw materials, intermediate products and finished products were severely disrupted (Xu et al., 2020). In addition, the flow of goods through global supply chains reduced significantly given that China is the world’s largest manufacturer and exporter. At the time of COVID-19 outbreak, Chinese government ordered the closure of major factories in the country (Ozili & Arun, 2020).

Problems in the supply chains damaged the sports equipment industry. The partial halt of production, the difficulty of transporting the products and the resulting lack of products drove sporting goods shops and retailers around the world to a difficult situation. Demand was higher than supply. Especially when most sporting goods are manufactured in China, global supply chain disruptions damaged the operations of retailers and importers.
4 Supply chains of the sporting goods industry in the post-COVID-19 era

Global supply chains will not be the same in the post-COVID-19 world. Stability encouraged producers to set up production networks around the world, locating the stages of the manufacturing process in different countries and often far from the consumer of the final product. The focus was on cost optimization, cost cutting and just-in-time production. There are shocks that have shocked global supply chains before COVID-19. For example, the earthquake and tsunami that struck Japan in March 2011 affected Japanese corporations in the United States to halt production as they were unable to obtain parts and components from the suppliers in Japan. These shocks have been perceived as one-off events and temporary disruptions to an otherwise successful business model (Javorcik Beata, 2020). However, it is unlikely that companies would go back to the “old normal” in the post-COVID-19 era (Fonseca & Azevedo, 2020). According to Kohli et al., (2021) major strategies for the future will be, among other things, supply chain agility, DTC and localization.

Important features in sports goods companies supply chains are going to be the flexibility imperative and a raised bar on agility. In the post-COVID-19 world, operations are characterized by shorter demand cycles, e-commerce and closer direct consumer relations. Exploring alternatives such as near-shoring and building stronger supply chain partnerships are important factors in times of uncertainty (Kohli et al., 2021). Kohli et al. believe that there are 8 main areas for success in the post-COVID-19 era:

- Strong presence in growing segments and sports categories
- An excellent direct-to-consumer business model
- Direct contact with consumers through digital platforms, loyalty programs, etc.
- Retail footprint that is purpose-driven with different shapes for different store types
- Credible sustainable development, either with the industry or as a differentiator
- New or reviewed supply chain relationships with built-in agility.
- Optimized marketing through digital channels
- Agility in planning and budgeting so that operations respond quickly to changes in the market environment

The more and better producers are able to implement the above actions, the better they
will be able to perform and succeed in the post-COVID-19 era. Important areas for this study are those that increase agility, eliminate stress and eliminates risks in supply chains;

*An excellent direct-to-consumer business model.* As stated earlier in the text, DTC sales have increased in the sporting goods industry. DTC sales require more flexibility and responsiveness in the supply chain, but it can also simplify the supply chain. Manufacturers do not have to rely as much on retailers if the customer buys the product from the online store themselves. DTC sales also provide the manufacturer with immediate data on purchasing behavior (Arora et al., 2020; Kohli et al., 2021).

**Agility in planning and budgeting.** Agility in planning and budgeting is important because in the midst of uncertainty, manufacturers strive to be as flexible as possible. This activity will help respond to the changing market environment and future shocks (Kohli et al., 2021).

*New or reviewed supply chain relationships with built-in agility.* The supply chain disruptions of 2020 were a challenge for manufacturers and their partners. According to Kohli et al., supply chains will need built-in agility in the future. They believe that this can be done, for example, through local-for-local sourcing and closer partnership.

The most important topics for the results of this study are agility, regionalization, and supplier base. The following paragraphs focus on these topics. First, chapter 4.1 deals with agility. Agility in the supply chain is achieved through actions that increase flexibility, speed and responsiveness. Chapters 4.2 and 4.3 examine the regionalization and nearshoring of manufacturing, and the expansion and decentralization of the supplier base, as measures to increase agility and reliability.

