

The effect of Covid-19 on supply chains: A Case Study of retail shops in Merthyr Tydfil.

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Abstract

Since the end of 2019 when the Covid-19 virus emerged from China governments around the world has had to adopt measures to mitigate the spread of the virus. The restrictions and policies in play has caused disruptions to the way businesses function thus having ripple effects through their supply chains. This thesis set out to identify the effects caused by Covid-19 on retail supply chains from the point of view of retailers in Merthyr Tydfil. There were three main barriers identified: Social distancing, travel restrictions, and government policies. Case studies were analysed to identify the effects on the supply chain and how some retailers in Merthyr Tydfil would be affected. The purpose of this study is to provide future researchers with direction and to act as a guide for future researchers to do further research on this topic and not to provide solutions or recommendations.

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Declaration

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed A. J. Diplock (candidate)
Date 14/05/21

STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated. Where correction services have been used the extent and nature of the correction is clearly marked in a footnote(s). Other sources are acknowledged by footnotes giving explicit references. A bibliography is appended.

Signed A. J. Diplock (candidate)
Date 14/05/21

STATEMENT 2

I hereby give consent for my thesis, if accepted, to be available for deposit in the University's digital repository.

Signed A. J. Diplock (candidate)
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Chapter 1 Introduction

The Coronavirus seems to have had an enormous affect around the globe since it emerged in 2019 in China, killing millions of people to date, putting strains on health systems and impacting economies around the world. There were impacts from the responses that governments, organisations, and the public had made due to the pandemic in progress, from the restrictions that governments around the world had implemented to combat the transmission of the virus and the new policies and procedures put in place to adapt to the “new normal” way of life, thus changing the way people lived their lives and the way organisations did their work.

The reports in the media and statements from government organisations highlighted there were impacts on the availability of products from retailers due to the pandemic and talking about issues such as: panic buying, social distancing, PPE, hand hygiene, clean downs, labour shortages, shutdowns, and travel restrictions to name a few, that seems to have had effects on the retail supply chain. The effects on the retail supply chain means there could have been issues for food security, access to essential items and labour and financial difficulties during the pandemic`s life cycle (CBBC, 2020; Gov.Wales, 2021; CDC, 2020; Barman et al., 2021; BBC News, 2020a; BBC News, 2020b; BBC News 2020c).

The World Health Organisation (WHO) states that the lifestyles of people in the 21st Century has had an impact on the way diseases spread due to the interconnectivity of the world and the regions within it. The transport systems around the world tend to have their hubs in cities and megacities by the means of land, waterways and air travel. Furthermore, due to higher population densities more people are moving from rural areas to have a better quality of life and the globalized economy resulting in the movement of people between international and national regions has thus increasing the likelihood of transmission leading to more epidemics or pandemics (W.H.O., 2018). The WHO also states that there are more contacts with domestic, livestock and wild animals coupled with poorer regions around the outskirts of cities, making healthcare less accessible, increasing their risk to infection and decreasing the chances infection detection. According to the WHO there are four phases an epidemic typically goes through, these are:

- Introduction/Emergence,
- Localised Transmission,
- Amplification, and

- Reduced Transmission Immunity.

The introduction phase is the first an infectious disease goes through in its life cycle. This phase is the first emergence of the disease in a community followed by the localized transmission phase. The second phase is when the infection has transmitted locally and is known as an outbreak. Amplification is the third phase when an outbreak has sustained and spread into the wider population, and this is known as an epidemic, if national coverage of the disease is achieved, or a pandemic if it has spread globally. The final forth phase is reduced transmission immunity, this means the transmission rates between people is decreasing caused by immunity or control measures in place to combat the disease (W.H.O., 2018).

This piece of research will be in the form of a literature review to discover what the secondary data implies about the effects that Covid-19 has had on the retail supply chain, the types of secondary sources of interest will be, however not limited to: academic literature (books, journal articles, government organisations, reputable organisations and the news/media etc). The literature will begin broadly looking at the principles and theory behind the supply chain and its components, the history of the virus and its development into a pandemic and the policies and procedures put in place to combat the issue. Theory and background reading will be explored and discussed to set the scene and to contextualise the findings to help with connecting one finding with another or identifying gaps in the data with the sense of what the environment is like in relation to the possible effects discovered.

The goal of this paper is to determine whether there are barriers disrupting the retail supply chain and identifying what the effects of those barriers have had on availability or changes to goods and services. After detecting the barriers and their effects, the focus will then be on the government/business mitigations and the effects these can have on the supply chain and the workforce within. The supply chain will be analysed by its component parts to identify which parts may be the most effected by the pandemic and its restrictions and the changes in demand. A PESTEL analysis will be performed to determine which of the external factors contribute the most to effects to each component part of the retail supply chain. Additionally, a SWOT analysis will be performed to discover what benefits and vulnerabilities each component part has cross examined against the external factors effecting the retail supply chain.

1.1 Personal motivation

The personal motivation for this research is due to the reports on the media about things such as boarder closures, stock shortages, empty shelves at the supermarkets, social distancing and farmers pouring milk down the drains. The supply appeared to be there, but there looks to be a problem in the supply chain that needs identifying for further research to be done to help find solutions or to mitigate against future sudden demand changes from consumers.

The Covid-19 pandemic is current and has affected everyone everywhere in the world. The reason for choosing this topic is because it has impacted Merthyr Tydfil a place of personal interest. Furthermore, according to the media this location was hit by the pandemic. This topic is closely aligned with the chosen subject of study which is Logistics and Supply Chain Management.

1.2 Research aim

The aim is to identify barriers to retail supply chains caused by the effects from the Covid-19 pandemic and to provide guide and direction for future researchers. The research in this thesis aims to analyse secondary data from reliable sources such as: peer reviewed journal articles, reputable news media, websites of institutions or governments, organisations and businesses affected. This research will focus on a case study of retailers in Merthyr Tydfil after considering and understanding the context of the broader picture. The barriers identified in the literature review will be the points of interest to look out for in the case study chapter to discover what/if any of the barriers affect retail in Merthyr Tydfil.

1.3 Research objectives

1. A literature review to understand the impact of Covid-19 on retail shops
2. To provide a future research direction

1.4 Research questions

1. What were the challenges faced by supply chain of retail shops?
2. How were supply chains managed during the pandemic?

1.5 Research structure

This research will be divided into four chapters as follows:

1. Chapter 1 introduction of the ideas for the study

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2. Chapter 2 The literature review to identify the problem or the gap
3. Chapter 3 The method which is based on secondary information (data).
4. Chapter 4 Analysis/discussion
5. Chapter 5 Conclusion.

Chapter 2 Literature review

2.1 A brief history of covid-19

The year 2020 began with the World Health Organisation (WHO) declaring a pandemic on the 11th of March, however the outbreak began in Wuhan China in December 2019. The virus named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) caused 2.84m people around the globe to lose their lives in less than a month following the pandemic being declared. The virus spread quickly infecting over 130m people, resulting in what is known to be one of the world's most deadly pandemics in the history of the world (W.H.O.int. 2020).

