Supply chain resilience issues faced for long-term healthcare institutions during covid

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ABSTRACT :

Covid has had major impacts on healthcare supply chains all over the world. From all corners of healthcare shortages of PPE supplies have been reported, also in the Netherlands. This paper is trying to fill the gap within the current literature about supply chain challenges and the strategies belonging to them for the permanent healthcare sector. Interviews have been taken with a Dutch permanent healthcare institution, a GPO and a supplier active in the healthcare sector. By taking these interviews, it became clear that permanent healthcare had specific challenges for its sector proven a challenge for upper management. While being less prioritized by governmental aid, risks and challenges proved to be significant. Focusing on a better streamlined and extended supply chain and trying to intensify collaborations turn out to be activities vital for the proper functioning of such an organization in crisis times. Collaboration as a strategy including suppliers, other health institutions and non-health related businesses. By focusing on these factors, they were able to maintain a fulfilling stream of supplies adequate to continue the right level of care for their clients.

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Keywords

Healthcare, supply chain, PPE, resilience, covid, permanent health, Netherlands

1. INTRODUCTION

A resilient health system can respond to changing circumstances during a crisis, rebounding from setbacks and absorbing shocks while still performing its essential duties and meeting the ongoing medical demands of its population (Haldane, 2021). The COVID-19 epidemic shook healthcare systems, putting their ability to adapt and endure to the test. In order to boost coronavirus testing and treatment and to safeguard providers from financial shortfalls, governments around the world have been forced to swiftly review and adjust buying systems for channeling resources to health providers (Waitzberg et al., 2022).

The COVID-19 pandemic's severe shortage of essential medical supplies created significant procurement difficulties in the healthcare supply chain. The discussion on how to improve supply chain resilience in healthcare has picked up steam because maintaining the availability of such items during disruptions is essential (Spieske et al., 2022). Specifically talking about personal protective equipment (PPE),they had great impact on the defense against Covid pandemic in healthcare organizations. The severe shortages of masks and gloves could be observed in diverse health systems, impacting both of patients and practitioners(V&amp, 2020).

These weaknesses became clear when the COVID-19 pandemic presented severe difficulties for HCSCs all across the world. Health institutions worldwide have been impacted by the severe shortage of essential medical supplies like PPE, ventilators, or COVID-19 therapy medications (Chamola et al., 2020). SC disruptions, such the supply shortages brought on by lockdowns and limitations on border crossings during the COVID-19 pandemic, are unexpected and unanticipated occurrences that impair the regular flow of products. The multiplied rise in demand for PPE and other medical items made these disruptions' detrimental effects worse (Cohen & van der Meulen Rodgers, 2020).

The government was involved within this crisis by creating central hubs for PPE distributions for instance. Organizations like ROAZ (Regionaal Overleg Acute Zorgketen) and LCH (Landelijk Consortium Hulmpiddelen) became active focusing on a coordinated distribution of these essential goods(de Graaff et al., 2021). Even though all healthcare locations were aided, hospitals were heavily affected by the covid crisis. Heaving to adjust their purchasing strategies to create a more resilient purchasing system. Specific tactics that became apparent were for instance creating a more diverse portfolio of suppliers. Most prominently for PPE supplies. Making sure the incoming stream of these essential goods became more sufficient was essential(Meyer et al., 2021). Securing the availability of these materials made possible to ensure that internal processes could proceed safely and according to protocol. At the same time effort was made to improve internal resource management. More sophisticated inventory and storage system for PPEs, would allow supply chains to be more efficient at that time. (Tip et al. 2022)

As it comes to purchasing within healthcare institutions, extensive research has been written as it comes to resilience of supply chains, including the procurement perspective (Khademi Jolgehnejad et al., 2020; Senna et al., 2021). With recent events, such as the Covid pandemic additional amount of papers about supply chain resilience have been introduced to the academic literature. Most of them focusing on the hospital perspective (Spieske et al., 2022; Zamiela et al., 2022). Although the literature on hospital supply chain resilience is extensive, little is known about how long-term healthcare institutions implemented resilience strategies. This is true, especially when considered the literature written regarding the Covid-19 pandemic period. In this research we therefor focus on the specific resilience strategies adopted by long-term healthcare institutions located in the Netherlands. This research focus specifically on permanent care institutions, which has had massive blows within the covid crisis (Montás et al., 2022).
It is important that additional research is done regarding this topic, because there are exceptional circumstances within these long term institutions that had effect on the acquirement of mainly PPE. Doing research on this topic will highlight the main challenges these institutions faced during the pandemic, and the different strategies to assure greater effectiveness regarding supply chain practices within these institutions.
Permanent healthcare institutions were less prioritized by the government as it comes to aid in the beginning stages of this crisis. While having an extremely high risk, these institutions were forced to sort significant parts of the supply process out for themselves. According to interviews within this research. Creating additional challenges and therefore being forced to dive deeper in possible opportunities and strategies to tackle these challenges.
On the one side having a shortage of previous academic research and on the other hand identifying the significance and vulnerability of permanent health makes it an interesting and valuable topic to work with. Long-term healthcare institutions are important setting for the research, since these types of healthcare organizations are under researched, yet they have an strategic role in health systems, considering the aging of population as a strong future trend.

Making sure that in future crisis scenarios, better decisions will be made regarding strategies for acquiring these essential goods. Building up resilience by delivering additional analysis formed accustomed to these specific businesses and scenarios. A transnational picture regarding purchasing challenges ought to be different from the specific Dutch perspective. Forming a structure maintained by governmental actions and regional management shortcomings. Thus, the research question of this thesis is proposed as follows:

What were the main supply chain resilience strategies adopted by procurement managers in long-term healthcare institutions during covid?

Challenges and strategies are identified in this qualitative study, which is a case study comprising interviews with around 5 purchasing managers and a supplier of critical medical supplies. First, this study gives a summary of the literature that has been published on purchasing in the healthcare sector and identifies its known difficulties. Following that, the Dutch healthcare system will be

described together with an overview of the purchasing process. The research technique is discussed in the following sections. Next, the findings from the interviews with the buying managers are presented, followed by a discussion and a conclusion.

