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Post-COVID-19 EU Supply Chains:

A Comparison between Two Types of Supply Chains

Student: **Musa Mustafa-zada**

Student ID: **339950mm**

Supervisor: **Dr. Wouter Jacobs**

Second Assessor: **Dr. Bart Kuipers**

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Chapter 1: Introduction

1.1 Background

The COVID-19 pandemic has impacted the functioning of companies from different sectors around the world. As soon as the pandemic started, numerous problems emerged for individuals and organizations alike. The global supply chain network has been significantly impacted, which resulted in major disruptions and irregularities for various small and global companies (Enderwick & Buckley, 2020). Returning to the pre-COVID-19 business state appears challenging to many organizations. This is because companies need to rethink, refine, and modify their strategic options to help them improve their performance in the post-COVID-19 business environment (Barbieri et al., 2020). In other words, they may need greater experimentation with different strategies and models pertaining to the structure and functioning of supply chains.

Prior to the COVID-19 pandemic, China was a crucial marketplace for global organizations to purchase and sell a wide range of goods and services. Upon imposing lockdowns due to the pandemic, the movement of global supplies was substantially disrupted, as both retailers and consumers were affected (Francis, 2020). Yet, in the post-COVID-19 world, EU companies have considered the importance of implementing significant changes in the context of supply chain models and supply chain functioning. Some of the priorities emphasized by these companies refer to increased supply chain visibility, efficiency, transparency, and resilience (Ishida, 2020). Cost-optimization will always remain the focus in supply chain restructuring in the EU business context.

A significant shift has already been observed from linear supply chains to more properly integrated networks involving various business players. Technology plays a crucial role in enabling a similar change, which is further strengthened by the necessity to reskill employees in the post-COVID-19 business world (Notteboom et al., 2021). Many companies in the United Kingdom and other European countries have expressed their strong willingness to encourage employees to use digital technologies in optimal ways as well as to adapt to persistently changing corporate strategies and business models (Perez-Batres & Trevino, 2020). The new ways of working have resulted in more substantial virtual collaboration and greater creativity in making well-informed business decisions.

The COVID-19 pandemic has forced global companies to refocus their sustainability objectives since they needed to think how to address the financial and social challenges created by the pandemic. Nevertheless, sustainable supply chain practices are still important;

therefore, in restructuring their supply chains, EU based companies should not disregard their sustainable orientation even though this might a lengthy and challenging process (Perez-Batres & Trevino, 2020). It has been noted that the future of supply chains is digital, as the process of digital transformation has already started (van Hoek, 2020). This means the COVID-19 pandemic has facilitated certain pre-existing trends and practices pertaining to the digitalization of different business processes and supply chains.

It appears that the simple use of diverse digital technologies is not associated with the establishment of autonomous and smoothly performing supply chains in the post-COVID-19 business environment. It has been emphasized that supply chain technologies adapted for this environment should be extensively connected to help EU companies achieve their long-term strategic goals (Perez-Batres & Trevino, 2020). Such connections are expected to be observed in the areas of strategic planning, procurement, and manufacturing. As a result, companies will be better able to respond to changes in consumer demands in different sectors of the EU economy (Wang & Sun, 2021).

The focus of this study is to demonstrate certain aspects and strategies related to the functioning of two types of supply chains, respectively agile and continuous flow models. The results from the study can guide business practitioners, researchers, and company leaders to make well-informed decisions to help EU based companies optimize the functioning of their supply chains in the post-COVID-19 business environment (Perez-Batres & Trevino, 2020). The study findings also have relevant practical implications to business practice in the sense of identifying and interpreting numerous supply chain trends related to supply chain models and strategic restructuring.

1.2 Research Questions

There are several research questions posed in this study. They are used to guide the research process and obtain relevant information about the research problem:

Research Question 1: How has the COVID-19 pandemic impacted the development of EU supply chains?

Research Question 2: What are the differences between agile and continuous flow types of supply chains in the EU business context?

Research Question 3: How can EU based companies restructure their supply chains to meet the demands of the post-COVID-19 business world?

Research Question 4: What are the key factors contributing to the selection of the right supply chain transformation strategy?

1.3 Research Objectives

The research objectives outlined in this study are described below:

- To critically investigate the specific ways in which the supply chains of EU based companies are developing in response to the COVID-19 pandemic.
- To review available supply chain strategies and compare between two types of supply chains, particularly the agile and continuous flow model.
- To provide viable recommendations to EU based companies to restructure their supply chains in response to the unique demands emerging in the post-COVID-19 business world.

The next chapter provides a literature review of studies related to the research problem identified in this study.

Chapter 2: Literature Review

This section contains information obtained from a systematic literature review on the development of post-COVID-19 EU supply chains. The emphasis is upon the strategic options available to EU based companies for restructuring their supply chains. At the same time, the results from the literature review raise the issue of the most appropriate strategic path EU based companies can take in selecting a viable supply chain transformation strategy.

2.1 The Impact of COVID-19 on the Supply Chains of EU Based Companies

2.1.1 The automotive industry

The COVID-19 pandemic has caused severe economic shocks in several countries. As a result of lockdowns in the EU, companies within the region have been harshly affected. Interruptions in numerous supply chains across industries occurred, particularly at the onset of the crisis and mostly within internationalized and complex value chains (Perez-Batres & Trevino, 2020). De Vet et al. (2021) asserted that the automotive industry is one of the sectors that has been hardest hit by the pandemic. At the onset of the first wave of the pandemic, the supply chain of the EU automotive sectors was unsettled by the closure of 30 Chinese factories (Kufelová & Raková, 2020). Even more harsh was the shutdown of European companies in the first phase of the pandemic. Across Europe, automotive companies were closed for about thirty days.

The sale of new passenger vehicles in the United Kingdom almost halted in April 2020 because of the pandemic. It dropped by about 97% to approximately 4,000 vehicles when compared to the previous year that recorded 161,000. Therefore, it reached its lowest since 1946 (Kufelová & Raková, 2020). At the same period, automotive companies in the EU recorded 3.6 million production losses of vehicles. By the close of the second half of the year (September 2020), the losses had increased to 4 million vehicles, representing twenty percent of the EU's entire manufacturing in 2020. At this time, the demand for vehicles had reduced by 28.8% when compared to 2019. More than 1.1 million jobs were directly affected by the pandemic because of the closure of factories in the first half of 2020 (Perez-Batres & Trevino, 2020). Furthermore, the amount of people actively working in manufacturing plants significantly declined as a result of compliance to distance, hygiene, and security measures.

2.1.1.1 Electric Vehicles and battery supply chain

Despite automotive industry suffering colossal losses due to pandemic, EV sector of the industry displayed outstanding growth of around 33% YoY in 2020 globally, and more than doubled in Europe due to increasing demand for environmentally friendly transportation (Harrison & Ludwig, 2021). Report by *Automotive Logistics* suggests 21% CAGR over the next decade and that by 2030 53% of all new vehicles globally will be fully electric or hybridised. In this context, it is interesting to note that this puts enormous demand on battery supply chain, as it will need to grow at an even higher speeds to match the demand, due to expected increase in battery capacity by 3% YoY. Report suggests that battery production will need to grow from 475 GWh in 2020 to 2,854 GWh in 2030 (Harrison & Ludwig, 2021). With around 30% of the EV vehicle cost coming from the battery, the consequence of such high demand is a "arms race" by various countries and companies to take share of the battery supply chain. Due to high weight and strict transportation regulations for batteries, it is expected that supply chain will be regionalized. EU has already declared that by 2024, key parts of battery production must be sourced locally, and by 2027 100% of production should be from Europe, to make supply chains resilient from foreign interventions. With support from EU and UK governments, companies like Arkema, Northvolt, BMW, Tesla, and Volkswagen have announced plans for massive production facilities, called "Gigafactories" in Europe and UK (Harrison & Ludwig, 2021). And while currently 93% of battery cell production is controlled by Asian companies (with 44% by Chinese companies, such as CATL), by 2030 it is expected that Europe will account for around 33% of global battery cell production thanks to massive investments from companies and governments and 33 new Gigafactories already under construction or announced. Some companies, like Tesla, are even attempting to take control of the upstream production, including mining of Lithium and Cobalt, which are crucial for Li-ion battery production (Harrison & Ludwig, 2021).

2.1.2 The aviation industry

In the aviation industry, the outbreak of COVID-19 in Europe prompted an unexpected drop in demand for civil aviation. A good example is the daily trend that occurred in March 2020, when air traffic declined by 86% in comparison to 2019 (De Vet et al., 2021). In April the same year, the number dropped further by 92.8% following restrictions on transport and movement that were applied by various countries in the EU. In the first half of the pandemic in 2020, the number of airplanes that were grounded in Europe increased to 80% when compared to 2019, representing the worst global trend within that period (De Vet

et al., 2021). However, from the start of the summer in 2020, stabilization and lifting of travel restrictions within the EU prompted a period of moderate recovery. It is essential to note that the rapid decline in demand for aircraft production, together with interruptions in the supply of raw materials, caused delays in the supply chain that led to reduced production. Eventually, it caused serious cash flow problems for several companies in all phases of the aerospace supply chain, especially for the second and third tier suppliers or small-and medium enterprises (SMEs).