2.2 Restrictions

The virus spreads through close contact with other people or contaminated surfaces, for this reason restrictive measures were put in place to mitigate the spread of the virus in the population. Furthermore, some nations put restrictions on exports for food security reasons. The restrictions relevant to this study are:

- Social distancing measures
- The use of facemasks and PPE
- Ensuring air ventilation
- Self-isolation
- Lockdowns and Quarantines
- Hazard control at workplaces
- Testing
- Travel restrictions
- Hand washing
- Vaccines
- Shutdowns
- Export banning and Fines

The social distancing measures would require organisations to adapt to accommodate these restrictions in order to minimise close contact with people outside their household. The space between employees should be 2m apart even at workstations, however space could be an issue, so masks would be required and physical barriers such as screens and visors (Gov.Wales, 2021). The government advised where possible employees should work from home (Gov.Wales, 2020). Working from home may cause disruptions due to possible productivity issues, however there are possible benefits such as: improved motivation, increased office space, minimising commute time, avoiding peer disputes among staff and allowing both genders to work more equally (Vyas & Butakhieo, 2021). On the contrary, Mustajab et al., (2020) states some employees felt demotivated due to the pre-conception of the home being a

place of rest. Disruptions from social media and other forms of communication impacted motivation and home entertainment technology around the home lead to procrastination, hence hindering productivity (Mustajab et al. 2020).

Organisations implemented strategies which require employees to wear face masks or any protective gear to help reduce the spread of the virus. However, sourcing for the PPE became difficult due to the high demand of materials (CDC, 2020).

Maintaining air ventilation in the workplace is to mitigate air contamination. HSE, (2021) stated air ventilation is important during the Covid-19 pandemic as an infected person would produce aerosols containing the virus to be released into the air. Good ventilation would minimise the number of particles in the air, thus reducing virus particles in the air. Enclosed working environments without ventilation would allow the virus in the air to accumulate and increase the likelihood of transmission. Ventilation should be used in conjunction with 2m social distancing and keeping good personal/workspace hygiene for this measure to work. According to Morawska et al., (2020) the reason for ventilating indoor space is to create similar conditions indoors to outdoors. This helps replace the indoor air at a faster rate than without ventilation. However, air ventilators should be fitted with pollen filters to avoid possibly causing allergic reactions within the workforce. Lamb et al., (2006) concluded from their research on allergies at the workplace that allergy related absenteeism is a key contributor to the costs to a business with health-related absence from work.

People are asked/required to self-isolate if they are awaiting test results or have virus symptoms to minimise the risk of infecting others (Gov.Wales, 2021). In addition, this issue of self-isolation results in labour shortages which has then impacted negatively on business performance or resulted in delays in the supply chain (Barman et al., 2021).

Testing of employees was implemented by businesses and government agencies as a means of ascertaining the status of people during the pandemic, although it was not carried out by force (Acas, 2021). This was put in place to detect infected employees in order for them to self-isolate pending the results, to avoid further spread of the virus in the workplace (Gov.Wales, 2020).

Travel restrictions were introduced to limit the movement of people across borders and within cities. However, the restrictions also limit the movement of goods from one place to another, affecting the entire supply chain. This also impacts employers by restricting hiring experts

abroad or from other regions to join their businesses in order to improve performance. This restriction has affected many businesses and reduces their ability to produce and process food and other vital materials to meet the demand in the market. This poses uncertainties in the business environment and supply chain at large (Gov.UK. 2020a; Stephens, al, 2020; Hobbs, 2020).

Hand washing facilities must be present and used to limit the spread of the virus and hands must be washed for at least 20 seconds at regular intervals, alcohol gel sanitiser is another option. These combats transmitting the virus from people touching surfaces (Gov.Wales, 2020).

There are tests pilots underway for the introduction of vaccine passports as a back to life as normal solution. These would require people to have a vaccine passport to allow them to access hospitality, business and travel due to vaccines providing a protective bubble from infecting others. Nevertheless, this has implications for inequalities in the population and is opposed by several MP`s such as Mark Harper, the Tory backbencher (BBC News, 2021c).

Exports in some countries have been stopped due to them hoarding food for example, to mitigate their food security risks. However, this can have drastic consequences on poorer nations food supplies (Gov.UK, 2020; Kerr, 2020; Stephens, et al, 2020). Fines are issued to those who offend against restriction measures or even the closure of businesses in an attempt to enforce the restrictive measures in place (nidirect, 2020; Gov.UK, 2020a).

2.3 The definition of the supply chain

The definition of supply chain management from the book Global Logistics and Supply Chain Management (Mangan, & Lalwani, 2016) states: *“The supply chain is the network of organisations that are involved. Through upstream and downstream linkages. In the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer”*. The definition that is quoted in the book implies the organisations in the supply chain create value through processing products and services by integrating and collaborating with each other, linked in both upstream and downstream directions of flow to allow the movements and transactions of products and services to flow from the point of origin to the end customer.

Christopher (2005) defines supply chain management as: a means of reducing costs but delivering increasing customer value throughout the supply chain by managing the upward and

downward streams via good relationships with customers and suppliers. The author implies this definition is an inward view of supply chain management due to the self-interest of the individual companies within. Furthermore, stating occasionally, the one needs to make less for the needs of the many; in other words, one company making less profit for others in the supply chain to make a profit, for the benefit of the whole supply chain. The author argued that the word supply should be replaced more adequately with the word demand, to make demand chain management the term due to the chain being market driven ideally, not supplier driven. Furthermore, the word chain should be exchanged with the word network to make demand network management the term, due to the author arguing that there are multiple suppliers, and the suppliers are linked with other suppliers and customers are linked to other customers. Thus, with this argument from the author considered a new definition to go as follows: *“A network of connected and independent organisations mutually and co-operatively working together to control, manage and improve the flow of materials and information from supplier to end users”* (Christopher, 2005, p.6).

These definitions will be used to form the framework of this literature review. The supply source, transport modes, warehouse and distribution, services offered, demand and other outside influences, are the areas of interest to see if Covid-19 has affected them.

2.4 The effect of covid-19 on supply chain

2.4.1 Supplier, Production and Processing

According to Deconinck et al., (2020) there were effects from Covid-19 on food supply chains, from the farms that produce raw foods being affected and effects on processing the food, through to logistics and transport of the food produce and effects on the demand in the market. Restrictions on travel have had several effects on farming, one being that of seasonal worker shortages causing bottlenecks in products such as: fruits and vegetables.

According to Deconinck et al., (2020) the seed farms are not affected by labour shortages in the same way as the fruit and vegetable farms. However, there is a risk of air transport restrictions having an impact on the availability of seeds due to their reliance on air transport. Furthermore, availability of fertilisers in some areas were disrupted due to transport issues.