2. CONTEXTUALIZATION

The COVID-19 pandemic has had a profound impact on the healthcare supply chain. The demand for personal protective equipment (PPE), such as masks and gowns, as well as other medical supplies, such as ventilators, skyrocketed as the number of infected individuals increased. This led to a shortage of PPE and other essential medical supplies in many areas, which created significant challenges for healthcare providers and first responders (Barlow et al., 2021). Additionally, the pandemic disrupted global trade and transportation, leading to delays and disruptions in the delivery of medical supplies. This was especially problematic for countries that rely on imports for many of their medical supplies, as borders were closed, and shipments were delayed. The pandemic also exposed the vulnerabilities of the healthcare supply chain, including the dependence on a limited number of suppliers, the lack of redundancy in the supply chain, and the lack of contingency plans in the event of a crisis. (Zamiela et al., 2022) To address these issues, many countries have taken steps to improve their healthcare supply chains, including diversifying their sources of supply, increasing domestic production of PPE and other essential medical supplies, and implementing new technology and data analytics to improve supply chain management (Barlow et al., 2021)

Another study says that an organization can incorporate resilience if it has redundancy and flexibility(Pal et al., 2014). Operational flexibility can be increased by adaptable materials, manufacturing lines, postponed manufacturing, and personnel cross-training. Having several suppliers, extra capacity in the organization or supply chain (SC), financial robustness, or slack resources to absorb disruptive consequences can all be used to build redundancy (Pal et al., 2014).

A growing number of research evaluations have focused on the definition, primary antecedents, and characteristics of supply chain resilience (SCR) as a result of the increased severity and frequency of SC disruptions in recent decades(Hohenstein et al., 2015). Three key goals for supply chain resilience were identified by (Hohenstein et al., 2015) after conducting a thorough assessment of the literature: financial performance, market share, and customer service level. The ability to reliably provide patient care and the related service level dimension might be viewed as the most important factors in the healthcare industry (Abdulsalam et al., 2015).

Resource dependency theory (RDT) offers a proven theoretical framework to look into how businesses react to SC disruptions (Bode et al., 2011). No organization is self-sufficient, according to the theory, and players must create relationships with other organizations to have access to vital resources. These relationships lead to dependence on outside parties, power disparities, and finally the introduction of a potential source of difficulty for the company. In order to lessen uncertainty, SC stakeholders seek to increase or limit other organizations' dependence on them (Nandi et al., 2021). RDT is ideally suited to research healthcare supply chain (HCSC) pandemic resilience. First, RDT asserts that an organization's dependences limit its capacity to adapt to sudden changes in supply and demand. Unprecedented shifts in the demand and supply of medical goods have been seen during the COVID-19 epidemic (Chamola et al., 2020). In order to accommodate the diverse, multi-stakeholder healthcare system and its range of resource flows, RDT applies a broad definition of resources (e.g., materials, human resources, money, an d political support) and potential sources for these resources (e.g., suppliers, customers, competitors, governmental bodies) (Craighead et al., 2020).

The definition of the word "resilience" varies depending on the subject or sector. The phrase can signify anything from "withstanding significant disturbances" to "the capacity to avoid frequent failures." When there is less need for machine maintenance, which reduces cost, a machine is said to be robust in the manufacturing sector(Ponomarov & Holcomb, 2009). The goal in the supply chain sector is to overcome interruptions with a high level of risk and expense while moving toward a more efficient state. Despite unplanned disruptions, supply chains that are resilient deliver the intended items. (Ponomarov & Holcomb, 2009) Finding key enablers during any disturbance is crucial since resilience is critical to many supply networks. The health care supply chains (HCSC) will benefit from a number of important enablers to remain resilient during long-term disturbances like COVID-19. Stoppages in the healthcare supply chain can cost the healthcare industry more money and have catastrophic consequences for patients. (Zamiela et al., 2022).

2.1.Activities for supply chain resilience

Within this research of Zamiela et al. (2022), with the help of the identification and ranking of these enablers, specific points of action were identified that could boost supply chain resilience. It being essential to keep supply networks resilient and keep the medical supply channels operating during a crisis like covid.

It was concluded that having a large supply backup stored in one place helps supply chains remain viable and supports healthcare facilities that use many of the same commodities. Storage of supplies is necessary due to redundant consumption of medical supplies brought on by healthcare facilities operating at maximum capacity.(Spieske et al., 2022) Besides these extra storage facilities, governments and healthcare organizations should work more closely together throughout the covid healthcare crisis to make sure a future crisis is tackled. Finalizing the research of Zamiela et al. (2022), it was concluded that a designated persons should provide information on healthcare procedures that will present truthful facts and only present information that is useful.

The reliability of accurate information gives researchers a great starting point for developing a range of solutions to enhance the medical supply chain in the wake of a disaster.

Research done by (Spieske et al., 2022) identified multiple strategic activities performed by hospitals regarding their supply chain . In a pandemic, hospitals can improve medical supply availability by reducing dependency by making direct purchases from upstream healthcare suppliers (buffering). At the same time, hospitals that pool their resources can lessen reliance and so increase the availability of medical supplies (buffering). Decentralized pooling is less effective than centralized pooling in these situations, because centralized pooling delivers benefits in terms of dependability, inventory visibility, and logistical complexity(Rojas et al., 2021). Hospitals can also increase medical supply availability (buffering) during a pandemic by working with public authorities on procurement activities. However, there are still issues with quality control, efficient resource allocation, and distribution planning.

More effectively than by adding new suppliers, hospitals can increase supply availability during a pandemic by leveraging partnerships with long-term strategic suppliers (bridging). (Spieske et al., 2022) Improved insight of supplier delivery capabilities and actual (customer) demand can help medical supply manufacturers and hospitals in a pandemic increase supply availability (bridging). Finally, by expanding their procurement efforts in the event of a pandemic, medical supply manufacturers and hospitals might lessen reliance on one another and increase supply availability (buffering).