### 4.1 Agility in supply chains

A key features of an agile supply chain is flexibility, responsiveness and quickness. Agility in business covers information systems, organizational structures, logical processes and ways of thinking. To achieve more agile supply chain, complexity of the supply chain must be reduced. An agile supply chain is easily mixed with a lean supply chain. However, lean means more with less and the term is often used in the context of zero inventories and just-in-time models (Christopher, 2000).

Many companies that use the lean model are not agile in their supply chains
According to Christopher (2000), this can be seen in the automotive industry. He cites the example of the Toyota Production System (TPS), which focuses on reducing and eliminating waste with its lean model. The TPS has had a major impact on production practices in various industries, but the benefits of lean thinking have been limited to factories. Vehicle manufacturing is efficient and production time at the factory is typically less than 12 hours. However, the stock of finished vehicles can be 2 of sales and nevertheless the customer has to wait weeks or a month to get the car they ordered. Christopher argues that leanness may be part of agile supply chain, but as a whole they are two different things.

However, it is not like sporting goods companies have not used agile supply chains all ready. According to Roscoe & Baker, (2014) one of the leading brands in the industry, Adidas, uses four different supply chain models which are lean, continuous replenishment, agile-responsive and agile-customized. When demand is hard to predict and product needs to be delivered quickly and accurately to the stores, agile-responsive supply chain is best option. Agile-customized supply chain is used when unique or customized products are needed. Even though agility has been used already in supply chains, making the supply chains even more agile will be one of the winning factors in the post-COVID-19 era (Kohli et al., 2021).

4.2 Relocating manufacturing and nearshoring

Regionalization and nearshoring are much talked about topics in all manufacturing industries (Juanjo et al., 2021). Juanjo et al., conducted a survey for senior supply chain executives in various industries. 93% of respondents said they plan to make their supply chains much more flexible, agile and resilient. Nearly 90% of respondents said they plan to pursue some degree of regionalization in the next three years.

One opportunity for companies is to relocate production to different countries. In developing and industrialized countries, unit labor costs are cheaper in the production of sporting goods. According to Andreff, (2006), American or European company should relocate its production when:

\[
\frac{w_h}{q_h} - \frac{w_f}{q_f} > c_i + c_j + t_i + t_j + g - e
\]
In this formula $w_h$ stands for the wage cost in the company’s home country, $q_h$ for the labor productivity in their home country ($\frac{w_h}{q_h}$ = the unit labor cost in the company’s home country), $w_f$ for the wage cost in the possible foreign manufacturing country, $q_f$ for the labor productivity in the possible foreign manufacturing country ($\frac{w_f}{q_f}$ = the unit labor cost in a foreign subsidiary or subcontractor manufacturing country), $c_i$ for the transportation cost of inputs manufactured in home country to the foreign country, $c_j$ for the transportation cost of the relocated output from foreign country to home country or any other developed customer country, $t_i$ and $t_j$ for the tariffs paid for past international input and output flows, $g$ for governance costs of a foreign subsidiary or subcontractor, and $e$ for the cost saved by the company in exporting, which is offset by the relocated production (Andreff, 2006). If the manufacturer already has a factory or production in one country, the equation can be used to achieve a more efficient end result by applying the equation to another potential country of manufacture. In that situation, of course, the equation should be changed to take into account the transfer of production from the first country of manufacture to the next.

Another option is regionalization. Regionalization often helps companies reduce costs, but it also reduces supply chain disruption in the event of shocks. If manufacturing is regionalized, the sporting goods manufacturer is more likely to receive the goods, when the manufacturing is done more than in one country. So, by regionalizing manufacturing, manufacturers save costs but also reduce supply chain vulnerabilities and prevent disruption (Chopra & Sodhi, 2014). In the sporting goods industry, large companies in particular have already regionalized their production before COVID-19. For example, the leading footwear and accessories manufacturer, Nike, has spread its manufacturing around the world, most of it to Asia (Locke, 2002).