The Covid-19 pandemic has affected processing plants due to social distancing being an issue in these environments. Workers are forced to work within close proximity of one another, increasing the risk of transmission in the workplace. An example of a workplace where many

cases of Covid-19 are being reported according to BBC News are meat processing plants. It is reported that the reason for the high rate of infections is probably due to the virus thriving in cold dark and damp environments, added to the need to shout over the noise levels from machinery in the plant enabling greater transmission probability (Reuben, 2020). The impacts on the process plants are high sickness levels and potential shutdowns of plants due to the high labour force needed to process meat at the meat processing plants. However, the grain processing plants have a lesser labour intensity due to these plants being heavily automated, thus causing little disruption (Deconinck, et al, 2020; Hobbs, 2020). According to Larissa, (2020) if a shortage in truck drivers were to happen, then problems would occur especially getting fresh produce from farms and meat processing plants. Resulting in wastage and animal welfare concerns (IFC, 2020).

According to Deconinck, et al. (2020) there were delays and disruptions to logistics and transport causing bottlenecks to form in the food supply chain. Furthermore, the types of product and transport modes results in variations in the effects seen during the pandemic. The modes of transport carrying bulk products such as: oilseeds and cereals. Even though these items are perishable, the effects on these products were minimal. Furthermore, the prices of these bulky products are close to historic lows.

2.4.2 Sea Transportation

The global maritime container shipping transport mode lost 8% of ships compared to the usual numbers available each year, and according to UNCTAD, (2020) the loss by mid-June 2020 was 8.5%. However, by the beginning of August had recovered and saw a loss of 3% from the previous year (Deconinck, et al, 2020). There were problems trying to source refrigerated shipping containers from China during the pandemic (Larissa, 2020).

2.4.3 Air Transportation

The air cargo freight products were subject to delays due to a sharp drop in passenger flights, significantly reducing the availability of flights to carry the cargo. The article highlighted that by the middle of May 2020, the global capacity for air cargo transport was down 26% from usual capacity. The places that were impacted the most were: Latin America and Europe, the percentage drop of both summed together was more than 80% from the previous year (Deconinck, et al, 2020).

To distribute goods globally during the pandemic, alternative modes of transportation were introduced to adapt to the effects the Covid restrictions had on transport. The drop in the usage of passenger planes meant there was spare cargo capacity that logistics organisations such as: DHL, used to transport shipments to and from China, and adaptations by airlines were made to repurpose passenger planes to carry cargo. While rail cargo between the EU and China is expected to significantly increase due to air freight between the two decreasing by 60%, some air freight carriers experienced a rise in congestion at their airports (UNCTAD, 2020)

2.4.4 Land Transportation

There were effects to the truck and container transport modes. Deconinck, et al. (2020) stated in their article the loss fell in the region of half of the air cargo from the EU and Latin America. The global maritime container shipping transport mode lost 8% of ships compared to the usual numbers available each year and according to (UNCTAD, 2020) the loss by mid-June 2020 was 8.5% however had recovered by the beginning of August and saw a loss of 3% from the previous year. In Europe at the start of April the trucking traffic was reduced between 40% and 50%, however increased to a lesser 24% decrease in traffic from normal levels by the middle of April (Deconinck, et al, 2020).

France had implemented a new requirement for haulage drivers to take a test and have a negative result before entering the country. BBC News reported that hauliers travelling to France from the Republic of Ireland had to pre-book a free rapid Covid-19 test and wait up to an hour for the results before proceeding with their journey to France (BBC News, 2021d). In the report by BBC News, John Martin from the Road Hauliers Association stated that the supply chain was under considerable strain due to the new regulations post-Brexit, coupled with the new regulations in place to tackle the effects of Covid-19. John Martin added that there were large numbers of staff off-work due to sickness in relation to Covid-19, the effects of bureaucracy from Brexit and the very large amount of money draining away are bringing haulier staff to their breaking point.

According to BBC News (BBC News. (2021d) there are two Covid-19 test centres in the Republic of Ireland, with one based in Dublin Airport and the other in Gorey, County Wexford. The news report ended with a statement from Eugene Drennan, the President of the Irish Road Haulage Association saying the two test centres were not enough. Furthermore, the test centre at Gorey was probably going to be a bottleneck, causing delays and tailbacks.

According to the International Road Transport Union (IRU) (IRU, 2020), France had put a ban on the entirety of trucks and their drivers entering the UK for 48 hours on the 20th of December 2020, choking off 85% of the imports from the EU to the UK and created a complete break in the supply chain of all imported goods from the EU to Ireland. The trucks UK-bound had to wait 24 hours in France before they could enter the UK. Due to stockpiling pre-Brexit, hauliers and drivers were hesitant on taking goods into the UK due to the risk of not being able to return on the lead up to the ban being imposed by France. The transportation of essential goods such as medicine and food, was at risk of being blocked off, affecting the supply of these goods to the UK, and impacting the supply chain throughout Europe. The IRU Secretary General Umberto do Pretto stated that a complete shutdown of the French borders to truck loads was unprecedented and should not be the case throughout Europe. He continued by saying that truck transportation had not been stopped throughout the pandemic to date and added that it did not make sense for France to pose a ban as this would intensify complications already caused by Brexit and reminded France that they are a member of the EU Green Lanes initiative, that considers logistical chains to be crucial and the continuity of them must be protected. He continued by suggesting that France should make exempt the trucks and goods to avoid further disruptions and causing further confusion.

According to Logistics UK, (2020) HGV drivers need to self-assess their health every five years to the age of 45, at which point they need to get a medical from their GP to renew their driving licence. However, there was heel-dragging from head government officials to create a solution that had been suggested by the Department for Transport and the Driver Vehicle Licensing Agency, for the red tape surrounding HGV driver's medicals as they could not go to their GP's due to Covid restrictions. The delay in action from the government meant that good drivers were not able to renew their driving licence and had to stop them from driving, creating a critical driver shortage effecting the ability to transport essential goods, such as getting food to retail outlets, medicines and PPE to the hospitals and GP practices.

2.4.5 Warehouse and Distribution

Warehousing is a place to store inventory and to hold buffer stock temporarily to fulfil customer demand by making the inventory available by basing the inventory close to customers to enable the products to get to the customer quickly, minimising costs as the goods moved by the adequate means of transport (Richards, 2014).

According to the IFC. (2020) adaptations have been made by third party logistics companies to combat the effects of the pandemic and they reacted as follows:

- The adoption of safety measures
- Adopting different modes of distribution
- More focus on grocery products

The introduction and integration of new safety measures were put in place to protect warehouse personnel from catching and transmitting Covid-19. The companies protected their personnel by using PPE and social distancing, offering sick personnel an unlimited amount of time off work and cleaning down measures using disinfectant. However, the cost to the company is greater than the norm, furthermore, these measures do not work as effectively in small warehouses where personnel are working in confined spaces due to the limitations of available space.

The focus on grocery products in warehouses has increased due to the increase in demand. Last mile distribution had responded to the pandemic by providing customers with the option for contactless delivery.