Additional research was done by Tip et al. (2021), identifying different strategic propositions of hospitals with the help of the Kraljic matrix.
-The goal of the several tactics used by hospital buyers was to improve internal demand access. For instance, almost all of the respondents within this research inspected their supply more frequently than before during the epidemic, using newly installed dashboards for instance, to improve demand access internally. Daily consultation could be identified as a new method in addition to stock monitoring, as well as minimizing the typical purchasing process to ensure quick access.
-To improve resource availability, buyers worked with complementary businesses and suppliers, including a Dutch bed manufacturer. By changing product specifications and using alternative products, accessibility was also increased. Hospitals went beyond substitute products to used hospital products that were retrieved after bankruptcy. Interviewees within this research additionally mentioned being solicited by unreliable providers. (Tip et al., 2021)
-In response to shortages, some hospitals additionally created alternative designs for masks acceptable for engaging with patients who did not have COVID-19. In addition to switching out equipment, hospitals also repurposed and sterilized existing products. (Tip et al., 2021)
-As it comes to collaboration between institutions, in this case hospitals, only more collaboration could be identified in the beginning of the pandemic. Besides this starting form of growing collaboration, a form of competitions between them was identified. Having negative effects on the total functioning of the system.(Tip et al., 2021)

2.2.Healthcare characteristics

In terms of the degree of service customization offered, the level of partner or customer interaction, and the level of fundamental process uncertainty, the healthcare industry's supply chain is distinct from that of the manufacturing sector. All of these increase the healthcare value chain's complexity and dynamic nature, which has a big impact on how well healthcare businesses execute(Mathur et al., 2018). Due to their high level of complexity, their high-value items , and, finally, the fact that they involve human lives, healthcare supply chains are again frequently regarded as being distinct from typical SC (Aldrighetti et al., 2019). The providers we focus on within this project are permanent care institutions, which are made up of several departments and have their own intricate flows of information and goods.

Healthcare supply chains (HCSCs) have become more complex as a result of increasing interdependencies, efficiency awareness, and cost pressure from expanding demand and competition(Hussain et al., 2018). When the COVID-19 pandemic presented devastating difficulties for HCSCs globally, vulnerabilities became clear. Health institutions worldwide have been impacted by the severe shortage of essential medical supplies like personal protective equipment (PPE), ventilators, or COVID-19 therapy medications (Chamola et al., 2020). The ability of healthcare providers and medical supply manufacturers to secure enough COVID-19-related medical goods or necessary production materials and components has emerged as a key challenge (Chowdhury et al., 2021).

Natural disasters and pandemics cause unexpected operational shocks in healthcare and emergency response organizations. Hospitals, which are the most susceptible and rarely ready for major crises, are the backbone to absorb and reduce pandemic shock waves. The COVID-19 outbreak badly overflowed hospitals all around the world(Okeagu et al., 2021). Had there been efficient techniques to optimize resources and processes, these detrimental effects might have been reduced or perhaps eliminated. For instance, a lack of PPE availability and access led to high infection rates among healthcare workers in Italy. One of the main responses was a hasty attempt by people and medical workers to obtain PPE, which was at conflict with the supply chain staff's concerns about limiting waste and prioritizing response (Menezes et al., 2022). Implications mentioned in this paragraph also apply to permanent healthcare institutions like permanent care. This research will focus on these specific institutions instead of having the main focus on hospitals, as a major part of researchers did prior.

Care homes were left exposed and vulnerable by a lack of personal protective equipment early in the pandemic, while the government's handling of the procurement left ministers open to accusations of conflicts of interest in the UK. Same circumstances emerged within other European countries during the pandemic (Rawlinson, 2021). A well-coordinated approach from out the Dutch government for example was lacking. Purchasing departments and workers were left unaided and therefor forced to find their own solutions. Resulting in critical circumstances for both practitioners and patients. Underrepresented and therefor unprioritized by governmental aid, while creating major risks for incremental outbreaks. Permanent care being extremely vulnerable for such calamities (V&amp, 2020).

2.3. Dutch healthcare

Patients want the greatest outcome possible and want quality measures in order to make educated decisions. Healthcare professionals strive to provide the greatest care to as many patients as possible, but they also require quality measurements to compare their performance to that of other healthcare professionals and pinpoint areas for development. (Pantaleon, 2019) Healthcare insurance firms strive to provide their clients with the best (long-term) value for their money. The goal of the government is to ensure that everyone in the country has access to the greatest possible public health services within a given budget (Fig. 1). (Eindhoven et al., 2015)

The easiest way to understand the current Dutch healthcare system is to consider a number of recent developments. All Dutch citizens are now entitled to a complete basic health insurance package thanks to the new Health Insurance Act, which went into effect in 2006.(van Kleef et al., 2018) Private, competitive health insurers and healthcare organizations are putting this law into effect. It should be emphasized that almost all Dutch health insurance companies are not-for-profit cooperatives that either return any profits they make in the form of cheaper rates or allocate them to the reserves they are obligated to keep. In the Netherlands, there are a total of 24 insurers who assume risk for their business activities. (Bekker et al., 2010)

The Dutch healthcare system is now demand-driven rather than supply-driven according to the Health Insurance Act. Shorter waiting lists, less bureaucracy, and a stronger emphasis on efficacy and quality are just a few ways that private health insurance firms are enhancing the healthcare system for patients and policyholders.(Lako & Rosenau, 2009) Health insurance providers can regulate the efficacy and caliber of the medical care delivered by using a selective contracting process. Since individuals have the option to choose healthcare providers each year and can affect the policies of health insurers and medical institutions, the general public also has some degree of power over this process. (van Kleef et al., 2018) Despite the fact that the healthcare system is primarily a private one, the government nonetheless exerts control over it to safeguard the general welfare.(Lako & Rosenau, 2009)

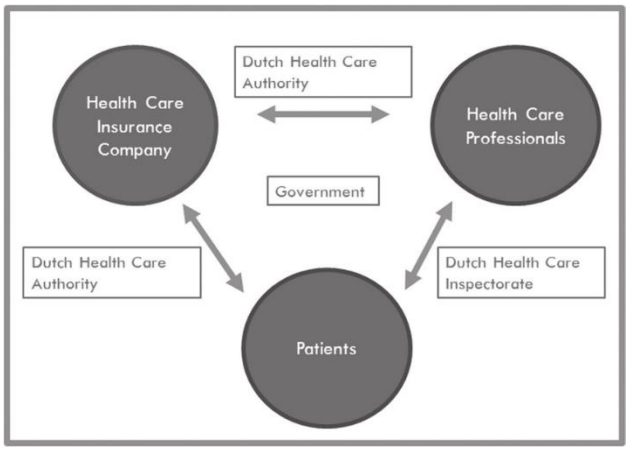

Figure 1: Dutch healthcare structure by (Eindhoven et al. (2015))

The Dutch healthcare system is considered one of the most comprehensive and efficient systems in the world. It is structured as a mixed system, with elements of both public and private provision of care. The main components of the Dutch healthcare system, including the insurance system earlier talked about.(Eindhoven et al., 2015) Starting with Insurance system, in which residents of the Netherlands are required to have basic health insurance coverage, which provides access to a wide range of medical services. The insurance is funded by a combination of individual premiums and government subsidies. There are several private insurance companies that offer policies, and individuals can choose between a variety of plans.(HelloDoc, 2023) Then there is public healthcare. Public healthcare system in the Netherlands is organized around a network of general practitioners (GPs), who act as gatekeepers to the healthcare system and are the first point of contact for patients. They provide a wide range of primary care services, including preventive care and referrals to specialists as needed.(HelloDoc, 2023)