During the second wave of the pandemic, rates of infection spiked, and the government re-introduced restriction measures across the EU resulting in reduced traffic between September and December in 2020. The EU's demand for aircraft manufacturing reduced generally by 43% in 2020, primarily as a result of Airbus order deferrals (De Vet et al., 2021). As for the travel sector, airline companies have struggled since the start of the pandemic. Several companies became bankrupt or resorted to business reorganization causing forced costs and asset reductions, and eventually loss of jobs. With a total of $60 billion of net losses for airline companies, navigation and airport service providers, national markets in the EU dropped by 60% when compared to 2019, with reduced flights ranging from 61% in Europe and 40% in the rest of Europe.

2.1.3 Food and drinks industries

While assessing the impact of COVID-19 on the EU food companies, it is essential to distinguish between various subsectors because the impacts are diverse (Public Health England, 2020). For instance, while hotels, restaurants and cafés were hit the hardest, as food retailers witnessed better sales as a result of a radical change in the behavior of consumers from eating outdoors to eating food at home. Retailers of packaged and frozen foods witnessed a steep rise in sales. For instance, at the onset of the pandemic in the United Kingdom, Public Health England (2020) reports that the volume sales peaked to March 22 prior to the announcement of a lockdown in March 23. The week that ended on 22 March recorded the highest ever sales by Kantar FMCG (43%) and surpassed the peak that occurs at every Christmas (De Vet et al., 2021). In the succeeding week that ended on 29 March, the volume sales fell significantly reflecting the amount of stockpiling that occurred in the previous few weeks.

After the first weeks of stockpiling and shoppers adjusting to the lockdown measures, the volume sales increased and remained above similar time periods in 2019. In general, Public Health England (2020) reports that the volume sales throughout 2020 remained 11%

higher than the equivalent period in 2019. The supply chain of food companies remained relatively resilient. However, some challenges were also experienced in the supply chain as a result of closed borders, which disrupted the supply for inputs, transport of goods, and labor shortages. Another issue in the supply chain occurred at the onset of the pandemic, especially because of stockpiling (De Vet et al., 2021). Although the behavior changed, the supply chains were backed by green lane measures, and employees were treated as essential service providers. As a result, the supply chains quickly stabilized and stayed resilient.

2.2 The Impact of the Pandemic on the Agile Supply Chain Model in the United Kingdom

Disruption of the supply chain is not something new. Previous events such as explosions, earthquakes, and the 2018 shortage of oxygen all caused disruptions to the normal flow of goods and services. The COVID-19 has shown that companies with an agile or resilient supply chain can easily adapt and remain competitive (Do et al., 2021). Therefore, as the impact of COVID-19 continues, companies have been forced to add contingency and agility into their supply chain operations. The concept of supply chain agility (SCA) has changed over the years into four fundamental aspects: pathways, criteria, scope, and objectives (Tarafdar & Qrunfleh, 2017).

Early proponents refer to SCA in a customer responsive manner, restricting it to a responsive ability of providing fast responses to sudden changes in demand, to attain a competitive edge. However, subsequent conceptual adaptations have immensely broadened SCA's limit to incorporate both physical and cognitive ability to pay attention, anticipate and identify opportunities and disruptions (Tarafdar & Qrunfleh, 2017). However, speed is not the only standard for measuring reactions to change; flexibility is also essential. The SCA addresses all kinds of unexpected disruptions in the supply chain, either external or internal, which is not necessarily restricted to the demand side. Changes within the scope of SCA are mostly immediate, sudden, uncertain, temporary, abrupt, and unexpected, rather than long-term and evolutionary. It also makes agility more relevant in the unpredictable and fast changing conditions shaped by the COVID-19 pandemic.

Therefore, concerning the comprehensive objective, Do et al. (2021) state that SCA has the prominent quality of allowing companies to achieve a competitive advantage and, therefore, improve such competitive metrics as operational performance indicators (such as product innovation, service quality, lead time reduction), strategic performance indicators (such as competitiveness, marketing, and financial performance) or sustained outcomes (view

Figure 1). Another important objective of SCA is disruption and risk management, referring to the ability to respond to sudden disruption and adapting fast to persistently changing market conditions (Tarafdar & Qrunfleh, 2017). Perhaps, the objective of SCA has become extensive beyond attaining competitive advantages. Proponents incorporate SCA in business continuity and embrace opportunity seeking in turbulent times, which become the risk-mitigation initiatives.

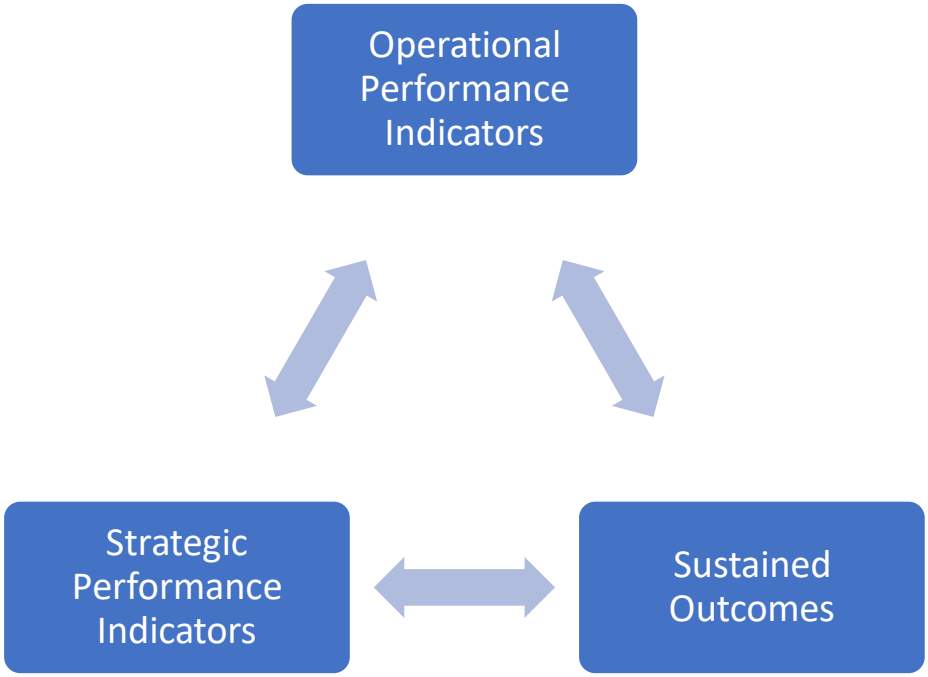

Figure 1: Supply Chain Agility

Tesco is a relevant example of a company restructuring its supply chain in a fast-changing crisis. A few days to the onset of the COVID-19 pandemic, Tesco's seven-weeks' worth of products sold out in one week. The giant retailer realized it had to react fast in such turbulent times. It resorted to working closely with its suppliers to simplify the collection of products it offered such as reducing the variety of toilet rolls in their collection from thirty-three to ten types (Jones & Comfort, 2020). At the same time, the company made several purchase promotions so that suppliers could focus on meeting the surging demand. In the end, the retailer boosted its online deliveries to the most vulnerable consumers. The shift led the company to hire several staff to fulfil the demand (Stewart, 2021).

As the pandemic started, Tesco's online capacity increased from approximately 600,000 weekly delivery orders to 1.5 million orders each day (Davey, 2021). The online grocery business grew from 9% to more than 16% of Tesco's entire sales in the United Kingdom, allowing the business to continue investing both short-term and long-term (Davey,

2021). One of the ways that the company ensured it continued to operate is by making early commitments to paying for goods ordered, especially in the fashion sector, one of the sectors that was hardest hit by the pandemic (Jones & Comfort, 2020). Tesco ensured that it paid its suppliers on time and sometimes earlier, for ordered clothes to make sure that its supply chain did not have a problem.

Another example of a company adjusting its supply chain is the Brompton company. In April 2020, a bike manufacturer, Brompton was forced to adapt its production and supply chain to make 1,000 foldable bicycles for the NHS employees (Reid, 2020). The company launched "Wheels for Heroes Crowdfund" with the aim to raise enough money to supply NHS employees with bicycles so that they could safely report to work during lockdown. At first, the company committed its production capacity value approximately £100,000 to finance the bikes, but the initiative raised more over £344,785 in 2 and a half months leading up to June. In spite of having to reduce its production capacity as a result of social distancing on the assembly lines, its production stations are usually 1.7 metres apart thus the company did not lose any day of production (Reid, 2020).