2.4.6 Retail outlets

According to George-Parkin, (2020) retailers are offering additional services such as click and collect, or if they already have that function, are expanding their capacity in response to Covid-19. The jump in the service saw an increase of 208% from April 2019 to April 2020 with 23% of shoppers online preferring to use click and collect type services. This allows customers to place an order online for everyday items and drive to their local store collection point to have the order brought to their car without additional charges. According to Shveda, (2020) as the pandemic was underway in April of 2020 across Europe, google searches for home deliveries and local food elevated to levels unseen before with a 600% higher probability of people searching for veg boxes than they would have a year before. This highlights how people were re-considering where their groceries were coming from and the means of getting them. The supermarkets and online retailers struggled to keep up with the pressure from the shift in customer demand for ordering online, with veg box companies doubling their usual sales for the time of year and needing to create a queuing system with lists ranging from 160 to 6700 customers (Shveda, 2020). The use of new online channels from food box companies and online farm food suppliers allows a more robust food system to create a more diverse range of

sources for groceries to consumers. As the supermarkets struggle to get food imported and having a limited variety and quantity of home grown produce in the UK, due to the heavily reliance on the EU for its fresh food produce.

2.4.7 E-commerce

According to UNCTAD, (2021a) despite the economic activity shrinking overall, at the time of the pandemic there was an increasing amount of the market share in retail e-commerce as shoppers took to online shopping due to travelling restrictions and their fear of going to brick and mortar stores because of the risk of infection. (UNCTAD, 2021a) expects the growth in e-commerce share to stay mostly intact due to new shoppers acquiring the ability to use this service and more people working from home. According to UNCTAD, (2021b) the Covid-19 pandemic has accelerated the transformation from traditional commerce to digital e-commerce, stating that its market share has increased by 3% from 2019's 14% to 2020's share of 17%. Furthermore, Volkan Bozkir the UN General Assembly President has stated that the growing trend was likely to remain throughout the Covid-19 recovery.

2.5 Identified Barriers

Travel restrictions caused difficulties for the movement of labour to reach their place of employment that resulted in labour shortages. The seasonal farm workers for example, coming from the EU to the UK, had potential to cause a supply issue and the produce going to waste due to its perishable nature. Furthermore, fertilizer imports were disrupted. Air travel restrictions impacted seed sourcing and endangered future food crops. The decrease of passenger plane demand resulted in a modal change for some freight, as some passenger planes were converted into cargo planes to mitigate against the restrictions. However, the EU and China cargo was expected to see a 60% drop off due to congestion at airports causing delays. Borders to and from France and the UK were affected by rapid Covid tests being needed, with a negative result before being permitted to cross the border, causing a further hour wait on top of the previous 24 hour wait caused by post-Brexit red tape (Gov.UK. 2020b; Stephens, al, 2020; Hobbs, 2020; UNCTAD, 2020; IRU, 2020; BBC News, 2021d).

2.5.1 Social Distancing

This barrier affected how close people could be from one another causing issues with indoor workplaces, especially if they are spatially challenged, increasing the risks of infection and impacting employee attendance, creating a shortfall in labour needed for the business to

function effectively. Meat processing plants were impacted this way due to the nature of the job being labour intensive (Reuben, 2020; Gov.Wales, 2021).

2.5.2 Social distancing

In order to prevent the spread of Covid-19, social distancing was implemented to help limit possible opportunities to come into contact with contaminated surfaces and infected persons who contracted the virus outside the home. Although the risk of severe illness may be different for everyone, anyone can get and spread Covid-19. The basic rules of social distancing are individuals should at least stay 2 meters apart, avoid hand shaking, surface touching, avoid all forms of social gathering and stay at home if possible. The most preventive measures include avoid touching your eyes, nose and mouth and washing your hands (Mohler et al., 2020; Kissler et al., 2020).

The supply chain was affected by the loss of labour due to transmission being caused by businesses not being able to maintain a safe distance for staff at work due to special deficiencies at workplaces. This could potentially cause a bottleneck to supply goods (Reuben, 2020; Gov.Wales, 2021).

2.5.3 The working environment

The conditions indoors had a secondary impact on the spread of the virus, for example, meat processing plants are cold, dark, and damp, these are ideal conditions for the virus to survive. The loud machinery in industrial workplaces increases the need to shout, making transmission more likely. Additional cleanliness and disinfection processes were necessary in the workplace and hand hygiene, PPE, ventilation, and screens were needed. Implementation of all these factors disrupted the flow of goods through the supply chain, either from the lack of labour or shutdowns/slowdowns to meet the new requirements (Reuben, 2020; HSE, 2021).

2.5.4 Government

Government policies to respond to the Covid-19 pandemic such as: travel restriction, social distancing and lockdown measures has impacted the supply chain by disrupting the flow of goods and people, creating a shift in consumer channels and restrictions on worker proximities has caused delays and shortages.

The heel-dragging of government to a work around presented regarding HGV driver licence renewal problems due to drivers over 45 needing a medical performed by a GP but could not

get access, resulting in a driver shortage affecting essential goods being delivered. The French closed the border for 48 hours in late December 2020 due to the new strain of the virus in the UK causing more delays and shortages in fresh produce (IRU, 2020; Logistics UK, 2020)

The rechanneling of demand from hospitality to retail is down to government policies to combat Covid-19. E-Commerce channels are impacted with a surge in demand and supermarkets need to adapt to the extra demand from customers losing hospitality options for food and drink etc. Due to the hospitality industry demand, reduction and shutdowns, the alternative source of food came from retail shops and the sudden adoption of the hospitality sector's demand was a surge to great and overwhelmed retailers. The retailers did not have enough resources and assets in place to cope, and the Covid restrictions and panic buying. The suppliers had hospitality servicing in their processing plans and had difficulty sourcing containers and packaging to repurpose the produce to meet the switch to mostly the retail channel for their output. The need for retailers to adapt to accommodate online ordering and click and collect services due to people staying at home (Mohamed Grida, 2020; UNCTAD, 2021a; UNCTAD; 2021b; George-Parkin; 2020; Shveda, 2020; Reuben, 2020; Gov.Wales, 2021; IFC. 2020)

2.6 Chapter summary

The key findings from this literature review are effects on the supply chain mainly coming from government policies. The main policies effecting the supply chain are, travel restriction and social distancing. The effects are labour shortages, delays and disruptions to services also the need for businesses to adapt and follow the policies safe practices. If the businesses do not follow the policies, this too can affect the supply chain due to sickness or added costs and disruptions to operations. Delays at the ports are the result of travel restrictions as well as the post-Brexit implications causing concern for fresh food availability and stock-outs.

Chapter 3

3.1 Research Methods

Secondary data was the source of this research paper by searching research that had already been carried out by third parties from sources such as: academic journals and articles from Proquest, EBSCO, research papers in relation to retail supply chains that were affected by Covid-19, news articles, industry websites and government and non-governmental-organisations (NGO) to establish what problems/solutions have been previously discovered by researchers and reporters that coincides with the goal of this study. The goal of this study is to establish what effects Covid-19 had on retail supply chains from the identified barriers that emerged from the literature review chapter of this thesis from Merthyr Tydfil's perspective. This study will identify the problem areas that faced selected retail businesses in Merthyr Tydfil from the secondary data. The types of sources used in this research paper will be discussed in more detail below.