The Dutch healthcare system includes both public and private hospitals. Public hospitals are funded by the government and provide care to patients regardless of their insurance status.(HelloDoc, 2023) Private hospitals, on the other hand, are typically funded by private health insurance companies and provide care to patients with private insurance coverage. In addition to primary care and hospital-based care, the Dutch healthcare system also includes a range of specialized care services, such as mental health services, rehabilitation, and long-term care. (Tikkanen, 2020)Then there is patient choice. In the Netherlands they have a high degree of choice in their healthcare, including the ability to choose their GP, specialist, and hospital. This choice is facilitated by the healthcare insurance system, which provides financial incentives for patients to choose high-quality providers.(HelloDoc, 2023)

In the Netherlands, healthcare providers such as hospitals, nursing homes, and clinics, operate within a regulated system for purchasing goods and services. The system is designed to ensure transparency, accountability, and efficiency in healthcare procurement. The Dutch

healthcare providers typically follow a centralized purchasing model, which means that procurement decisions are made at a higher level in the organization, rather than by individual departments or units.(Gelderman et al., 2018) This helps to streamline the procurement process, reduce costs, and ensure consistency across the organization. The Dutch healthcare procurement process typically involves needs assessment with which healthcare providers first identify their needs and requirements for goods and services. Within the following tendering process providers may issue tenders to suppliers to solicit bids for the goods or services required. (Gelderman et al., 2018) Suppliers are selected based on a competitive bidding process, which may include factors such as price, quality, and delivery times. Once a supplier is selected, the healthcare provider enters into a contract with the supplier to provide the goods or services. The contract typically includes details such as the quantity of goods or services required, the price, delivery times, and quality standards.(Bakx et al., 2020) Healthcare providers monitor supplier performance to ensure that they are delivering the goods or services as agreed upon in the contract. This may involve conducting regular quality checks and performance evaluations.

It is also worth noting that Dutch healthcare providers are subject to strict regulations regarding procurement, which are designed to ensure transparency, fairness, and accountability. For example, providers are required to adhere to EU procurement laws and guidelines, and must maintain detailed records of their procurement activities.(Hatzopoulos & Stergiou, 2011)

3. METHODOLOGY

A qualitative research design will be used to gather a deeper understanding of problems that arise within Dutch healthcare as it comes to resilience. To improve the validity of the study, the research design draws upon perspectives from not only purchasers but also physicians and crisis teams from different healthcare (related) institutions in The Netherlands. Data will be collected through semi-structured interviews. Interviews will not be done in focus groups because the presence of other people can inhibit a respondent and influence how they formulate their judgment or answer (Acocella, 2012). Interviews can be classified according to their degree of structure: they can be structured, unstructured or semi-structured. On the one hand, structured interviews are highly inflexible, but offer much guidance. Unstructured interviews, on the other hand, are very flexible, but highly inconsistent and may be subject to various errors (Azarpazhooh et al., 2008) For this reason, semi-structured interviews will be conducted in this research, as it offers a middle ground. The questionnaire consisted of 3 parts, covering the topics relevant according to their managerial activities. Focusing on the main interests and challenges relevant for this research paper. (see appendix 1)

This research is characterized as a case study. Case studies can be used to study, explain, or characterize occurrences or phenomena in their natural environments. These can assist with understanding the causal relationships and pathways resulting from the creation of new policies or strategies. (Crowe et al., 2011) The central tenet being the need to explore an event or phenomenon in depth and in its natural context. Unlike experimental designs, which aim to test a certain theory by purposefully altering the environment(Crowe et al., 2011). Using a case study is justified in this instance while we intend to gain a deeper understanding as it comes to the purchasing problematics during covid within permanent care institutions. This by doing research on a limited amount subjects for not having the capacity of a more extensive research form. Nevertheless, the right knowledge will be acquired with this methodology. Using the available resources to full extend.

Case study research designs are used in many fields, including psychology, sociology, education, and business. There are various research designs possible. Starting with single-case design: This is the simplest form of case study design, which involves studying a single individual, organization, or event in detail. Then there is multiple-case design: This design involves studying multiple cases in order to identify common themes or patterns. For example, a sociologist may study several different communities to better understand the factors that contribute to their well-being. Longitudinal design involves studying a single case over a period of time, often years or decades.(Hua & David, 2008) Comparative design involves comparing two or more cases to identify similarities and differences. Comparing for example two companies in the same industry to determine what factors contribute to their success. Lastly, there is exploratory design which involves exploring a new area of research or a topic that has not been well-studied. (McPhee, 1990)

This research can therefore be identified as multiple case design. Performing interviews within multiple organizations with multiple individuals in order to identify common trends. Ultimately creating a solid base for well-funded results.

Within this research there will be worked with one chosen elderly institutions. Located in the Netherlands and preferably of a larger size. An organization that has a larger span as it comes to locations. This organization was chosen, as a more effective analysis could be performed, having more ample reach. It could allow creating a more diversified portfolio of locations/circumstances. Interviews were performed within this company with one purchasing managers, one crisis manager and additionally a physician. Additionally, one purchasing manager and one relational manager of an umbrella purchasing organization (GPO) were interviewed who focus purely on procurement of permanent healthcare institution in the Netherlands. This will contain both a relation manager as a sales manager. To get an effective picture of the challenges that raised during covid as it comes to supply chain resilience. At last, an interview was performed with a salesman of a highly committed supplier who was closely linked during the covid pandemic. This to get a fully formed picture as a base for effective research. The choosing of these specific businesses was mainly based on the interlinkage of them. They work partially together and

form a large span across the Netherlands, one being placed in the north of the Netherlands, while the other two are based in the east. Identifying the right interviewees was purely done by choosing the relevant managers who effectively worked hands on tackling these problematics. As a summary, a total of 6 persons was interviewed within this research. See table:

	Job	Company
1	Head purchaser	Health institution 1
2	Crisis manager	Health institution 1
3	Practitioner	Health institution 1
4	Purchaser	GPO
5	Relation manager	GPO
6	Salesman	Supplier

All of the interviews were recorded with the participants' consent and stored safely. The interviews are then partially written down and examined. The transcripts required to be coded and arranged in order to evaluate the qualitative data. This will be accomplished using a two-step coding procedure that included both axial and open coding (Turner, 2022). In the beginning, general open codes are linked to the parts of text snippets from various interviewees. These open codes are then compared and integrated to create axial, overarching codes. The primary categories employed in this study will be the result of this. Coding was done by hand while no additional software was needed to perform an analysis.