Apparently, the company is creating over 1,200 bikes each week notwithstanding the production shifts brought by the pandemic. It can be argued that the smooth operation of the company's supply chain is as a result of the plans the company made ahead of the first Brexit departure date, that was later changed. While preparing for Brexit, the company stockpiled parts from its suppliers overseas. As a result, Do et al. (2021) state that the crisis (the pandemic) enabled the company to understand that it is important to integrate agility in all aspects of the supply chain to remain resilient in the future.

2.3 The Impact of the Pandemic on the Continuous Flow Supply Chain Model in the United Kingdom

While some supply chain models (such as the agile supply chain model) need companies to be flexible and responsive to changes, other supply chains need efficiency (especially in fiercely competitive industries and markets) to operate. An efficient supply chain allows a company to not only compare costs to key metrics but also make constant adjustments when needed depending on the precise situation (Singh et al., 2018). A good example of an efficient supply chain is the continuous flow supply chain model. This model works best in highly competitive industries that are schedule-centered with the objective of maximizing efficiency across the supply chain and using all assets at a lower cost (Singh et al., 2018). The model relies on the stability of supply and demand, with processes organized

in a manner that it guarantees a stable tempo and constant flow of information and products (view Figure 2).

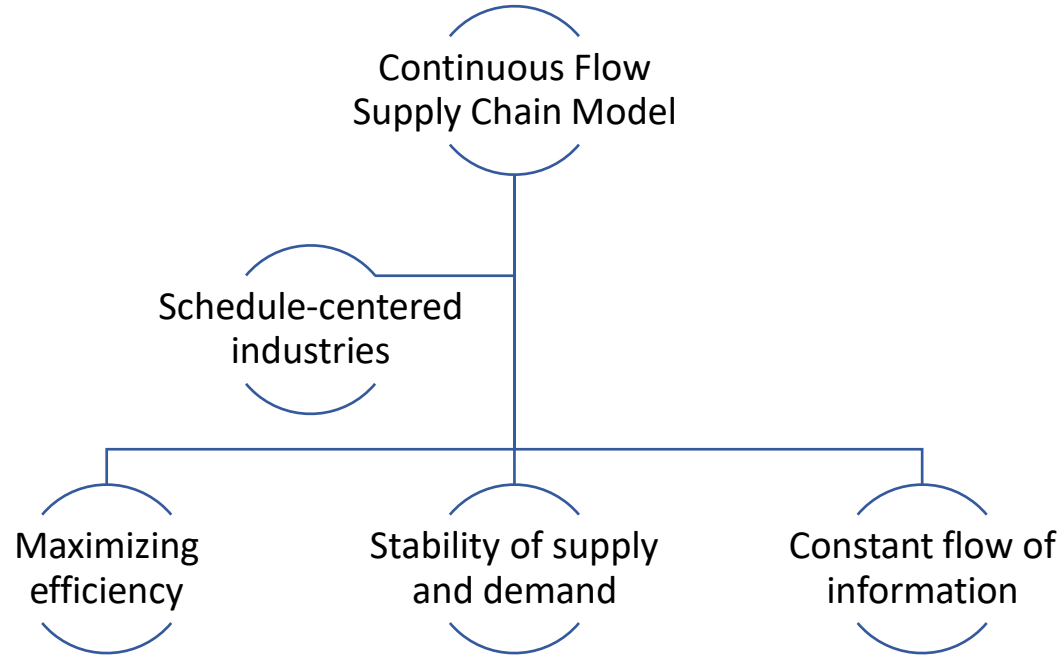

Figure 2: Continuous Flow Supply Chain Model

The continuous flow model is essentially built for an established supply chain with a consumer demand profile that has little change. Companies that use this model operate in an environment where the market is flooded with the same manufactured products, all selling to the same kind of consumers. Such consumers often do not seek the unique worth of a particular product but its cost (Amelec, 2015). The primary focus of a continuous supply chain model is to help the manufacturers have raw materials essential for the company to remain competitive and manufacture the volume that will keep the costs down. This means proper strategic actions taken to appeal to the increasing consumer base.

Prior to the pandemic, most companies in the United Kingdom, especially in the manufacturing sector, used the continuous flow supply chain model because of its efficiency. However, the same approach could not be used during the pandemic because the impact on manufacturing companies varied significantly (Iyengar et al., 2020). For instance, while the demand for non-essential products (such as construction equipment and automobiles) dropped, the demand for essential products (such as food and medicines) increased across the world (Iyengar et al., 2020). The global demand for construction equipment declined sharply because of customers cancelling orders and deliveries being suspended. A good example is

JCB Ltd. which halted its UK manufacturing facility to re-organize orders and focus on products that customers need.

On the other hand, the demand for essential products such as medicines, food and ventilators grew abruptly, causing short-term shortage of products. In fact, there were delays in the online delivery of products (Chowdhury et al., 2021). The spiking demand for such products were caused by panic purchasing, worrying about the future, and hoarding behaviors (Chowdhury et al., 2021). As a result, the continuous flow supply chain model was significantly disrupted. For essential products, companies were forced to adjust and increase productions while for non-essential products companies had to reduce the production of such products.

2.4 Effective Supply Chain Transformation

It has been argued that the post-COVID-19 business environment has prompted EU based companies to undertake a process of supply chain transformation. This is because the respective organizations have focused on how such transformation could improve the functioning of their supply chains and enable them to facilitate growth and mitigate risks (Perez-Batres & Trevino, 2020). Research shows that effective supply chain transformation starts with proper alignment of supply chains with companies' business objectives (Williamson, 2021). The proper utilization of supply chain transformational strategies is associated with visionary leadership (Enderwick & Buckley, 2020). Such leaders tend to provide real-world examples because their goal is to turn their vision into a reality (view Figure 3).

Figure 3: Factors Facilitating Supply Chain Transformation

It has been indicated in research that the supply chains of EU based companies should be transformed in such a way to be equipped for the future. This implies a thorough consideration of consumers' needs and preferences in the continuously changing business environment (Gereffi, 2020). Furthermore, it has been noted that companies are focused on the optimization of supply chain costs. The components of customer experience are adequately taken into consideration, along with profitable growth indicators and sustainability issues (Perez-Batres & Trevino, 2020).

There are different solutions for effective supply chain transformation. In the uncertain and volatile post-COVID-19 business environment, it is important to conduct a value stream analysis to determine the overall health of supply chains (Bolter & Robey, 2020). As a result, it is possible to understand how companies respond to rapid market changes caused by the pandemic (Perez-Batres & Trevino, 2020). They can be more enthusiastic to experiment with new business models and strategies to improve the functioning of their supply chains.

The component of supply chain visibility has become an inseparable part of effective supply chain transformation in the post-COVID-19 business context. Once companies are prepared to decrease their lead time and inventory, this automatically increases agility and resilience irrespective of the challenging business situation in the post-COVID-19 world (Fonseca & Azevedo, 2020). In the process of enhancing supply chain visibility, EU based companies have recognized the importance of implementing the Internet of Things (IoT), as this method is believed to optimize product portfolios of organizations.

2.4.1. Near-shoring

Near-shoring has been increasingly popular strategy for supply chain restructuring, with some regions like CEE/SEE increasingly benefitting from EU near-shoring (Nagy-Mohacsi et al, 2021). Western Balkan countries have been indicated as a potentially attractive destination for near-shoring for countries such as Germany and Austria after COVID-19, provided sufficient infrastructure investments are made (Reiter & Stehrer, 2021).

At the same time, near-shoring outside EU region to nearby countries has also been proposed as a mechanism to stimulate local development and create a buffer zone that limits migration pressure, effectively transforming near-shoring from purely economical to a political instrument (Nagy-Mohacsi et al, 2021).

Researchers have pointed out that while logistical costs of near-shoring might be smaller compared to off-shoring, this advantage can be temporal, while cost of switching to a

new location and finding the right suppliers can be high enough to outweigh logistical benefits. However, researchers have found out that customers might be willing to pay additional price for improved availability and speed, hence making near-shoring a viable option nevertheless (Hoek, 2020).

Near-shoring is not a new trend. In fact, it has been established that previous pandemics such as MERS and SARS have also played role in triggering near-shoring attempts. For example, SARS epidemic has resulted in increased export from Poland in Europe, at the expense of Chinese exports. This has been further stimulated by reaction of European companies to sanctions against China by US. As companies are seeking to remain competitive in US markets, they move their production out of China and into Hungary, Czech Republic, and Poland (Shingal & Agarwal, 2020).

2.5 Key Success Factors for Supply Chain Management Practices

The need for supply chain management success has been clearly recognized in the context of business transformation in the post-COVID-19 business environment. Therefore, organizations aim to improve the performance of their supply chains through adhering to key success factors (Prasad et al., 2020). One such factor is identified as the process of setting realistic and measurable goals. This means companies need to envision their success once they are ready to develop realistic objectives, as the idea is to respond more efficiently to ongoing changes in the market (Perez-Batres & Trevino, 2020). By comparing decision alternatives, these companies can better understand the impact of their corporate metrics. This could lead to a higher level of customer satisfaction and improved customer engagement with different organizational processes.