3.1.1 Journals

Journals were determined to be a good source of data for studies done in the fashion industry regarding the impacts of Covid-19 on their supply chains. After reading the relevant journals, problems started to emerge from the writings and possible solutions to some of the problems found. Journals were useful in gaining a broader understanding of garment supply chains and from the problems they encountered could lead to the effects on some retailers in Merthyr Tydfil. At the time of writing this research paper there were a limited amount of research journals that had been done to academic standards, likely due to the current nature of the events; or in other words the pandemic is still unfolding, so impact results may not have reached their conclusions.

3.1.2 Academia

The significance of academic writing in this study is high for its' merits from experts in the field, with most being peer reviewed for its reliability. The information gained from these experts gave this study its' framework and understanding of what is happening in the garment supply chain during the pandemic. The areas of interest were restrictions such as: travel restrictions, social distancing, and government policies. The areas of interest were covered by the academic literature stating things such as: Demand changes or drops, transportation

problems, communication issues, supply chain rigidity and labour shortages. Proquest and Google Scholar were the main sources for this thesis.

3.1.3 News articles

News articles were used due to the current nature of the problem and were either the only source or a more focused source. The news articles reported specifics about specific companies in specific places such as Merthyr Tydfil, usually reporting what has been said by the parties involved providing a more heuristic source of information which was needed to produce the effects that Covid-19 had on retail supply chains in the Merthyr Tydfil area.

3.1.4 Organisation publications

The publications from organisations from the retail sector or conducting research on the retail sector provided inside information on current and past events that could impact the retail supply chain. This source was insightful to what these organisations considered to be the key area that was causing the problems and facts on the problems themselves. Usually there were more specifics from these sources than from the academic literature. Government publications were found to cross examine the reports from the literature regarding restrictions and policies impacting on retail supply chains.

3.1.5 Textbooks

As well as background reading before starting this section of the thesis, textbooks were key to understanding the principles and theories from experts in the field of supply chain management and logistics. Furthermore, providing information for creating the sequence to conduct this research and write up. The textbooks created the framework this research is based upon to have solid foundations to build and to provide direction and recognition of the works of others to support this thesis.

3.2 Justifications Behind Using this Methodology

Secondary research was the method that was decided upon to investigate and find problems that could be found from previous literature about the possible effects Covid-19 has had on retail supply chains from a Merthyr Tydfil perspective. This method utilised the current literature provided by experts, researchers and reporters to discover the problems in retail supply chains and the retailers involved as the only data source. The decision was to use secondary data due to the method being the best choice for this particular research over the use

of primary research. The reasons for choosing secondary over primary data would be due to time constraints, interview or questionnaire response time delays, financial costs, information confidentiality, security purposes and unforeseen circumstances that can all be a consequence of conducting primary research. The most practical alternative to primary research would be to conduct a research thesis based on secondary data due to its' richness of content regarding quality and its' convenience of speed and accessibility to respectable and reliable sources to discover the problems in the retail supply chain that may be directly or indirectly caused by the Covid-19 pandemic. The goal of using secondary research is to use different sources to highlight any emerging problems in the retail supply chain caused by Covid-19 from a Merthyr Tydfil perspective to provide a guide and direction for possible future research however, not to provide any solutions to problems found in this research paper.

It is relevant and significant to inform that, not all the secondary data collected by third parties were reliable nor were they valid. However, the data was analysed by comparing the data with other reliable sources to emerge any facts from such sources of information. The credibility of sources was crucial to this thesis and information sought was credited for originality and its' merits for the purpose of this research paper. The conclusions that emerged were due to the collection of information from the many sources compiled and analysed to bring out meaning to answer the research questions for this thesis.

The importance of using secondary data in this thesis is due to the extent of information that can be collected and the greater understanding for the chosen topic by enabling comparisons to be made of different sources to discover facts and opinions from experts to provide the data necessary to discover what effects Covid-19 had on the retail supply chain from a Merthyr Tydfil perspective and identify key problem areas for future researchers. The speediness, quality, and availability of using secondary data was paramount to this study from sourced such as: Proquest, journals, research papers, news articles and organisation websites. Secondary data proved to be a good choice for this thesis due to the limitations the researcher had meaning, the speed and the convenience of using reliable secondary sources to provide direction for future research to be carried out by future researchers has been achieved.

Chapter 4

4.1 Discussion and Analysis

In this chapter there will be a discussion taken from related case studies to illustrate the identified barriers that affect retail supply chains. In this section problems will be identified and related to the literature review's findings using real situations and the management methods used in response to the pandemic. This chapter will attempt to link cases found to retail industries in Merthyr Tydfil through the links in their supply chain and how disruptions in other parts of the world can impact this region's retail businesses.

4.1.1 Case study

According to Winter, (2021) the impacts on food security from the Covid-19 pandemic were mitigated using government policies and at the start of the pandemic the first lockdown required the vulnerable to shield with national food parcels available for those with health problems. However, the government policy changed by 2021 and in the second lockdown required those shielding to rely on home deliveries and family and friends to receive their food. Furthermore, the Environment Food and Rural Affairs Committee had showed concern about the policy change due to people not being able to afford the minimum spending requirement by retailers to be entitled to the home delivery service and the delivery charges for the service thus excluding them from access to the food they need, therefore the suggestion by the Committee was for the government to suggest that retailers reduce the minimum spending limit for delivery and cut the delivery charge for shielding customers. The Committee also wanted retailers to adjust to accommodate disabled customers due to the Covid-19 measures in place in store (Winter, 2021). The literature review part of this thesis highlighted the significance government policies had on businesses during the pandemic causing barriers to customers in the case mentioned in the first half of this paragraph resulting in difficulties in accessing home delivery services causing food security concerns for the vulnerable. This case has added more significance on government policy to what was found in the literature review effecting the customer with them being a link in the supply chain (Christopher, 2005).

Winter, (2021) stated the Environment Food and Rural Affairs Committee's report was focused on changes made in January 2021 to provide vouchers for families eligible for free school meals instead of the food parcel support policy. There are 1.7 million children in households with food security concerns. Furthermore, the voucher is a means of giving additional options

for schools and children as alternatives from the food parcel service due to the lack of quality and value for money from some suppliers and allowing access to free school meals in their stead. The Committee highlighted to government the need for understanding what causes food insecurity and the consequences that follows by the means of producing annual reports under the Agriculture Act on food security and appointing a minister on food security with a 'right to food' consultation to be introduced with support for the vulnerable to have access to food during the pandemic which has already been actioned by ministers. The participants of the voucher scheme were retailers such as: Aldi, Morrisons, Tesco, Iceland, M&S, Asda, Waitrose, Farm Foods, Sainsbury's, McColl's, and the Company Shop Group. All the retailers had some benefit from the voucher scheme however at the expense of wholesalers (Winter, 2021). From this case government policy influences the retail supply chain due to retail businesses providing services for the beneficiaries of the government policy to mitigate against food security issues caused by the shutdown of schools and lockdown restrictions mentioned in the literature review. This would have added to the strain on the food retail supply chain that was already affected by the change in demand from hospitality to retail for food coupled with more people staying at home (Mohamed, 2020; UNCTAD, 2021a; UNCTAD; 2021b; George-Parkin; 2020; Shveda, 2020; Reuben, 2020; Gov.Wales, 2021; IFC. 2020).