4. RESULTS

4.1 Theme: Supplying problems for PPE's during the COVID pandemic

4.1.1 Characteristics of the healthcare organizations researched

Within this research, interviews were performed at in total three organizations active within Dutch healthcare. Consisting of one permanent care institutions focused on elderly care called healthcare institution 1. It has around 3000 employees, with self-regulated purchasing process. Meaning that they have internal purchasers actively mediating with active suppliers. They have collaborations with an external purchasing advisor, which is focused on healthcare purchasing. Additionally they started collaborations with the GPO after the first heat of covid, which gives them extra resources for an optimal purchasing process. During the crisis 3 purchasers, partly involved with crisis team, were responsible for incoming supply streams. With the main purchaser being interviewed within this research.

Additionally, a GPO located in Overijssel was interviewed. Working with around fifty healthcare institutions, spread through the entirety of the Netherlands. Their activities are mainly managed by both the purchasing manager and the relationship manager. Aided by a group of highly experienced directors, giving additional advice for general decisions.

Finally, an interview was taken at a well performing supplier active in among other things PPE's. This supplier is also located in Overijssel.

4.1.2 Healthcare institution 1

Starting with the healthcare institution 1, which can be seen as a successful institution covering multiple locations. Around 3000 people are currently active as employee which makes it one of the larger permanent health institutions in the country. The purchasing function is led by one head of purchasing, assisted by location managers who make sure the right number of products are proactively ordered. Before the crisis, this process was being assessed as solid and reliable. It was able to withstand the challenges thrown at it throughout the chain. The healthcare institution 1 has a healthy supply base to cover the business challenging needs. The covid crisis has put extreme pressure on the incoming supply chain, letting the demand of certain products, such as PPEs needed for virus protection skyrocket. Supplies needed to safely provide the care needed for this fragile group of clients. The same challenges were thrown at the interviewed GPO which is currently also actively working with the healthcare institution 1. Having talked with an active purchasing manager, supported by a relations manager who manages the internal purchasing and relational activities. They are supported by a general commission build up out of people actively engaged within the healthcare sector, having experience to support the GPO with its challenges and opportunities.

Central hubs were created by the government to give aid to different institutions that were troubled by shortages. It came as a challenge to effectively distribute these large quantities to the right institutions. Communication and transparency were factors that acted short and therefor caused a difficult, sometimes unpredictable situation. Story was that specific values that were used as an indication of need, beds and patients for example, were inaccurately communicated and/or noted by these central hubs. Causing inadequate numbers of supplies to be transferred. These central hubs were managed by national suppliers of these essential goods, being PPE's and sanitizers. For example, central hub 1, a supplier was assigned to alternate a part of their capacity into a central hub, monitored by the government. Even though these systems were being presented as a (partial) solution, circumstances caused a large part of these depended on institutions to take matters into their own hands. Focusing mainly on the more critical healthcare, being hospitals including their intensive care activities. Having this competition caused a magnified imbalance and therefore shortage towards the permanent healthcare institutions.

Not only was there shortage of adequate PPE supplies, but a general misconception was being created due to a lack of adequate information availability as it comes to the regulatory circumstances with these materials. Unknown

for purchasing managers was whether certain available supplies on the market were fitted for use if the intention was to follow national laws. This is regulated from out the EU and expected to be tight and clear. Rules are set regarding product requirements, rules regarding the manufacturer, including CE markings. Within such tight circumstances for managers, missing these extra supply buffers due to such uncertainties had a negative effect on supply chains strengths. Active research and collaboration with other institutions was needed to bypass these challenges, which took time and was therefore unfortunately delayed post the initial crisis of the beginning 3 to 4 months.

As earlier mentioned, an imbalance was created as it comes to supply aid towards both hospitals and long-term health institutions. At the same time a disbalance in preparedness could be identified between these two sectors according to the interviews. Looking at the internal structure and their different functions, a difference in usage of these apparent PPE's shows some excessive differences. Hospitals having a far more extensive use of these protection supplies compared to permanent health before the corona crisis. It is essential when confronting such challenges that the supply infrastructure is in order. This including the storage and its management. Having the sufficient supply lines that help saturating the locations and personnel in need of these supplies. Additionally, hospitals are legally required to be in possession of a crisis department. Something that made the creation and installation of such a department purely a task for permanent health managers in the start of this crisis. Not only supply channels, but also the adaptability of personal gives aid to a more fluent adaption conform these critical circumstances. Creating arrangements from scratch would prove to be extra challenging for the healthcare institution. Consequence was that healthcare institution 1 had to actively engage crisis management, which was expanded and prioritized by upper management.

4.1.3 GPO

According to managers at the GPO, the majority of institutions with which they had contact or interaction with during these challenging times were focused on their own interest. Understandable for most people, but in often cases highly disruptive for a more effective PPE supply chain. Un-health related businesses and external PPE suppliers were often not collaborative at a sufficient level. Taking disadvantages of market balances was not out of the ordinary. According to purchasers at the GPO, one of the organizations that was interviewed, there were multiple cases of so-called "cowboys'' that had the intention of selling fluctuating amount for higher prices than considered regular. These cowboys can be identified as suppliers of short notice, being both people and organizations that force themselves through the existing market with the help of extreme demand shifts. Problem often was that quality and delivery certainty were non consistent, which caused purchasing managers to avoid these instances. The locations interviewed within this research were having an effective base of supply, while being part of a larger purchasing group and having these solid suppliers at hand.

4.1.4 Supplier

The interviewed supplier was mainly struggling with gaining contact with sufficient new suppliers, whilst trying to get sufficient streams of PPE supplies from both new and existing parties. Having to outcompete other buyers in newly formed circumstances formed due to covid. It was mentioned that different selling practices were apparent in some forms, for example direct buying from port. Not relevant for this research, but showing the real intensity of the situation. Circumstances that were not interfering with the functioning of this supplier. They were able to maintain a mostly consistent stream with their existing client base.