The second key success factor for optimizing companies' supply chain management practices is recognized as the development of a highly effective plan. This type of strategic planning involves all details applicable to different business transactions, as well as data inputs and outputs and major security provisions (Prasad et al., 2020). The thorough consideration of these aspects contributes to a more effective planning process in which the interests and expectations of all stakeholders are properly understood.

Furthermore, the completion of successful projects in the supply chain management context needs a solid executive sponsor. Such a sponsor is usually able to make effective, evidence-based decisions and remove any obstacles for success (Gimenez & Sierra, 2013). Support from top leaders at companies is needed during such a transformation process, as it is important to encourage team members to adopt a proactive attitude toward the expected

organizational changes (Goose, 2013). In case some stakeholders demonstrate resistance to change, leaders should be prepared to respond to such negative attitudes with clear facts and adequately presented information on the research topic.

In the process of building agile supply chains, companies are usually focused on developing effective supplier contracts. In case key suppliers fail as a result of the pandemic, businesses should be prepared to replace that supplier with an alternative option to prevent further disruptions of their main operations (Bolter & Robey, 2020). Maintaining multiple supplier relationships is a prerequisite to the development of highly performing supply chains (Gimenez & Sierra, 2013).

An important success factor for supply chain management practices in the post-COVID-19 business environment is the presence of an agile team within organizations. Individuals should be trained to become adequately aware of external changes and emerging market trends that may influence their business operations and processes (Bolter & Robey, 2020). The sense of urgency to restructure companies' supply chains should be accompanied by sufficient flexibility. In this way, team members have the freedom to initiate any changes they consider optimal for business development in the post-COVID-19 world.

Companies operating in today's complex environment should demonstrate an expertise in utilizing the most effective technology. In this way, different suppliers can be connected through a shared technology platform, which gives them the opportunity to discuss any supply chain management practices they might find challenging or controversial (Singh et al., 2018). Since competition is significant in different industry sectors, organizations need greater strategic preparation in responding to changes in terms of supply and demand. When companies set their objectives beyond their survival, these organizations gradually move in the right direction (Do et al., 2021). Both employees and suppliers are expected to initiate collaboration to help them achieve the ultimate goals of improved supply chains.

It is also important to consider the key success factor of data-driven supply chains. Gathering relevant data is crucial for the optimal operations of supply chains, as corporate leaders frequently emphasize the use of data optimization software to achieve relevant results in the long term (Do et al., 2021). It is possible to track the movement of companies' supply chains, as this can enable them to improve their efficiencies as part of their operations (De Vet et al., 2021). The direct outcomes of such changes are commonly described as handling of materials and equipment more efficiently, making better future forecasts and improving overall productivity.

It has been indicated in research that supply chain leaders tend to empower employees. This usually takes place through the implementation of efficient labor management practices (De Vet et al., 2021). The empowerment of employees is translated into relevant actions to benefit the entire organization, rather than being solely focused on one's goals and interests. The most effectively performing organizations tend to place their employees within the supply chain to achieve optimal results (Jones & Comfort, 2020). This practically means employees are provided the most reliable mechanisms and tools to complete the given tasks in a flexible and efficient manner.

Since the development of data-driven supply chain has been prioritized by EU based companies, the emergence of greater transparency has been considered another key success factor for the ongoing process of restructuring organizations' supply chains (Public Health England, 2020). All parts of supply chains are connected and integrated to contribute to the profitability of the respective business operations (Stewart, 2021). By focusing on the parameters of transparency in supply chains, corporate leaders can undertake the necessary actions to reduce financial and reputational losses that may occur within supply chains.

As shown in the literature review, the COVID-19 pandemic had an impact on the supply chains of EU based companies. Some of the industries that have been affected included the automotive industry (with exception of EV sector, which showed impressive 33% growth globally), aviation industry, and food and drinks sectors. The two supply chain models were explored in the UK business context, particularly the agile and continuous flow supply chain models. It has been concluded that the pandemic resulted in a substantial disruption in EU based companies' supply chains, leading them to make rapid decisions of increasing their flexibility and agility. Numerous examples were provided in this section to emphasize the responsiveness and social responsibility of EU organizations in finding the most optimal way in which they could address the challenges pertinent to the pandemic.

Another significant aspect discussed in the literature review was that of effective supply chain transformation. The need for having completely transformed strategies was emphasized, as EU based companies had to rethink their strategic approaches to improving the functioning of their supply chains. The emphasis was upon the high level of alignment to business objectives, which could create sufficient synchrony and greater balance in volatile business conditions.

In addition, the literature review provided a discussion of key success factors for improving EU based companies' supply chain management practices. Aspects of visionary leadership could be important to helping those organizations achieve their strategic

objectives. The focus was on the development of agile, flexible, and data-driven supply chains. The benefits of the entire organization have been adequately taken into consideration. In conclusion, the literature review demonstrated that EU based companies need to be consistent in implementing a wide range of strategies to address the inconsistencies and gaps in supply chain functioning caused by the COVID-19 pandemic.

The next section of the paper introduces the research methodology. The emphasis is upon understanding the specific methods implemented to gain a better understanding of how the COVID-19 pandemic affected EU based companies' supply chains.

Chapter 3: Research Methodology

The research methodology implemented in this study is identified as secondary research. This type of methodology implies the use of already existing research information. The respective data is properly organized and synthesized through the utilization of an inductive approach (Stewart & Kamins, 1992). The emphasis is upon the specification of substantial textual data into a summary format which can be easily accessible and interpreted in line with the research questions and objectives posed in this study. It has been pointed out that the implementation of an inductive approach indicates the development of proper links between the research objectives and the summary findings derived from the extensive literature review on the research topic (Largan & Morris, 2019). As a result, it has been possible to analyze the qualitative data findings in a way to produce valid and reliable conclusions that can be used in future research on the development of post-COVID-19 supply chain models in the EU business context.

The focus of the researcher in this study is on conducting a systematic qualitative textual analysis of recent research on the supply chain management practices of EU based companies. The selection of two types of supply chain models, particularly the agile and continuous flow models, is done strategically to determine the differences between supply chain management practices of EU organizations in the post-COVID-19 business environment (Largan & Morris, 2019). The focus in such a comparison is on different strategic options for the respective companies in terms of back-shoring, near-shoring, digital transformation, and automation.

As part of the secondary research methodology, there is quantitative data included on the research topic. Some empirical data sources utilized for expanding the research refer to OECD-WTO Trade in Value Added (TiVA) database, OECD's Analytical AMNE database, WIOD, and World Bank WDR 2020 data. It is believed that using quantitative data sources has increased the validity and reliability of the conclusions made in this research.

The secondary research methodology is cost-efficient and convenient; thus, many researchers prefer this method to collect relevant information about a research phenomenon. Data about a particular research topic is extensively available on the internet, which facilitates the research process significantly (Stewart & Kamins, 1992). For the purposes of this study, only credible websites have been examined in order to locate authentic research information. The secondary research methodology is based on tested data which was previously analyzed and interpreted.

The way in which the secondary research is conducted in this study is properly organized and structured. The initial step is to identify the topic of the research, which is to explore differences in two supply chain models in the EU business context in the post-COVID-19 world. The second step is to specify the research sources, which are recent peer-reviewed journal articles as well as numerous credible EU websites (Largan & Morris, 2019). It is important to narrow down the data collection sources, which is helpful in preventing the retrieval of ambiguous and confusing research findings (Stewart & Kamins, 1992). After the collection of relevant research information, the data is combined and compared to attain a thorough understanding of the research subject.

The data obtained from secondary research is thoroughly analyzed to reveal any links and patterns. This also enables a coding process in which the researcher is focused on introducing different codes based on the scope and objectives of the study (Stewart & Kamins, 1992). Even though the data analysis process is lengthy, the in-depth conclusions generated through this method are helpful for future practical insights.

The next chapter provides the research findings and analysis of important takeaways generated in the study. In this way, it is possible to understand better how EU based companies plan to restructure their supply chains in line with the reformed business world in the post-COVID-19 environment.

Chapter 4: Research Findings and Analysis

4.1 Research Findings

As noted, the research method utilized in this study was secondary research. The focus in the research was on comparing the differences between two types of supply chain, respectively the continuous flow and agile flow models. Table 1 presents the major differences between continuous flow and agile supply chain models.