Winter, (2021) revealed that Covid-19 has had an impact on the fresh food supply chain coming from farms. There has been an accelerated shift towards agricultural ecological farming, organic food with more vegetables in people's diets and shorter more local supply chains. Furthermore, the decentralisation of the governance or regulatory system that is all for the nutritional and health benefits contained in food. There are multiple agencies and authoritative organisations responsible for supplying food from farms to ports consisting of bodies such as: FSA, PHE, RPA, LA, VMD, DEFRA, TS, ALPHA, and Port Health etc. Due to the decentralisation of the governance of food from farm to port and the multitudes of bodies involved there is a duplication of bureaucracy and conflictions when collecting intelligence, inefficient delivery fulfilment and a decoupling of food supply chains that develop added risks of fraudulent food supplies making enforcement difficult and wasting resources (Winter, 2021). This source seems to indicate that food supply chains are getting shorter due to the shift in demand toward fresh and organic food exacerbated by the disruptions caused by government policy to combat the spread of Covid-19. This case makes an addition to the problem mentioned in the literature review regarding disruptions to the fresh food supply chain due to

the shortage of labour that followed from imposing travel restrictions and social distancing measures. Furthermore, the literature review mentions the waste and animal welfare concerns as a consequence of not having enough truck drivers to mobilise and deliver the food to their destinations (Shveda, 2020; Deconinck et al., 2020; Larissa, 2020).

Blundell, et al., (2020) stated that because customers at retail outlets were stockpiling grocery items and there were disruptions in the supply of grocery items, customers were faced with little to no choice but to change their shopping habits. The customers had to choose different brands to what they would normally purchase moreover the pack sizes usually available would be smaller than what many customers would purchase due to the higher costs for purchasing the equivalent amounts of the smaller packages as an alternative from the usual larger packages. Furthermore, customers would often need to travel to different stores from their usual outlets, usually resulting in higher prices paid for the items in the alternative stores. Supermarkets had chosen to put a hold on their multi-buy discounts to try and mitigate against the problem of stock shortages (Blundell, et al., 2020). Highlighted from this case is the change in consumer behaviour and the impacts this has on the supply chain by the demand increases and customers purchasing items they would not normally as a paradoxical consequence of consumers reaction to the pandemic unfolding (CBBC, 2020; Gov.Wales, 2021; CDC, 2020; Barman et al., 2021; BBC News, 2020a; BBC News, 2020b; BBC News 2020c).

In The Guardian Goodley & Butler, (2020) reported that Sports Direct was criticised for not adhering to restriction measures set out by the World Health Organisation and the government, affecting the safety of their warehouse workers during the pandemic by allegedly not keeping employees at least 2m apart and not providing workers with enough soap to wash their hands. Mike Ashley a spokesperson for Sports Direct had put blame on the unprofessionalism and reliability of the recruitment agencies they were using, stating it was due to restriction enforcement issues between themselves and the agencies. However, Sports Direct decided to keep their warehouses working during lockdown to focus on their online services and operations and as a result had responsibility for the workforce they hired from the agencies. Sports Direct stated they were guaranteeing working hours for both internal and external employees however, in an interview between employees and The Guardian there were allegations made alleging that Sports Direct pressured their employees for taking time off to self-isolate. The government forced Sports Direct to shut down even though Sports Direct had an argument stating to the government that they were essential for the health and fitness of their

customers. However, after eventually adhering to the wishes of the government and shutting down their retail activities, they volunteered to provide logistical services for the NHS utilising their fleet of lorries. In the article Goodley & Butler, (2020) also reported that JD Sports was condemned to closed temporarily by the Usdaw union due to them not keeping their employees safe and putting their lives at risk. Next, Topshop and Asos had kept their online operations running during the Covid-19 pandemic and Moss Bros was shutting down even their online activities. (Goodley & Butler, 2020). This case provides more detail about how the new Covid-19 response policies issued by the government has impacted warehouses for the garment industry. The impacts of these policies have had a negative impact on staff wellbeing and the wellbeing of the families and region the workforce goes home to. This has stopped the business from doing its normal operations and adaptive measures were needed (IFC. 2020; UNCTAD, 2021a).

McMaster et al., (2020) stated that the measures put in place to mitigate against Covid-19 such as lockdown and social distancing had impacted the fashion industry's supply chain. The impacts of the measures had reduced the usual outputs from production plants from key suppliers for the industry. The fashion industry tends to adopt a lean strategy in its' supply chain management putting focus on supplier relationships and limiting the number of suppliers in the supply chain increasing the risk of supply disruptions. Furthermore, companies implementing lean operations adopt Toyota's 'just-in-time' approach putting an emphasis on scheduling of orders and deliveries and to maintain discipline throughout the supply chain. Moreover, the fashion industry is less resilient to disruptions to the flow of materials or production especially due to most fashion manufacturers being based offshore introduced through the fast fashion trend that started in the 1990s utilising low production costs in countries such as China, Bangladesh, India or The Comprehensive Economic Partnership (RCEP) ASEAN members. However, travel restrictions caused problems in the supply chain by the prevention of suppliers exporting to manufacturers and manufacturers sending their exports to buyers with shortages of workers being able to work (Taqi, et al., 2020). McMaster, et al., 2020 and Taqi, et al., 2020 argued that an agile supply chain may be more beneficial to allow more flexibility for events such as the Covid-19 pandemic. Furthermore, to address customer unpredictability, market dynamism, market uncertainty and high demands that usually would increase the risk of creating the potential to over or under stock. However, the trend in the fashion industry is to minimise their operational costs which is why they tend to

choose a lean approach to meet this strategic goal. To put this in another way, a lean system is a simple supply chain structure due to the minimalism of suppliers, logistical and operational activities to reduce cost and avoidance of waste. However, this is a rigid system and has low resilience to large disruptions to any link in the chain and provides lower transparency of the supply chain that has caused problems for firms in the past. On the other hand, you have an agile supply chain system that creates flexibility to disruptions by having more options (not having all your eggs in one basket) and having a larger buffer stock, making a more robust, resilient but albeit a more complex supply chain system that requires additional costs, capital, and management of a larger inventory. Furthermore, an agile system would have greater communication and company relationships through partnerships, and a more efficient means of information sharing between buyers and suppliers shifting the focus from cost reduction (Lean) to value creation (Agile) thus reducing the likelihood of experiencing a bullwhip effect through the supply chain. There is a ripple effect that is caused by Covid-19's disruptions coming from each end of the supply chain and can be mitigated by the emerging technologies of Industry 4.0 to respond better to demand fluctuation using big data analysis, track and trace technologies and enables resources to be reconfigured at the retrieval stage (McMaster et al., 2020; Taqi, et al., 2020). This case study has illustrated two of the identified problems from the literature review. The barriers identified here are the movement of labour due to travel restrictions and government intervention across the regions affecting the garment industry. This case reveals the vulnerabilities of lean supply chain systems that are typical in this industry and that a more agile and flexible supply chain system supported by the new technology from industry 4.0 could potentially make the supply chain more resilient and robust to black swan events in the future. Additionally, communication, additional supplier options, and transparency improvements through better relationships with each member of the supply chain could mitigate future events like this one (Christopher, 2005; Reuben, 2020; Gov.Wales, 2021; Gov.UK. 2020a; Stephens, et al., 2020; Hobbs, 2020; IFC. 2020; Richards, 2014; Shveda, 2020; UNCTAD, 2021a).