4.2 Theme: Supply solutions for PPEs shortages

From within permanent health institutions, it not only became a number one priority to serve the right quality of care, but also to pursue a healthy supply chain within the whole spectrum of their services. To have the adequate incoming streams of products it was key to both seek out help effectively within the governmental aid hubs like ROAZ or LCH and effectively search for an expansion of their current supplier base. These organizations had to make sure that both incoming streams of for instance PPEs are optimized and further distribution of such is handled with care and organized accordingly. What became apparent was that these institutions created additional taskforces during these problematic times. Meaning that personnel was set towards fully focusing on for instance settling agreements with central hubs for these PPE's. Deliveries from out these hubs could be called moderately and it was therefor of upmost importance that someone tried to achieve maximum results from these hubs. Especially at the start of the corona crisis it was essential that these activities were coordinated. Previous of the crisis, the situation regarding the storage and acquirement was different in comparison to that after the start of the covid crisis. Purchasing was often mainly managed decentral. Meaning that in an organization like the researched healthcare institution, one of the interviewed businesses, individual locations placed under the healthcare institution 1's management cared for local storage fillings. This making the process a lot more complicated caused it to be altered when the corona crisis announced its arrival. Making sure that there was centralized storing of essential products needed for the containment of covid, including PPE's. Creating a more proactive form of **inventory management**. Additionally, also purchasing was more centralized to make sure that the right decisions were made regarding the distribution to the locations. This was partly needed to make sure the right locations were able to acquire the right amounts. When demands fluctuate per location and the products are scarce, it is very important to manage this efficiently. By centralizing this process more towards central management, the process was minimalized into a more manageable form.

Fact was that extra supply streams were necessary to create a sufficient stream of PPE supplies. Having an exploding request of these items during the start of the pandemic created an extreme imbalance of availability and demand. The existing supply base which settled by the healthcare institution 1, which was considered full reliable, was in the heat of the pandemic unable to fully fulfill the demands of PPE needed for the healthcare institution 1's functioning. Task was for the appointed management team to locate additional opportunities as it comes to expanding the supplier base, existing out of both active healthcare supply providers and nonmedical businesses. Within the healthcare institution, these shortages were managed effective enough through both the expansion of supplier base and the intensification of existing collaborations that that the quality of care for their clients was not compromised in extreme forms. This intensification was done by collaborations with higher frequencies. Health institution 1 was engaged with purchasing advisors during the covid period. There were collaborations with a GPO only after the critical phase of covid. They had contact directly with their suppliers for PPE's and were partially advised by an external organization. The main activities to phase the main challenges formed during covid were controlled from out its own management.

The first opportunities that raised within the starting phase of the pandemic were local non health providers that were able to give assistance as it comes to PPE supply. For instance, mentioned by the head of purchasing at the healthcare institution 1, a local shipyard business that was possessing a large quantity of masked also applicable for use within healthcare. Of course, such an initiative was being embraced by healthcare institution 1. It was task for management to identify these businesses in the region. According to one of the interviewees of the healthcare institution 1, at the start of the pandemic more than 60% of incoming supplies of PPE from the non-medical businesses was disposed. This because of not meeting the standards accustomed to this branch of health. While their demand of such supplies was plummeting, the demand within the healthcare institutions grow vastly. Coming up with helpful agreements was the right thing to pursue for both parties. According to interviewees from healthcare institution 1 there were many instances in which such aid was given which helped to ease the situation fractionally.

Besides these developments as it comes to acquiring additional local supplies from non-medical business, focusing on additional supply from professional medical suppliers was showing to be of even more help. Both healthcare institution 1 and the GPO spoken with stated that they did not have a large portfolio as it comes to suppliers. According to the GPO, 2 suppliers were held under normal circumstances before covid. Of course, they had more suppliers, but these two were the ones focused on the supply of PPE. One of these suppliers was interviewed for this research. Calling it the main supplier from now on. The main supplier can be seen as supplier actively engaged with customers throughout the Netherlands. Serving the GPO and the healthcare institution 1. Having transparent and loyal suppliers was for most Dutch institutions a normal circumstance, while during the covid pandemic these relations were challenged. Having talked with one of the suppliers active in the Netherlands working not only with PPEs, but with a wide array of cleaning supplies, it became clear that even for such highly experienced businesses it was not always possible to prioritize every customer. Creating a situation that not every supplier was able to fully deliver. The focus of the supplier spoken with within this research was promptly aiding their long-lasting customers before helping their newly acquired counterparts. The situation demanded a more precise approach towards such an expansion. Not wanting to get seated on the table with as earlier mentioned ''cowboys''.

When looking at this form of extensions of the supply base, a strategy can be identified. Trying to find additional supply sources to make sure deficiencies can be buffered out can be called **''multisourcing''**. It was deemed essential to maintain a sufficient stream of goods during the starting phases of the Covid pandemic. Also **supplier diversity** can be identified. Institutions interviewed within this research try to gain different collaboration with a variety of suppliers to create a more resilient supplier base.

While normal circumstances enable health institution one with one main supplier for specific items. Covid forced the company to invest in finding more available suppliers who could be able to facilitate extra incoming supply streams. Multi sourcing makes sure that certain risks are spread out over a larger number of participating suppliers. Often creating a buffer as it comes to supplies. When one is failing, flows can be taken over by additional suppliers to make sure healthcare institution 1 is able to receive enough supplies to support their day to day activities and sustain their inventory.

Lastly it was essential to intensify existing relationships with suppliers to make sure that in such instances as mentioned previously, as an institution you are prioritized as a customer. All the interviewees spoken with were clear about the fact that their focus was mainly centered at coordinating and collaborating with their existing suppliers. Active engagement with for instance the main supplier for both healthcare institution 1 and the GPO was seen of high importance. It showed to be important to have intensive communication with these suppliers to be better prepared for great fluctuations as it comes to the critical circumstances. When there is close collaboration, thoughts can be shared as it comes to both supply planning's and more diversified dynamics within the distribution of these essential PPE's. Certain initiatives could be pressurized more intensively by healthcare institutions, both hospitals and long-term.

It became in any case clear that priorities from purchasing management altered during the crisis as it comes to supplier collaboration. Focusing on pricing was something that was almost fully diminished. Focusing more on a deeper level of collaboration and in that way trying to potentially create a steadier flow of goods. Because there was a definite power shift within such business relations, contracts tended to be more long-term instead of heaving

continuously altering trade relations. A healthy partnership with a supplier can be identified as one that is being actively preserved by both sides, in which thoughts and interests are shared and so new initiatives are taken for the interest of both parties. Such a healthy partnership was identified and/or created by purchasing managers within both healthcare institution 1 and the GPO, their main priority was preserving the relationship for continuing their trade deals. Preserving and possibly extending the trading portfolio became essential. Demands from out healthcare institutions like healthcare institution 1 became thinner, helping to preserve their portfolio. Activities belonging within the **supplier optimization strategies**. Not only being of importance during healthy market times, but of even more importance during Covid like crises. To maintain a healthy flow of incoming supplies from these existing suppliers, communication and coexisting development can have massive impact on the successes at both sides.