Nearshoring have also been considered as a good way to improve the functioning of supply chains. The shorter the distances in the supply chain, the less prone it is to disruption. While nearshoring is good option and reduce risk, sporting goods manufacturers favor cost-effective countries. As mentioned earlier, global configurations provide companies with cheaper labor and raw materials, better access to finance, a larger product market, the opportunity for arbitrage, and additional incentives provided by the host government to attract foreign capital. Because of this, nearshoring can increase costs for businesses. However, nearshoring done correctly can
be a good solution. Nearshoring in the midst of constant uncertainty is an option that is good to explore and is already cheaper in some cases (Kohli et al., 2021). In their study, Kohli et al., uses an example of jeans production. This example (Figure 9.) examines nearshore options that are more efficient than China. Data shows that nearshoring can save costs in the manufacturing process and product transports are also faster.

![Nearshoring Costs Comparison](image)

Figure 9. (Kohli et al., 2021)

As stated earlier, a lot of manufacturing takes place in China. Eloot et al., (2013) argues that China may no longer be the best manufacturing country in the future. According to them, China’s low wages, strong supply base, large investments in port, road, railway infrastructure and engineering and technical know-how created a strong foundation for industrial exports. At the same time, China’s extensive domestic market helped transition to a consumer-based economy. Eloot et al., believe that times have changed and they present four core challenges that have changed the situation. These challenges are rising factor costs, rising consumer sophistication, rising value-chain complexity and heightened volatility. In addition, the "trade war" between China and the United States has been one factor alongside COVID-19 which is why manufacturing should not be so dependent on China (Mao & Görg, 2020). Many companies have already begun to adopt a China-plus-one strategy, according to which manufacturing will be diversified to other Asian countries in addition to China (Enderwick, 2011).

### 4.3 Supplier base

Expanding the supplier base is a means that has been used in the past. For example,
companies may have backup and alternative suppliers. When one supplier is unavailable, it is possible to use another supplier. This increases supply chain flexibility (Paul & Chowdhury, 2020). Naturally, the larger the network of suppliers, the more likely the supply chain is to perform better. In 2020, important supplier countries ran into difficulties due to lockdowns. If the supplier base is decentralized in the future, it is more likely that the supply chain will work in the best possible way. However, wider supplier base provides more agility in the supply chain to a certain point. The more suppliers the more expensive it is for the company. According to Burke et al., (2007), if the supplier base is too wide, a possible weakening of decentralization benefits is possible.

Fonseca & Azevedo states that in the past suppliers are selected based on quality, price, performance, delivery capability and performance. Fonseca & Azevedo believes that due the COVID-19 there are two new key process indicators that should be addressed: time to recovery (TTR) - “the time it would take for a particular node — a supplier facility, a distribution center, or a transportation hub — to be restored to full functionality after a disruption” and the Time to Survive (TTS) - “the maximum duration that the supply chain can match supply with demand after a supplier or node disruption”. If the TTS is higher than the TTR, there is no risk of disruption as the company can match supply to demand as it recovers. If the TTS is lower than the TTR, there will be a disruption in the supply chain that will cause the company financial and operational problems.

4.4 Summary

According to multiple sources, (Fonseca & Azevedo, 2020; Juanjo et al., 2021; Kohli et al., 2021; McMaster et al., 2020) increasing agility helps manufacturers to reduce disruptions in their supply chains. However, McMaster et al., recalls that increasing agility is an expensive exercise and would be impractical for firms to completely overhaul their SCs to manage events like COVID-19. Manufacturers need to balance costs and agility so that they can operate in the event of potential shocks, while being as cost-effective as possible.