Jackson, et al., (2020) stated that from September 2020 half of the people working in the manufacture of garments worked in areas that had restrictions in place to tackle Covid-19, requiring the garment factories to shut down due to them and non-essential retailers being forced to close by their government as part of the same restrictions. Lockdown had all but collapsed the trade of garments at the beginning of 2020 with as much as a 70% reduction in

importation from Asian countries and a 60% reduction was experienced by the garment manufacturers of their input of imported materials. Many of the factories that supplied garments that had closed made workers redundant or were dismissed. Furthermore, reduced labour capacity was experienced after the factories were re-opened causing the average employee to miss out on two weeks to a months' worth of work moreover, only three out of five workers were summoned back to work by the end of 2020 and some workers back in work had experienced delays in receiving their wages and/or had their earnings reduced (Jackson, et al. 2020; Taqi, et al., 2020). From the information taken from this case the issues of government lockdowns on businesses and their supply chains caused significant disruptions in the availability of labour and the ability to produce non-essential products such as garments. This case corresponds with the barriers identified in the literature review of government restrictions on people, businesses, and travel restrictions (BBC News, 2020d; Deconinck et al., 2020; Gov.UK. 2020a; Stephens, et al., 2020; Hobbs, 2020; Barman et al., 2021).

Global apparel exports from Asia and Pacific regions make up 60% of global supply and due to that reason, the sobriquet given to that region is: "clothing factory of the world" (Jackson, et al., 2020). The region of Asia and Pacific had been affected by Covid-19 first due to the outbreak starting in China and later spreading to the Republic of Korea, Thailand, and Japan prior to the spread throughout the entire globe after them. Governments in both local and global regions-imposed travel restrictions, closed workplaces such as: shops and factories to mitigate against the spread of Covid-19 impacting at first the suppliers, then the manufacturers to then ripple out to affect the whole supply chain affecting international fashion brands and retail outlets. Furthermore, customer demand dropped significantly due to rising uncertainty, purchasing power shifts, lockdown and travel restrictions affecting customer confidence globally dependant on the restriction intensity in the affected region. The garment industry had larger reductions in its' imports than other types of industries due to being heavily dependent on imports from Asian and Pacific suppliers. Due to the drop in consumer demand the purchasers of globally sourced garments set out to make reduced orders, putting a hold on shipments, cancelling orders altogether or asking suppliers for discounts using clauses in the contracts between them and the supplier in attempt to force their hand. Many garment retailers had gone bankrupt or had to go into administration for various reasons from already being in debt before the pandemic's emergence, to issues with adapting to changes in the retail market prior to Covid-19. However, all was later exacerbated when the pandemic struck forcing

companies such as: Debenhams, Brooks Brothers, G-Star, J. Crew, Neiman Marcus, and JC Penney to go out of business. Furthermore, it was estimated that a third of fashion purchasers would not survive after the severity of the pandemic subsidies (Jackson, et al., 2020; Taqi, et al., 2020). This problem ties in with the literature review's findings on the topic of customer demand changes, even though in the literature review the term was either used generically or in relation to grocery products and services provided by online channels for grocery retailers. There is also a collaboration between where the outbreak began, and from a garment industry perspective the other regions affected in turn by the emergence of Covid-19. Furthermore, the travel restrictions imposed by the authorities in Asia and the Pacific regions were similar to those seen in the EU and UK. However, due to these regions manufacturing 60% of the worlds' garments any disruption in those regions would be felt throughout the supply chain globally (Gov.UK. 2020a; Stephens, et al., 2020; Hobbs, 2020; IFC. 2020; Richards, 2014; Shveda, 2020; UNCTAD, 2021a).

Figure 1



(Stephens, 2020)

The photograph above (Fig,1) illustrates the impact Covid-19 has had on the retail supply chain in Merthyr Tydfil with the end of one of their largest fashion retail outlets, Debenhams being

cleared out and shutdown. Stephens, (2020) reported in her article for Wales Online That Debenhams were trying to negotiate contractual terms for the store at Cyfarthfa Retail Park in Merthyr Tydfil. However, the landlord was unwilling to agree on the changes suggested by Debenhams. Debenhams chairman Mark Gifford begged the Welsh Government to contribute and equalise the UK chancellors Rishi Sunak`s holiday from business rates for hospitality, leisure and retail companies that was set to last a year. The Welsh Government initially said they would match it; however, they changed their minds in making the relief holiday for business rates available for large companies therefore, Debenhams would need to pay high business rates for their stores while under shutdown restrictions. The Welsh Government later stated that the Merthyr Tydfil store would fit the criteria for a smaller retail company, however the larger Debenhams stores nevertheless would not. Even with the new business rates relief issued by the government would not prove to be enough. Moreover, the Governments furlough scheme in place to mitigate labour retention would not be enough to save the store or the business as a high street retailer. By April 2020, Debenhams made an announcement that they were closing all of their remaining stores by May 4th, 2021, stating that the pandemic was the final nail in the coffin. However, Boohoo the online channel-based fashion retailer bought the Debenhams brand for £55 million to continue as an online retailer from 2022 (Evans, 2020; Stephens, 2020; Doody, 2020). This case demonstrates how large the impacts of Covid-19 and the restrictions put in place by the government to combat against its` spread, can have on a large fashion retailer with it ultimately closing its` doors for good in Merthyr Tydfil and throughout the UK. The retailer was already in trouble before the pandemic struck, however it was the pandemic that put an end to the supply chain as it was to be reborn as an online retailer only with a new supply chain setup to service this new channel. This case relates to government policy changes as a response to Covid-19 that has been highlighted in the literature review, however not in the context of the garment industry (Gov.Wales, 2021; Gov.UK. 2020a; Stephens, et al., 2020; Hobbs, 2020).

Chapter 5

5.1 Conclusion

5.1.1 Conclusion Introduction

This thesis was created as a means for future researchers to utilise as a guide to provide direction for future studies by identifying problem areas and providing the data for the problems identified. The context of this study is in relation to how retail supply chains are affected by Covid-19 from the perspective of Merthyr Tydfil retailers in south Wales. This thesis began by introducing the emergence and impacts of the Covid-19 pandemic on the world and its possible causes and how the virus develops into a pandemic by using information provided by the WHO. The introduction included what intentions and motivations were for undertaking this research project. The first chapter disclosed the research aims and provided the research objectives. The aim was to identify the barriers that was caused by the pandemic through utilising secondary data and using it to analyse case studies related to supply chain disruptions for retail businesses in Merthyr Tydfil. The research questions were formed in chapter one and was the bases of this thesis to attempt to answer these research questions.