4.3. Theme: Collaborations between multiple branches of healthcare and beyond

Before the covid period presented itself, extensive forms of collaboration between healthcare institution 1 and other permanent healthcare institutions in the same region were not present numerously. Covid had an effect on the intensity of collaboration present between institutions both locally and nationally. It can be seen as an extra measure to strengthen a business position not only in the supply market. Also, knowledge can be shared between them which can create additional value, strength and persistence. All values needed to outperform rivals or in this particular situation, make sure that the healthcare system we know in the Netherlands is continued. Even during such a calamity as which the covid crisis can be identified.

Multiple activities could be identified when interviewing multiple employees of not only healthcare institution 1, but also the GPO interviewed within this research. Only collaborating after the main period of the covid crisis. Still sharing their knowledge and services currently. Actions of goodwill could firstly be identified. Initiatives of resource sharing were apparent during that period, which helped different locations and institutions to support one another. According to multiple employees, certain initiatives tend to be deemed functional on a bigger spectrum. Not only products can be a part of such an extension. Also, knowledge and services could be bundled in future periods to smoothen out the processes within these long-term institutions. Such activities could be brought also to periods when markets and health related circumstances are more stable. Activities could be identified as a **supply chain collaboration strategy.**

Mentioned interviews at healthcare institution 1 entailed that collaboration between permanent health and hospitals on the other hand was lacking even though there were intentions from permanent institutions including healthcare institution 1 to actively initiate such collaborations. There was need for additional knowledge and resource sharing that could be beneficial for both sectors. Obstructions were mostly that situations between these sectors were somewhat diversified. Hospitals being better prepared in a way, but at the same time feeling the extreme pressure of their ICU departments. The purchasing department of healthcare institution 1 had to make sure that powers were bundled between different business entities and at the same time create an isolated supply stream which is diversified and resilient. Creating both strong partnerships with suppliers and other health providers.

Within the interview of an practitioner of healthcare institution 1 it was mentioned that internally there were struggles as it come to collaboration. Having to share the central resource pool within the company some tensions existed when it comes to the distribution of these supplies. Initiatives were created to intermediate within these relations making sure interests of all personal was taken into consideration and interactions within the company were performed more smoothly.

Besides these interactive collaborations on ‘’horizontal’’ levels, additional cooperation’s are proving their value during the covid crisis. Interviews, as earlier mentioned, were also done at a Dutch GPO based in the east of the Netherlands. They provide a secure and bundled purchasing organ for a wide array of healthcare providers. Intentions being to actively incorporate business deals with multiple well-known suppliers active within the healthcare industry. The GPO’s activities can be stated as having continuous negotiations and further communication with both the supply part as the demand part. Intermediating between those two sides and therefore intensifying these collaborations whilst making them more efficient and therefore more fruitful. With the help of multiple professional purchasers backed up by well-formed board of directors, the GPO is able to provide stability and certainty for both hospitals and permanent healthcare providers. Such structures proved most useful during covid times, as their main function became to seize a more powerful position within the market. Because they buy in larger quantities due to bundled supply deals and because they have far reached connections with a wide array of suppliers, they obtain a strong position within these critical markets.

4.4. Creating a better functioning supply chain through software improvements

A red line can be identified as it comes to the wide array of strategy implementations during these covid times by permanent healthcare institutions. The intentions of these purchasing managers are to create a healthy supply flow. One that is reliable and therefore resilient. Having the right number of suppliers which are all able to perform accordingly and having a healthy communication flow with these businesses. Additionally performing well in the identification of needs, collection and distribution of these incoming supply streams. Healthy enough that internal activities with both their own employees as their clients can effectively take place and will not be limited due to

supply constraints. Within the pandemic the main goal was to assure the safety of both practitioner and clientele. Effective management in that way preserves or at least try to preserve continuity of care. This specific process was emphasized in multiple occasions by the different managers.

A factor that aided the process of better procurement was the introduction of improved software within the ordering process. Adding a more aligned ordering system that gives a more direct link from buyer to supplier. Giving a more agile and custom supply stream adding additional insights as it comes to the requirement of supplies between the different involved locations. It was mentioned that during the crisis there were initiatives from healthcare institution 1' suppliers regarding the improvements of ordering software. These activities were mainly apparent with the central hub 1 as earlier mentioned within this research. Because of implications created by the separations of the governmental central hub for PPE hub, it was deemed necessary to make improvements within their software package. These were improvements of the ordering system. It was within these crisis times hard to keep track of stocks and distributions of these essential PPE's. By upgrading this purchasing software, which was mainly improving the accessibility for the customers, a better performance of the supply stream could be acquired. Initiatives were picked up by management of the GPO and healthcare institution 1 which gave them enough reason to integrate these systems into their own process. Collaborations after the first heat of the covid crisis were made for continues improvements within the purchasing organ of healthcare institution 1. Creating a director line in collaboration with healthcare institution 1's main supplier created a more reliable and resilient system. It was done by giving direct access from all locations for the purchasing and distribution of essential goods. Giving the workers direct access to the purchasing system will give a much clearer picture off the actual needs within these specific parts of healthcare institution 1. Only small steps were taken during the heat of the covid crisis. These intentions were put through to initiate a more sophisticated system to ultimately make the purchasing process of healthcare institution 1 more sophisticated and more resistant against challenging periods like covid created.

These developments with the initial goal of making the supply chain more resilient can be seen as a strategy form of **total quality management (TQM)**. It being part of optimizing the full functioning of such an institution. Steering towards a higher level of satisfaction among clients. Even though full developments were not put through during the heat of the covid crisis, these measures will give a boost for the chain's resilience in upcoming times.

These new systems can offer multiple benefits. When integrated within the already active system, specific trends or bottlenecks could be identified more easily. Making the purchasing part of these organizations more durable against opposed challenges. Having endured the past covid period has given all parts of these health institutions the right amount of experience to support grounding changes through currently active processes. Taking these experiences and using them for example for the optimalisation and use of these software package could prove useful. While it has already given aid in a smaller form during the covid crisis, making it a relevant point of interest.