Relocating manufacturing can give manufacturers a better chance at cheaper labor, raw materials and transport options. In the golf industry, many manufacturers have sought to shift their production away from China to more cost-effective manufacturing countries due to increased prices in China (Palotie, 2021). However, relocating
manufacturing alone does not guarantee agility and reliability in the future. According to Palotie, the disturbances brought by COVID-19 were shocking, especially in China. Nevertheless, possible future shocks may affect the exact country to which manufacturing has been relocated. Therefore, in addition to relocating production, regionalization provides a better opportunity to maintain operational reliability.

Regionalization is a much-considered way to improve supply chain performance. As mentioned earlier, nearly 90% of respondents to a survey conducted by Juanjo et al., said that some kind of regionalization will take place in the company they work over the next 3 years. Regionalization and decentralization create a better opportunity for the manufacturer to have the products ready and transported to the consumer market. Nearshoring in particular helps manufacturers due to shorter transport distances. In the figure 9, Kohli et al., showed that textile manufacturing, for example, could be brought closer to the consumer market in a cost-effective manner. Nevertheless, the manufacture of sports equipment, may not be ready for this. Palotie says that the golf club manufacturing is not ready to move out of Asia because, at all costs, Asia is still the best option.

Expanding and decentralizing the supplier base works as a way to increase the agility and reliability of the supply chain. Manufacturers need to remember that this works up to a certain point. If the supplier base grows too large as a result of decentralization, it will incur additional costs for the manufacturer.

Next, Chapter 5 introduces the supply chain of golf equipment company TaylorMade and the impact of COVID-19 on their operations. For the purposes of this study, it is important to find out how the literature on supply chain changes examined in this study matches TaylorMade’s plans for the future. Chapter 5 will look at what TaylorMade’s supply chain was like before COVID-19, how COVID-19 affected TaylorMade’s operations and whether TaylorMade aims to increase agility in its supply chain and if so, how.
5 Interview – TaylorMade

Founded in 1979, TaylorMade Golf Company is one of the world's leading golf equipment companies. TaylorMade strives to lead the industry in product innovation. It is exploring new frontiers, pushing the boundaries of producer manufacturing and constantly striving for the next big breakthrough in the industry. TaylorMade has been making revolutionary products year after year. It has attracted the best golfers in the world like Rory McIlroy and Tiger Woods to represent TaylorMade (TaylorMade, n.d.).

In this interview, Pekka Palotie, TaylorMade's Finnish importer, was interviewed. The purpose of the interview is to find out how TaylorMade's supply chains work, how COVID-19 affected in the supply chains, sales and product orders, have TaylorMade made any changes in their supply chains and are they going to change their supply chain model in the future and if so, how.

The interview is resent and important for the study. In 2020, the popularity of golf grew exponentially around the world. Before 2020, about 300–700 new players started playing golf per year in Finland. In 2020, the number of new players was 8,000, which increased the number of members of the Finnish Golf Association in the whole country by more than 6%. This was due to an increase in outdoor sports after the first wave of COVID-19 (Yle, 2021).

The interview is divided into three discussion areas. The first topic of interview is TaylorMade’s supply chain before COVID-19. The second topic is the effects of COVID-19 on supply chain, sales, and consumer behavior. The third topic is the development of the supply chain.

5.1 Supply chains before COVID-19 era

First, it is a good idea to determine which product category (functional / innovative) TaylorMade products represent. According to Palotie, TaylorMade's most important and best-selling products are golf clubs and balls. Other products TaylorMade sells include golf bags, gloves and other accessories. Retailer's pre-order most of the products in advance for the following year, indicating that most of the products are efficient products.

TaylorMade also provides innovative products. According to Palotie, about half of the clubs ordered are tailor-made. The golf club consists of a grip, a shaft and a club
head. TaylorMade makes club heads but the shafts and the grips are made by subcontractors. In customization, customers have the opportunity to choose one of TaylorMade’s club head models, a suitable shaft, and a grip. TaylorMade has even more personal customization programs in the United States where customers could also influence the color of the club head, but this is not possible in Europe, at least for the time being. In addition, it is also possible to customize the balls with logos or texts.