Continuous Flow Supply Chain	Agile Flow Supply Chain
Stable supply and demand	Unpredictable demand
Continuous flow of information and products	Products are made after customers place their order
Appropriate for mature supply chains	Goods are tailored to customer needs
Production matches demand	Customers value short lead time
Has a long lead time	It is appropriate for service businesses
Attains customer satisfaction	Offers on demand products
Streamlined information system for managing inventory and transaction processes	
Appropriate for businesses with products that have a short shelf life (hospitality industry)	

Table 1: Differences between Continuous Flow and Agile Supply Chain Models

4.1.1 The continuous flow supply chain approach

The primary aspects of the continuous flow supply chain approach include the stability of supply and demand, and processes that are organized in a manner that guarantees rhythm and constant flow of products, services, and information (Archibugi, 2020). Prior to the COVID-19 pandemic, Europe's airline industry represented a good example of the continuous flow supply chain model because of the stable supply and demand (Archibugi, 2020). The industry was valued at $37.78 billion in 2020 and estimated to reach $68.41 billion in 2026. Despite the impact of the pandemic on the EU's economy, Europe's demand for airlines increased slightly due to increased expenditure on defence aircrafts (World Bank, 2020). The average expenditure of NATO nations increased from 1.52% of GDP to 1.64% of GDP in 2020 (Archibugi, 2020).

It is essential to note that the continuous supply approach is suitable for mature supply chains and customer base that has little change. Therefore, the continued demand for aircrafts, especially in the military, shows that despite changes in the market, there is always a demand for aircrafts (Ser'yoznov et al., 2021). Production is made to replenish predefined stock levels based on the number of orders. Figure 4 below presents revenue share (%) by type as of 2020 for Europe's aviation market.

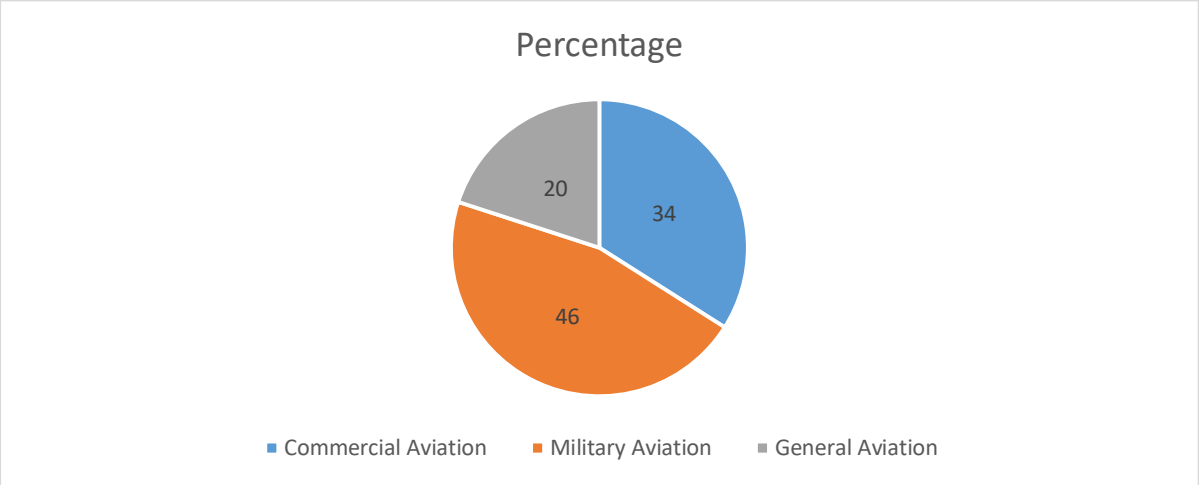

Figure 4: Europe's Aviation Market

The UK's aviation market apparently accounts for a major share of Europe's market share in terms of revenue. It has the busiest international airports such as Gatwick airport, London-Heathrow, and Manchester. In spite of the 72% decline in passenger demand in 2020, the Heathrow airport in London continued to be the busiest airport in Europe. While the pandemic drastically impacted the future growth of carriers such as Virgin Atlantic and EasyJet, a few companies continued to expand in 2020. A good example is Ryanair airline which ordered for the manufacture of an aircraft worth $9 billion. According to Ryanair, its customer base is projected to increase from 149,000 million in 2022 to 200 million in 2026. British Airways also continues to increase its fleet by shifting from Boeing in early 2020 to Airbus. However, British Airways delayed its initial deliveries of Boeing from 2022 to 2024 after delays from Boeing (Helmold, 2020). Besides commercial flights, the UK government had significantly invested in the upgrading of its fighter aircraft fleet. For instance, the Royal Navy and Royal Air Force intended to acquire a total of 130 Lockheed Martin aircrafts, 20 of which were already operation in 2020, out of the 45 intended to be acquired by 2025. Figure 5 illustrates share in total value added based on the parameters of air transport, manufacturing of air and spacecrafts, and operation of airports.

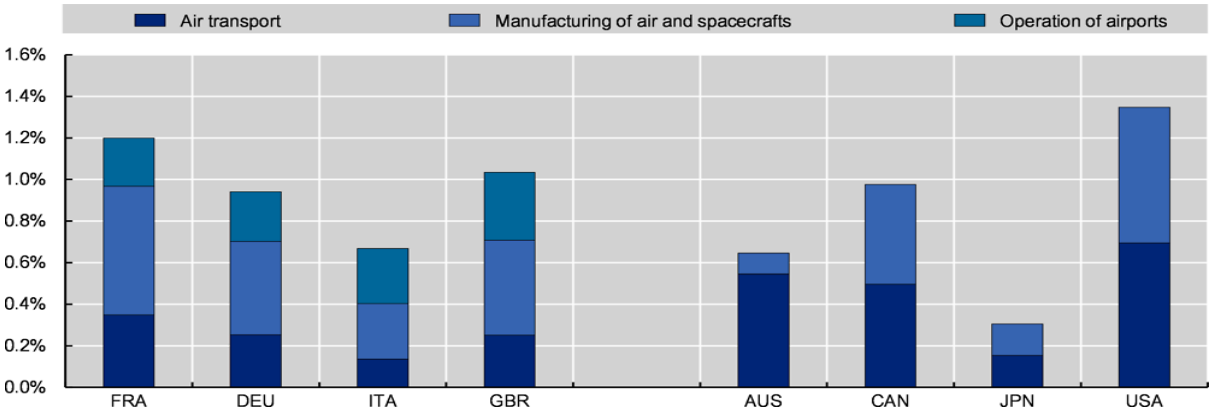

Figure 5: Share in Total Value Added (OECD, 2020a)

The UK's government also plans to invest $2 billion on Tempest, a different aircraft project that will be operational by 2025. Furthermore, the UK commercial airline industry has experienced a significant growth over the years (Helmold, 2020). For instance, the nation has two of the leading busiest aviation airports in the EU, London Luton airport and Farnborough airport. Ravenair, Luxaviation, and VistaJet are among the primary charter jet service providers in the United Kingdom. Charter jet airlines are purchasing new aircraft to increase their fleet (World Bank, 2020). Figure 6 illustrates revenue share (%) by nation in Europe's aviation market.

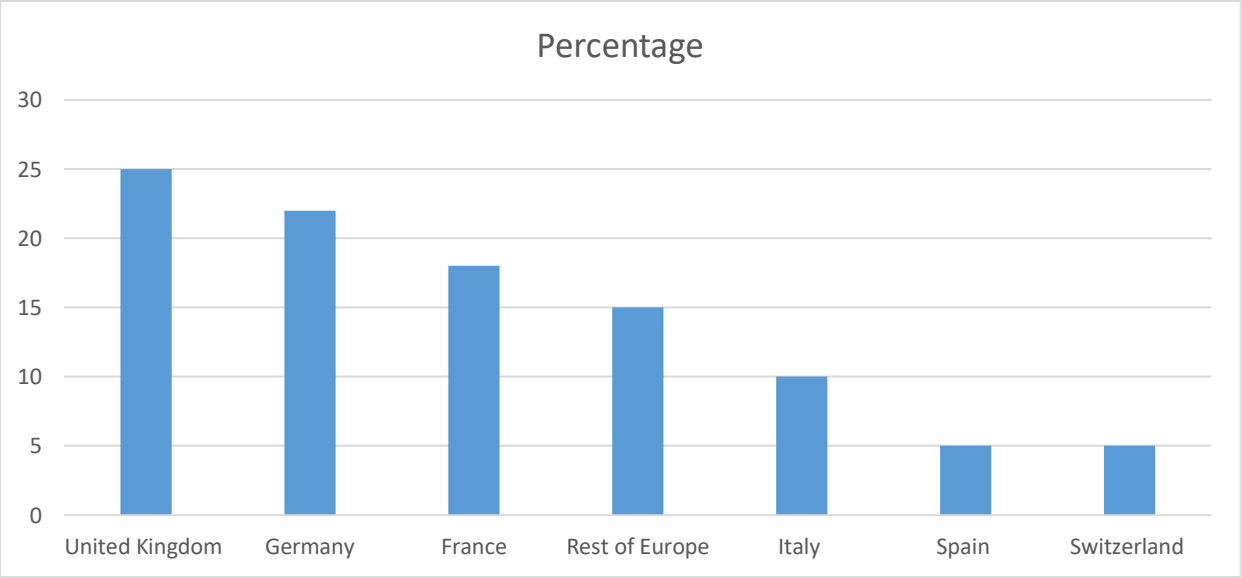

Figure 6: Europe's Aviation Market

In view of the above information, it is essential to note that the competitive advantage of the continuous flow supply chain model is based on constantly replenishing customer demands to

guarantee high service levels and low inventory levels at customers' facilities. This contributes to attaining optimization of costs associated with inventory.