The focus of this thesis was to answer two of the following research questions:

1. What were the challenges faced by supply chain of retail shops?
2. How were supply chains managed during the pandemic?

The conclusion will answer these questions in separated paragraphs with headers for the reader to easily distinguish and connect the appropriate conclusions to address the right answers to the relevant question. The aim was to identify retail shop supply chain barriers due to effects from the Covid-19 pandemic, to supplement future research by being a guide and give direction for future researchers by the means of utilising case studies to identify how the supply chains of retailers in Merthyr Tydfil have been affected.

The structure of the thesis was illustrated by laying the 5 chapters of this dissertation to prepare the reader of what lies ahead and to show the process has a natural logical flow from one chapter to another. Chapter 2 was the review of literature revealing data on Covid-19 and the government restrictions in place to prevent the spread of the virus with the need for businesses to take action to meet the needs of new government policies. The supply chain was defined by experts from the definitions contained in their textbooks and quoted or paraphrased in chapter

2 to provide the context and framework for this thesis. Christopher (2005) made a definition of supply chain management that had been used in the literature review chapter of this thesis. This definition was most relevant due to the author putting an emphasis on demand instead of the supply, and an emphasis on network instead of chain to re-term supply chain management as demand network management. This became clearer as the data from the secondary sources was compiled and analysed to reveal evidence of changes in demand affecting the functionality of the supply chain and evidence to suggest that through inter-company integration and good communications and cooperation including with customers, more resilience to changes in demand is possible.

The effects of Covid-19 were revealed in chapter 2 to identify how, and why the pandemic was impacting retail supply chains, Towards the end of chapter 2 the literature reviled and identified the barriers effecting retail supply chains followed by the summery. Chapter 3 discusses the methods used to answer the research questions while justifying the utilisation of secondary data. Chapter 4 is the secondary data undertaken providing case studies to discuss and analyse to have a more specific view on how Covid-19 and its corresponding consequences has on Merthyr Tydfil retail supply chains. Chapter 5 contains this introduction to the conclusion as a summery to remind the reader of the previous chapters before concluding in the next part of the conclusion chapter.

5.2 Challenges Identified

There were three main challenges identified by conducting this research from the secondary data analysed. The challenges identified in this study that affected retailers in Merthyr Tydfil were as follows:

1. Social distancing
2. Lockdown and travel restrictions
3. Government policies

5.2.1 Social Distancing

Social distancing emerged as a barrier to retail supply chains by preventing people from working near one another due to the 2-meter rule imposed on people and organisations by government policy changes to mitigate the spread of the virus. Social distancing meant factories, warehouses and retail outlets found it difficult to accommodate the changes needed to meet these new polices and to keep business operations performing as they should.

Furthermore, this ultimately led to some businesses being shut down, or re-purposed to help the NHS, or provide services for the vulnerable. Social distancing led to the closure of non-essential retailers in Merthyr Tydfil by analysing the impacts on garment retailers in the area.

5.2.2 Lockdown and Travel Restrictions

The introduction of lockdown and travel restrictions meant some people could not go to work meaning there were reduced numbers of labour available by members of the retail supply chain. Examples identified were seasonal labour shortages at farms creating problems with the supply of food to the grocery retailers and borders being closed off in France preventing trucks from entering the UK. Furthermore, there were issues with labour shortages in the garment supply chain due to travel restrictions in Asia and the Pacific that manufactures most of the worlds' garments creating bottlenecks in the supply chain especially due to import bans and company shutdowns.

5.2.3 Government Policies

The new government policies introduced measures to help combat the spread of Covid-19. There was also support offered to businesses and their employees to mitigate the impacts the new measure would have on businesses. The government used enforcement measures to ensure the new policies were followed. These affected supply chains in different ways such as: Having enough space in workplaces to keep employees safe and being able to function at the same time, workplaces needing to make big adaptations to stay in business and to minimise effects further along the supply chain, problems acquiring labour due to travel restrictions, being able to pay employees for self-isolating and maintaining operations with reduced labour numbers, and changing the structure of the business to accommodate new market channels as a result of government closures and restrictions on the movement of people.

5.3 Management of Supply Chains During the Pandemic

The problems identified by the research done in this thesis had affected businesses globally, impacting the supply chain of each effected business. The way businesses were managed prior to the emergence of Covid-19 was different in some way post-Covid-19. The adaptations required to mitigate the effects of Covid-19 identified in this thesis are:

1. Retailers shifted their market from selling in store to selling online by orienting their operations and supply chain channels towards online ordering and offering click and collect services or home delivery services. This was achieved by hiring and training

staff, purchasing vehicles, and adapting warehouses to fulfil the new operations. This was done by grocery retailers to enable them to reach their customer due to travel restrictions, social distancing, and providing food security for the vulnerable. The garment retailers had difficulty with this method due to it being difficult to manage the social distancing needed in their warehouses, while having sufficient labour to meet demand. Furthermore, the non-essential nature of some such as Sports Direct meant that government interventions eventually forced them to stop their usual operations to provide service to the NHS and others providing delivery service for food boxes for children and the vulnerable.

2. There were businesses that offered their staff to work from home where possible. This was done following government guidance to limit the spread of the virus by limiting the contact of people at work as much as possible. This would require managing people's performance from a distance with possible positive and negative effects identified in the literature review. Another problem to manage would be to provide training and put physical measures in place to keep people at a safe distance from each other while in the workplace, with good ventilation and maintenance of upgraded hygiene standards to help stop the spread of the virus. These changes would require management to acquire funding and support from the government.
3. Agile supply chain system and term changes were either made or suggested. It was suggested that more supplier options would add to the flexibility of the supply chain in the event of disruptions happening to suppliers due to impacts from Covid-19. A larger buffer stock was suggested to provide a safety net to supply issues to still meet customer demand. Better relationships within the supply chain by the means of communication and new industry 4.0 technology allowing greater transparency and control of operations and inventories. Garment purchasing management made changes to their terms in favour of themselves over their suppliers in Asia and the Pacific. The purchase managers put delays on orders or put a hold on some while requesting price reductions using clauses built into the contractual agreements between them and their suppliers.
4. Repurposing transportation modes. Due to the loss of passengers using aeroplanes because of travel restrictions, passenger planes were re-purposed to carry cargo to both utilise the planes more economically and provide additional transport options for changes in demand. Medicine and food were essential during the pandemic, requiring airfreight and haulage companies to be re-orientated to further service these needs.

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5. The management of workers during this time was essential to meet the requirements set by the government. Offering tests and furlough schemes to staff and making allowances for sickness and self-isolation. Furthermore, hiring additional staff and training was required to meet demand changes and increases.

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