<table>
<thead>
<tr>
<th>Effective SC</th>
<th>Functional product</th>
<th>Innovative product</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Pre-ordered products</td>
<td><strong>Mismatch</strong></td>
</tr>
<tr>
<td></td>
<td>• Manufacturing and transportation processes are planned in advance according to order quantities</td>
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<tr>
<td></td>
<td>• For retailers. Basic products and the order volume is high compared to the innovative ones</td>
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<tr>
<td>Responsive SC</td>
<td><strong>Mismatch</strong></td>
<td>• Customized products</td>
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<tr>
<td></td>
<td></td>
<td>• Usually ordered through a reseller according to the customer’s specifications</td>
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<td></td>
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<td>• Demand more difficult to predict</td>
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</tbody>
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Figure 10. Product types of TaylorMade

TaylorMade has a diverse product base and that is why the supply chains are different depending on the product. TaylorMade has factories to manufacture balls around the world and club heads in China and Vietnam. TaylorMade has gradually moved from China to Vietnam because it is more cost-effective. According to Palotie, China was good, but as production costs rose, they wanted to move to more cost-effective manufacturing country. All other products are manufactured by subcontractors. Golf gloves come mainly from Indonesia, shafts from Vietnam and bags from China. For example, in the manufacture of gloves and bags, many different companies use the same subcontractors due to the limited number of high-quality manufacturers. However, companies decide the appearance of the products themselves. Factories can also be found in Mexico, within driving distance of the TaylorMade headquarters located in San Diego, California. There are also factories in the United States, but they focus mainly on design and assembly. According to Palotie, the assembly can already be done in Asia, but they do not want to move all operation stages there. There is a risk of
copying and counterfeiting products.

Delivery of products from Asia comes mainly by sea and air freight. Air freight is mostly used for club goods because the components of the clubs can be easily stored in a small space and do not weigh much. For example, bags that take up a lot of space, are delivered by sea freight. TaylorMade’s European warehouse is located in England. Brexit complicated the situation, but warehouse is still in England. The warehouse is in a so-called duty-free zone and from there products can be moved along the “green line” to DHL’s central warehouse in the Netherlands and from there to customers. Before Brexit delivery time was about 2 weeks. When Brexit came into effect, it rose to about 3 weeks.

5.2 Impact of COVID-19

According to Palotie, the initial shock brought by COVID-19 was significant. Factories were closed and forecasts for 2020 sales collapsed. Palotie said that in 2019, according to TaylorMade’s forecast, they would sell a total of 7.1 wood clubs. Due to COVID-19, this forecast dropped to about 3.5 to 4 million clubs. As the COVID-19 situation began to return to normal and it became known that golf could be played, this forecast increased to about 5 million. In May, the need for clubs was already 7 million, and a total of 8 million clubs were needed throughout the year. According to Palotie, the year 2020 was good and instructive nonetheless. In 2020, total sales increased by about 20% and in Finland sales increased by more than 20%. Some increase was forecast for 2021, but sales volumes exploded. Sales growth in 2021 was 50% and pre-orders for 2022 are 50% higher than in 2021.

According to Palotie, it was difficult to start making from scratch. When additional orders came in, TaylorMade and its subcontractors had to procure raw materials and start making products at very short notice. Palotie says, "You can imagine when at first everything was put to a stop and after that you have to make a few million club heads quickly plus get shafts and grips, pack them up and deliver, so it is not quite a piece of cake."