4.1.2 The agile supply chain approach

The agile supply chain approach is different from the continuous supply chain approach because of various reasons: the agile model is suitable for a market where customers have unique needs; it is often practiced in an industry with unpredictable demand and uncertain environments. Products are made on order to avoid making products that have no certainty in future sales and in the service industry. This means services are provided based on the estimated demand for the service. A good example of Europe's agile supply chain is the hospitality industry where business strategy is formed based on the uncertain nature of the business environment (Veselovska, 2020). The hospitality industry creates foreign exchange, drives development in the EU market, directly supports various jobs and businesses, and underpins several local communities (view Figure 7).

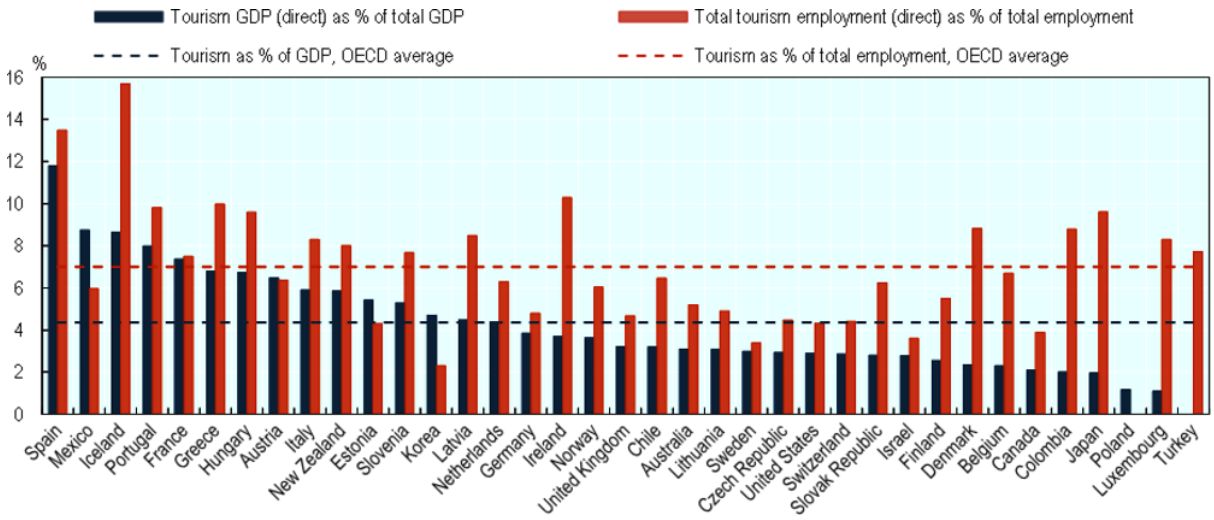

Figure 7: Hospitality Industry's Contribution to the EU (OECD, 2020b)

According to the OECD (2020b), the hospitality industry recorded an all-time low demand during the COVID-19 pandemic. Hotels recorded a 33%, which is 54% less than 2019. The average daily rate for 2020 was $93, 18% less than the previous year while revenue per available room was $30, 62% less than in 2019. González-Torres et al. (2021) stated that the hospitality industry did not only witness low occupancy rates but mass closures. It is projected that 75% of hotels will be closed in Europe. Spain, which significantly relies on tourism, only had 35% of hotels open in 2020 and only 17% of bed spaces available when compared to the previous year (OECD, 2020c). At the same period, the overnight hotel visits declined by 95% by June. As a result, revenue reduced by 50% for

hotels, 71% for tour businesses, and 90% for airline companies (González-Torres et al., 2021). Therefore, the primary objective of competitiveness in the hospitality industry is agility, that is, the ability to meet the irregular demand of customers.

4.1.3 Restructuring supply chains in the post-COVID-19 era

Long before the COVID-19 pandemic started, companies were doing supply chain restructuring. The process mostly involved firms rethinking their relationship with China because of the trade war between the United States and China. A number of companies in the EU were also shifting for various reasons. A report by De Vet et al. (2021) stated that Japan, South Korea, and China account for 86% of the global supply of processed resources and components of Li-ion batteries which are essential for electric vehicles. EU companies only account for 20% of the world's Li-ion batteries in terms of production. Clearly, this cannot satisfy the EU demand for such batteries (De Vet et al., 2021). In terms of assembling cells and manufacturing of battery packs, 66% of the world's cell production occurs in China and the EU is fully dependent on the importation of battery cells (Kajjumba et al., 2020). As a result, the EU's Li-ion battery industry is exposed to supply uncertainty and possibly higher costs. The pandemic also had a disruptive impact on the battery value chain, especially in the initial months of the pandemic, that forced China to endure shutdowns thus the need to restructure.

Apart from Li-ion batteries, the supply chain for nano and microelectronics has been significantly outsourced and globalized. Companies in the EU rely largely on non-EU suppliers; thus, the EU has changed from a producer of such technologies to an importer. Approximately 80% of semiconductor factories and assembly processes are based in Asia. As a result, Asia has a market share of 60% and its leading exporters are China (34%), Taiwan (14%), and Singapore and South Korea both having 11% (Kajjumba et al., 2020). In view of these statistics, companies in the EU seek to restructure their supply chain by back-shoring and near-shoring.

However, a report by Eurofound (2019) indicated that European countries were already experiencing an increased number of reshoring activities before the COVID-19 pandemic. Some of the EU countries with the largest number of reshoring processes included Spain (7%), Austria (5%), Netherlands (4%) and Switzerland (4.2%). Serbian, Slovenian, and Croatian firms made up 2%, while Germany made up 3% which was considerably lower share (Eurofound, 2019). Furthermore, 50% of production was relocated predominantly from EU-15 nations, 20% from other EU countries, while China and other Asian nations made up

25%. Unlike previous years, back-shoring from Asia and China specifically has been on the rise. Nevertheless, this trend should not be overemphasized, because the number of firms engaging in reshoring activities is still small, that is the number of firms transferring their production from Asia to the EU (Eurofound, 2019). The main factors influencing reshoring activities by companies were rigidity (55%), labor availability at home (42%), and poor quality (51%) (view Figure 8).

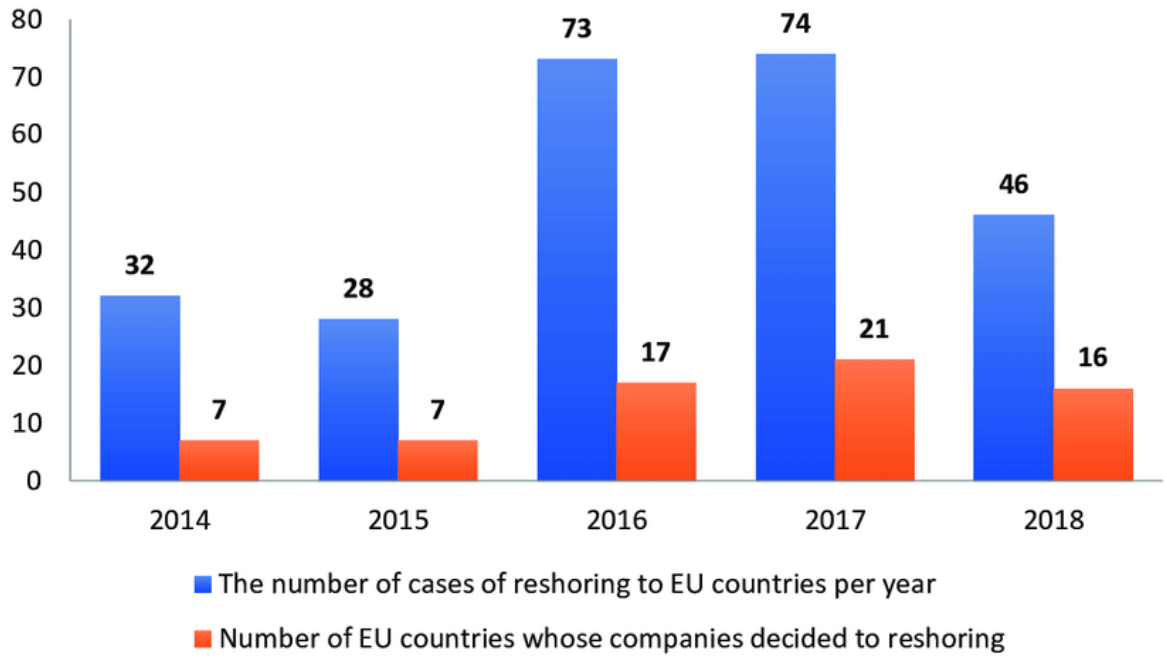

Figure 8: Cases of Reshoring to EU Countries before the Pandemic (Eurofound, 2019)

According to a report by CBI (2021), the period between 2015 and 2017 saw the market for European business process outsourcing (BPO) fluctuate by approximately €2.5 billion worth of contracts annually (Kajjumba et al., 2020). BPO implies the activity of firms outsourcing business processes that are not their core functions to external service providers. Following a somewhat low annual contract value (ACV) of €1.8 billion in 2018, 2019 experienced a strong market value. The contract value for BPO increased by 61% to reach €2.9 billion (view Figure 9). However, it is essential to understand that the average collective value for 2018 and 2019 is as good as that of the period between 2015 to 2017 (CBI, 2021). In 2019, the EU market accounted for approximately 43% (€6.8 billion) of the of the world's contract values (Kajjumba et al., 2020). This is a significant growth from the 29% in 2018 and the 38% in 2017, owing to 2019's strong performance. Although 2019 experienced promising growth, the pandemic disrupted businesses (Kajjumba et al., 2020). Prior to the

pandemic, projections for the BPO market in 2020 were largely positive but at the moment, experts have re-adjusted their expectations. For instance, Technavio reduced its estimated growth of the global BPO market for 2020 from 9% to 1.7% (Kajjumba et al., 2020).

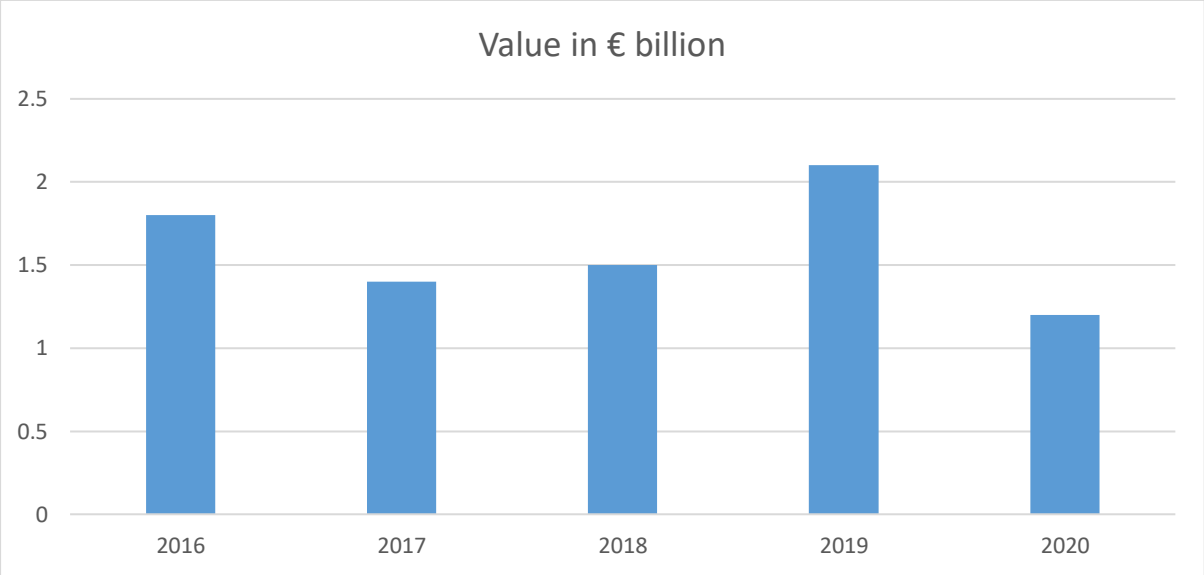

Figure 9: European Annual Commercial BPO Contract Values for Q1-Q3

The impact of the pandemic is mirrored in the yearly BPO contract values of 2016-2020. In 2020, contract values in the initial three quarters of 2020 were significantly lower than in 2019 which recorded €1.2 billion. It has been observed that the specific strong performance in 2019 relatively overstated the variance. Whether or not the growth would have carried on in 2020 is an arguable topic.

4.1.4 Selection of the right supply chain transformation strategy

The results in this study showed that one of the key factors contributing to the selection of an appropriate supply chain transformation strategy is the need to be flexible and agile. In the airline industry, Sun et al. (2021) stated that at the onset of the pandemic led to a situation where several flights were cancelled. In 2020, airlines recorded 50% fewer flights globally than in 2019. Demand for air transport reduced and airline companies lost 66% of passengers in 2020. The total revenue reduced by 50%, a $419 billion decline when compared to 2019. Another trend observed as a result of the COVID-19 pandemic was that aircraft manufacturers, airports, and airline companies downsized. For instance, Air France retrenched 75,800 employees, Aer Lingus cut working hours and wages of its employees by 70% while Wizz Air forced its employees to accept 25% pay cut (Sun et al., 2021). As a

result, the airline industry needs to adapt its supply chain based on the market. For instance, an option could be to make extra revenue by reacting faster to commercial opportunities such as quickly opening new routes that do not have substantial restrictions.

Another key factor contributing to the selection of an appropriate supply chain transformation strategy is the need for strategic autonomy. It has been illustrated in this study that Europe has experienced unprecedented economic and health crisis that has exposed significant vulnerabilities, particularly its overdependence on other nations. Therefore, the EU seeks to readjust its economy to become autonomous from world powers such as the United States and Asia.

The pharmaceutical supply chain, for instance, is strategic for the EU, but the COVID-19 pandemic has shown that the manufacturing and distribution of pharmaceuticals is a difficult activity involving different stakeholders across the entire value chain. Furthermore, the value chain is significantly globalized, and the EU is documented as the largest exporter. Research and development are a significant part of the EU's value chain, but the process is expensive and takes a lot of time to make relevant changes in the value chain (Kajjumba et al., 2020). As a result, pharmaceuticals companies in the EU often outsource research and development to academic institutions, biotech SMEs, and contract research firms. The process reduces the time spent researching and offers value in terms of technological advancement and scientific knowledge that diffuse in their entire value chain.

The first effect of the pandemic on the pharmaceutics value chain was not significant as projected. The demand for chronic disorder medicines increased by 9% resulting in temporary shortage of the drugs (Kajjumba et al., 2020). A number of companies integrated safety measures in their labs, allowing for constant manufacturing (Magableh, 2021). Yet the slowed production in China and India caused increased shortage and price, leading to India restricting the exportation of medicines. As a result, the restrictions led to shortage of generic pharmaceuticals in the EU (Kajjumba et al., 2020). The crisis, therefore, triggered structural shifts in the value chain and created new opportunities. The pandemic highlighted the significance of strategic autonomy. Pharmaceutical firms will probably avoid sourcing from a single place and seek partnerships with manufacturing organizations in Europe.

When choosing between back-shoring and near-shoring options, European companies look at multiple factors. First, it has been established that smaller companies have less ability to near-shore due to increased management and logistical costs, hence they tend to prefer back-shoring, whereas bigger companies that can absorb management costs tend to prefer near-shoring (Merino, Stefano & Fratocchi, 2021). Another crucial factor is availability of

skilled contractors and workforce in the target country, and it has been shown that this factor is even more important for back-shoring than for near-shoring (Merino, Stefano & Fratocchi, 2021). Finally, government policies aiding companies to relocate their business is another enabler to back-shoring and near-shoring. For example, UK has established "Reshoring UK" initiative, specifically designed to help companies interested in re-shoring back to UK.

4.2 Analysis

4.2.1 The impact of the COVID-19 pandemic on the development of EU supply chains

As shown in the results from the secondary research performed in this study, the COVID-19 pandemic has substantially impacted the development of EU supply chains. Europe has been persistently relying on international supply chains, and the pandemic forced EU policymakers to advocate for back-shoring and near-shoring as a way to ease the consequences of the crisis. The emergency plans of EU countries were somewhat outdated when the COVID-19 pandemic struck (Roloff, 2020). Therefore, leaders of all EU countries have recognized the need for introducing additional measures, especially when production and consumption trends start increasing once again.

The results in this study illustrated that the impact of the COVID-19 pandemic on EU supply chains has caused significant concerns of disruptions to global value chains. It appears that the process of value chain restructuring would be challenging. This is because the crisis associated with the pandemic can intensify other particular trends influencing global value chain development (Ivanov, 2021). Existing supply chains of companies in the EU are characterized by complexity, and any restructuring efforts may be quite costly.

4.2.2 Differences between agile and continuous flow types of supply chains in the EU business context

As shown in this study, continuous flow supply chain is a strategy leaning toward businesses with marginal variation in the demand for their products and services. Since such businesses possess a steady demand for their goods and services, they constantly replenish their supply through a stable process (Ivanov, 2021). The value proposition of this approach is that of constant supply. As illustrated in the research, a good example of the continuous flow supply chain in Europe is the aviation industry. Prior to the pandemic, there was a steady demand for aircrafts. However, the pandemic triggered a significant drop in demand for civil aviation when compared to 2019. Key factors influencing the drop in demand for civil aviation include the reduced number of tours and travels following the cancellation of

international and domestic flights across the world. Nevertheless, despite the decline in demand for commercial airlines, the demand for military aircrafts continued to increase in the EU, especially because of NATO's increased military budget (Guan et al., 2020). As a result, aircraft manufacturing continued to fulfil military demands.