In 2020, the spike in demand and the problems brought about by COVID-19 created severe disruptions in TaylorMade’s supply chains. In 2021, they experienced similar disruptions. In 2021, they were able to meet pre-orders in production and the products were delivered on time. The problem was high demand, which meant that European-
wide products had been sold out by the end of June. The same problem occurred with many manufacturers and all needed additional orders for the rest of the year. In addition to the current situation, the intense impact of COVID-19 in Vietnam, the shortage of containers in Asia, rising raw material prices and the cost of sea freight brought additional pressure. In 2021, the big problem in club goods was the lack of components. At some point there where lack of shafts, which may be due to the tense situation in Vietnam. On the other hand, there were also situations where shafts were found but the club heads were not. The problem was that some of the components were available but some were not. Consequently, clubs were not ready for sale. Palotie states that the current delivery time has remained around 3 weeks, as long as all components for the product are available.

5.3 Future insights

Palotie says that TaylorMade has begun exploring new ways to develop supply chains. He said regionalization has been explored as a potential option, but these changes are not happening fast. Palotie mentions that the aim is not to put everything in the same, but to decentralize production to different countries. Manufacturing is currently concentrated in Asia, but in the future, one option is to relocate manufacturing elsewhere. However, for now, TaylorMade is going to continue manufacturing in Asia and they keep looking for opportunities for possible regionalization there. In addition, new suppliers and labor will be needed if factory relocates to a new area. TaylorMade is constantly striving to find new reliable suppliers. Machinery can be moved and factory facilities can be found, but it will take time before the machines are up and running and the quality level is desired. What is important, however, is that alternatives can be found. Thus, the situation can be better controlled.

TaylorMade has strived to be as agile as possible to maintain product availability and reliability. Palotie says that for them, agility means striving to get the desired products to the desired place at the desired time. He says the logistics team has had a lot of work to do. Palotie gives as an example, if they have components in Australia and it is being investigated those components will not be needed there, they will move the components to where needed as soon as possible in order to serve customers. This, of course, brings additional costs, but most importantly, they have been able to serve customers. Likewise, if some products have not been available, they have tried to provide the best possible replacement products. Palotie praises the employees in the
logistics department and says they deserve some sort of medal for their work. Palotie said that in his opinion they had succeeded well in agility.

TaylorMade has a good platform for e-commerce and its use has increased. The online store is primarily intended for retailers, but private customers can also buy products from there. The online store offers the option of standard products and customized products. Personalization is also possible in some things, such as engravings on certain clubs. DTC sales are available in the United States and have also been tested in Europe. There are no DTC sales in Finland for now, but next year TaylorMade want to increase DTC sales in some by-products, such as special weights for putters. Palotie says that currently working with retailers works so well that no DTC sales are required. However, at some point in the future, the DTC sales will become involved on a larger scale.

TaylorMade's changes in supply chains to date in the COVID-19 era are changes aimed at compensating for the disruption caused by the shock. Palotie says that the supply chains are still not in the same operating condition as they were before. For this reason, flexibility and responsiveness are key to ensuring a potential customer service. Permanent solutions are currently being explored. One of the most examined of these solutions is regionalization of manufacturing.


6 Conclusion and limitations

6.1 Conclusion

The research objective of this study, as stated in the first chapter, is to identify agility-enhancing supply chain opportunities for the post-COVID-19 era. The opportunities of supply chains discussed in the research were the most prominent in the literature and in the interview. In addition, the topics raised in the interview support the literature used in the study.

As the literature review and interview revealed, changes in supply chains have already taken place and will take place in the future. The most prominent of the topics reviewed to increase agility is regionalization. As Palotie said, for TaylorMade agility means striving to get the desired products to the desired place at the desired time. The agility has focused on maintaining operational functionality due to the disruption caused by the pre-existing shock. However, increasing agility in the long run is the end result of different actions. To increase agility, sporting goods manufacturers need to change their practices in ways that support agility, such as regionalization, decentralization, or responsiveness. The more of these ways are used, the more agile the supply chain becomes. The challenge for manufacturers is cost efficiency. Palotie stated in the interview, "Increasing agility is a constant balancing with cost-effectiveness."