On the other hand, the results from this study showed that the agile supply chain approach occurs within industries that experience volatile demand. The approach is often practiced by businesses that generate customized services or products for their consumers. The value proposition in this case is certainly the capacity to meet the uncertain demand of customers in an efficient way (Guan et al., 2020). Market positioning in this case is determined by the speed and quality of production. The primary responsibility of this approach is to be flexible and agile to meet specific market demands. As a result, it can be argued that while the airline industry relied on continuous flow supply chain approach prior to the pandemic, it was forced to adopt an agile model during and post pandemic.

Another example of the agile supply chain is the hospitality industry. In normal circumstances, the hospitality industry significantly contributes to the EU economy, but the uncertainty caused by the pandemic forced companies to reinvent their strategies (Sinha et al., 2020). One of the ways that companies have reinvented is by aligning talent with procurement and the general business approaches to establish a cost-effective and value-driven organization.

4.2.3 Restructuring EU supply chains

As a result of the uncertainties posed by the COVID-19 pandemic, this study demonstrated the need for companies to readjust their supply chains to continue operating after the pandemic. It is essential to note that for companies seeking to stabilize their operations and restructure their development and resilience during the pandemic, there are always profound uncertainties (Inoue & Todo, 2020). The reopening of the economy in Europe brings forth several questions about the society, economy, and public health implications. Clearly, there are lingering questions about how businesses will survive in the post-COVID-19 era and how companies need to restructure their supply chains to survive.

As illustrated in this study, one of the approaches that companies can use to restructure their business is relocation or reshoring. Reshoring refers to the process of transferring value chain activities that were previously offshored (production, sourcing, R&D, and services) back to the EU (Xu et al., 2020). This can be either in the form of back-shoring (moving to home country) or near-shoring (moving to geographically close country).

The process is essential because it presents a strong reason to revamp the future of manufacturing in the EU. From the results presented, some of the manufacturing activities that the EU had offshored to other nations include the manufacture of Li-ion batteries which are used for electric cars and microelectronics. As a result, the EU heavily relies on non-EU suppliers to the extent that when there were restrictions (triggered by the pandemic), several businesses were significantly affected.

However, it is essential to note that reshoring is not a new activity in the EU. From the results obtained in this study, it is evident that reshoring activities started in the EU prior to the pandemic. It is apparent that companies were already seeking ways to bring manufacturing processes close to their businesses (Inoue & Todo, 2020). However, the uncertainty brought about by the pandemic implies that more companies need to embrace the process to survive.

Apart from reshoring, another approach that companies need to embrace post pandemic is outsourcing. It has been noted that outsourcing refers to a business activity where a company hires a party outside an organization to undertake services and create goods that were traditionally done in-house by the organization's own employees (Xu et al., 2020). It is a cost-cutting measure that companies engage in and has to be embraced at such a time to help companies cut on costs but increase efficiency.

4.2.4 Selecting the right supply chain transformation strategy.

Some of the factors that significantly influence an appropriate supply chain strategy have been identified in this study as agility and flexibility. For instance, when faced with a scenario of the decline of demand for services or products in an industry, such as the airline industry, companies need to adapt by downsizing or pursuing new routes that do not have restrictions to continue generating revenue (Hilmola et al., 2020). It is also essential to note that strategic autonomy is another factor that can significantly influence the adoption of an appropriate supply chain strategy (Farooq et al., 2021). For instance, the EU experienced unprecedented health and economic crisis but could not handle it fast because of dependence on other nations (especially in terms of medical research). As a result, it has been concluded that one of the factors that EU companies need to consider when pursuing a supply chain strategy is autonomy (the ability to do it within the EU region to avoid future uncertainties).

The final chapter of the dissertation summarizes the main conclusions discussed in the study. Also, it provides viable recommendations to improve the supply chain functioning of EU based companies.

Chapter 5: Conclusion and Recommendations

5.1 Conclusion

The objective of this study was to compare two types of supply chains, particularly the agile and continuous flow supply chain models. Such a comparison took place in the context of post-COVID-19 EU business world. It has been persistently emphasized that the impact of the pandemic has been critical on the development of EU supply chains. Returning to the pre-COVID-19 situation has proven difficult. Therefore, EU based companies need to rethink how to restructure their supply chains in order to respond to the new business dynamics, pressures, and uncertainties caused by the pandemic.

Four research questions have been developed for this study. The first research question focused on determining the impact of the COVID-19 pandemic on the development of EU supply chains. The second research question emphasized the differences between agile and continuous flow types of supply chains in the EU business context. The third research question aimed at finding the strategies implemented by EU based companies to restructure their supply chains to meet new dynamics in the post-COVID-19 business environment. The fourth research question was related to specifying the key success factors for developing an effective supply chain transformation strategy.

The literature review provided substantial information about the impact of the pandemic in different EU industry sectors such as the automotive industry, aviation industry, and food and drinks industry (Aday & Aday, 2020). Additional emphasis was made on the growth of EV sector and expected rise of demand for battery production. Specific information was provided about the impact of the COVID-19 pandemic on the agile and continuous flow supply chain models in the UK and the EU business contexts. The emphasis in the literature review section has been upon effective supply chain transformation since important changes have been predicted to occur due to the pandemic. Another significant section of the literature review referred to key success factors for reliable supply chain management practices.

The type of methodology adopted in this study was identified as secondary research. This implied the collection of relevant information from various reputable websites and peer-reviewed journal articles. An inductive approach was utilized to gather and analyze the respective research information. The selected research methodology was considered appropriate for collecting research data in a cost-efficient and convenient way.

In comparing the two types of supply chains in the EU business context, it has been concluded that the continuous flow supply chain model is characterized by stable supply and

demand while the agile supply chain model was marked by unpredictable demand. Another important conclusion discussed in this study was that the continuous flow supply chain model was considered suitable for mature supply chains. On the other hand, the agile supply chain model was found suitable for consumers who valued short lead time.

Furthermore, the study illustrated the need for restructuring supply chains in the post-COVID-19 era. It has been pointed out that EU based companies need to rethink, refine, and modify their relationship with China. Achieving optimal results requires persistence and positive communication, as well as implementing evidence-based practices. It has been argued that EU based companies have an opportunity to improve the functioning of their supply chains by adhering to best practices in the field, emphasizing the need for ensuring flexibility, agility, and transparency.

5.2 Recommendations

One of the recommendations for EU based companies in the process of transforming their supply chains is to explore the limitless possibilities of digital transformation. In this way, they will be able to raise the performance of their supply chains to completely new levels. EU organizations should explore the benefits associated with supply chain digitization. An optimal approach recommended in this case is to digitize EU companies' supply chains by integrating the latest technologies with improved business operations. Establishing a strong vision for future supply chains is crucial for successful transformation.

The role of Industry 4.0 should be clearly recognized in driving innovation in EU supply chains. There should be a proper shift to data-driven processes, which can facilitate business leaders to improve their decision-making capacity. The focus in EU supply chains should remain on optimizing the processes of automation and streamlining of crucial business information. In the post-COVID-19 business environment in the EU, providing numerous options for individualized products and services is a good recommendation for EU based companies to follow.

It should be pointed out that EU companies should enhance their views of supply chain visibility and collaboration. Adopting a cross-enterprise perspective may be useful for organizations in the sense of emphasizing opportunities for greater visibility as related to the order process in supply chains. Moreover, supply chain risks should be carefully recognized as part of organizations' strategic preparation to address any uncertainties or complexities pertaining to the impact of the pandemic.

EU based companies may need to explore a wide range of options to enhance the functioning of their supply chains in the post-COVID-19 business environment. One such innovation they may wish to consider is the use of collaborative mobile robots. This solution can increase the flexibility and scalability of their supply chains, as such robots can improve the efficiency and productivity of supply chains. Traditional warehouse automation solutions may be no longer appealing, as customers have new demands and expectations in today's dynamic business environment. At the same time, EU based companies should recognize the benefits of blockchain technology. As a result of the adoption of blockchain solutions, EU organizations can optimize the performance of their supply chains by making them more transparent, efficient, and reliable.

5.3 Limitations

The limitations of this research mostly refer to the selected research methodology. Even though secondary research has significant advantages in obtaining a thorough view of the research subject, the implementation of primary research could have improved the validity and reliability of the research findings. This is because the use of secondary research did not provide opportunities for generalizing the findings to the overall population. Moreover, another limitation of the study is the limited time designated for collecting and analyzing the research data. The analysis of the research findings could have benefited from more time allocated to this stage of the research process.

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