Figure 10 shows that supply chain models at TaylorMade are similar to what Fisher shows in theory. TaylorMade has supply chains for different products and supply chain models can be compared to an efficient and responsive supply chain model. In practice, TaylorMade uses the efficient model more because the number of pre-ordered products is higher and large part of their sales consist of these products. Nevertheless, a responsive model has been needed in the COVID-19 era due to increased demand and additional orders. Due to the high volumes and the spread of the virus, use of responsive model has been particularly difficult and the supply chain has experienced disruptions, especially in the sourcing of raw materials and the manufacture of products. Many different manufacturers experienced similar problems. This is why it is important for manufacturers to focus on those improvements that they can influence themselves. If, for example, the government of the country of manufacture orders the factories to close, the manufacturers can do nothing about it. The effect of COVID-19 was so drastic that it would be incredible to survive without any disruptions.
Fisher’s matrix shows the supply chain model should be determined by product. The literature review and the interview show that sporting goods manufacturers produce both functional and innovative products. Some companies manufacture both product types and some focus on only one product type. If a company is to manufacture functional and innovative products, it is important that they use the right supply chain. The result for large sporting goods manufacturers is that they should not resort to a single supply chain model. In the case of a functional product, it does not make sense to rely solely on a responsive supply chain if there is also the possibility to use effective supply chain. Palotie said that TaylorMade was unable to respond to large volumes on a fast schedule in 2020. This also shows that it is not worth rely for a responsive supply chain if, for example, high-volume products are manufactured.

Next, 3 important points based on the interview and literature review:

- **Manufacturers should not pursue the old pre-COVID-19 supply chain.** The literature showed that if a company aspires to go back to the old pre-COVID-19 model, it is very likely that it will stand in the competition, especially given the potential future shocks. In the future, it will be important for sporting goods companies to be able to minimize potential risks.

- **Changes take time.** As Palotie said in an interview, making changes does not happen overnight. Manufacturers must strive to be agile in the short term to maintain reliability. Long-term changes such as regionalization take time and require a lot of planning.

- **Responsiveness will be key in the future.** All of the practices outlined in the research improve the responsiveness of manufacturers in one way or another. For example, DTC sales help a manufacturer see the consumer’s needs better which helps the manufacturer in a market environment. This allows the manufacturer to react quickly, for example, to trends. Regionalization and the diversification of the supplier base will help maintain the flow of goods. If a shock occurs in the future as a result of which one manufacturing country suffers, manufacturing may continue in another country.
6.2 Limitations and future research

There are limitations to this study. This study addresses the supply chain opportunities in the sporting goods industry, which will make the functioning of supply chains better and more reliable in the future. There are many ways to improve supply chains, but research does not address all of them. This study addresses popular and much talked about ways to improve. For a more comprehensive results, more data on the different possibilities would be needed.

We are now living in the end of 2021 and the end of COVID-19 era is not in sight. The situation has been better due to vaccines and by restricting the movement of people. Nevertheless, new virus variants and increased rates of infection speak for themselves, and so far, we are living in uncertain times. Currently, we cannot know when the COVID-19 era will end and the post-COVID-19 era will begin. Due to the uncertainty, it is possible that manufacturers will face new challenges as the pandemic continues. To ensure quality operations, sporting goods manufacturers have already begun to adopt new models and practices in their supply chains. Therefore, if the current pandemic situation continues for a long time, changes in supply chains when entering the post-COVID-19 era, may not be so significant.

In the future research, it is important to consider how the current situation with the pandemic develops. If the COVID-19 era continues, and especially if new shocks occur, it could affect the performance of manufacturers. This can bring new ways to change supply chains. It is also possible that the methods already used will be intensified. However, it is important to examine what has happened since the previous study and how it has affected. As stated earlier, this study explores the possibilities in theory. In the future, these opportunities will be put into practice. When this happens, future research should look at what changes were made and how it affected supply chains. In this way, research and data can be utilized in the longer term, for example in the event of a surprise of a new shock.
7 References


worldwide/.