5. Discussion

Performing the interviews for this research and transforming these into the textual results showed that the challenges created by covid demanded action on multiple facets within these companies. Despite this fact, it can be said that the possibilities within these management themes were limited. Broadly speaking, the main opportunities acted upon were in the lines of expanding or optimizing their supply base. Being focused on the preservation of the companies incoming supply stream. Making sure the company's activities would not be altered due to a shortcoming from purchasing.

Performing these interviews in an open manner made sure that all potentially relevant information was being collected. Covering a wide span of job description gave a higher chance of collecting the relevant information needed for this research. Same goes for the fact that research was done not only within one single health care provider, but additionally within a GPO which works with a large number of such institutions. Creating a wider coverage within this specific sector. Also covering the supplier part within the relevant supply chain gave us useful information regarding the relationships created or ended during the covid crisis. Having used the adequate form of sources on an academic level of analysis makes this paper a valued piece of research as it comes to validity and reliability.

According to (Bode et al., 2011), the Resource Dependency theory clearly shows the important points relevant during supply chain disruptions. It could be seen that with healthcare institution 1, there were limitations within its reach and therefor capacity to adapt to sudden changes in demand. It can be concluded that the shortages of resources caused not only healthcare institution 1 to become potentially limited in their day to day activities. According to the theory no organization is self-sufficient in that sense and should collaborate actively with other entities. As goes for the existing collaborations with the GPO and the additional purchasing advisor. Creating relationships with other organizations for extra resources, spanning from PPE supplies to human resources according to Bode et al. (2011).

Being the initiator of this research paper, the potential strategy gap between hospitals and permanent health is created by some specific differences as it comes to preparedness and possible prioritization as it comes governmental aid. Literature used within this paper (Spieske et al., 2022; Tip et al., 2021; Zamiela et al., 2022) is almost fully based on the research of hospital institutions. Having identified the main differences between these two types of institutions gives enough reason to see these points identified within the literature

review also applicable towards permanent healthcare institutions. Hospitals are mainly differentiated through the intensity of certain factors, like overall risks linked to underperformance and the intensity of shortages during the covid period.

During the concluded interviews it became clear that the covid period formed a challenging period for both suppliers and health institutions. All businesses spoken to had intentions to use all their capabilities to sustain a healthy supply chain of which resilience was sufficient to withstand these challenges. At the same time, it became clear that the list of effective measures was rather thin. Being highly dependent on the existing market and being confronted with intensified shortages throughout the whole chain.

The existing literature written about supply chain activities within the medical sector both during covid and in normalized circumstances before the pandemic (Klasa et al., 2018; Tip et al., 2021) give a great inside in the existing challenges and points of attention that form the full process of supply chain. A wide array of data has already been collected and show that even though healthcare supply chains mostly overlap with supply chains in other industries extra caution is adequate within its supervision. Not only because of the vulnerability of the sector itself when it comes to the effects of certain distortion, but also the chances of it becoming a whole different market due to covid like calamities.

The results collected with the interviews gave a great insight in the specific challenges faced by these institutions. Having cleared a big part of available literature regarding this topic, specific expectations were formed. Besides the definitions identified within the literature chapter, it was being concluded that the health sector, again, can be seen as a sector with specific needs and vulnerabilities. Interviews showed that within the short time frame, purchasing managers from both healthcare institutions itself as suppliers were forced to take intensive measures to keep its supply chain afloat. Making sure the needs of the clients could be satisfied, which in this instance could be directly linked to survival rates within these institutions. Measures taken by supply managers had the main goal to create supply chain resilience as mentioned within Zamiela et al. (2022).

When looking at the strategies identified within the literature review, a specific list of choices could be identified. These were all taken from papers focused on purchasing activities of hospitals. As earlier mentioned within this paper, there are factors differentiated both permanent care and hospitals. Mainly identified within the readiness of the institutions, because internal structures are different between them. Additionally, governmental aid programs were deemed unbalanced between these two. Settling a priority was being enforced during the crisis, even though both sectors were in grave distress.

As expected through the papers of Spieske et al. (2022), a few essential strategic activities could be identified throughout the interview results. The healthcare institution was forced during the covid crisis to pool their resources within their locational structure to make sure distribution was done collectively and efficient. Because of the distress caused by covid and the pressure not only healthcare supply chains endured it was deemed necessary to pool the essential resources to create enough offers for all locations. Additionally creating more visibility within these supply levels to participate more effectively within the harshly created market. Besides this, active collaboration with governmental aid systems was fully implemented by both healthcare institution 1 and the GPO.

Active leveraging existing partnerships whilst trying to expand the existing supply base were strategies applied according to Spieske et al. (2022) by researched hospitals. These were implemented accordingly within the interviewed institutions. It was seen as a key activity to perform high level supply base management. Because the market was certainly hostile, an intensified form of management had to be applied to create intensive information streams with suppliers and a boost of potential new partners. High demands and low offerings from out these markets created a scenario in which expansion was not out of the question. At the same time no extreme efforts were made to purchase directly from vendors higher on the supply chain. Whilst Spieske et al. (2022) and Peters et al. (2023) identified such activities within hospitals, no such thing was performed by both health institution 1 and the GPO. Of course, the main supplier interviewed within this research was having further reach within this market and performed excessive reaches towards manufacturing lines.

According to Tip et al. (2021), as an addition to previously identified stock pooling activities, software improvements for both getting insight on stocks as having direct lines with suppliers were introduced during the covid pandemic. Interviewees from healthcare institution 1 explained that software packages were integrated, mostly after the initial hit of the crisis. It was seen necessary to make improvements within these supply chain elements to create better efficiency within these processes. The covid period exposed certain bottlenecks in this instance. Expanding on the expansion of supply bases, interviewed institutions were able to seek expansions out of the boundaries of healthcare markets with the help of non-healthcare related business. Covenant to the findings of Tip et al. (2021), these activities were forced within the existing supplier management activities to introduce new opportunities needed to fulfill the supply needs of its daily activities.

Incoherent with the paper of Tip et al. (2021), which identified alternations within the specifications of product of which in high demand during covid, no actions of such were mentioned by the interviewees within this research. It being claimed that regulatory restrictions and overall capabilities of these institutions were compromising such intentions. Fact is that the majority of products mentioned within the research of Tip et al. (2021) are the kind that are less regulated. Non protective equipment's that were not required to be conform these restrictions. These requirements were not mentioned within the interview, while the institution in question was mainly focused on protective equipment. Nevertheless, it was stated that for instance masks were additionally altered to fill in the

missing supply gaps. An activity not spoken of within health institution 1.

Additionally, Tip et al. (2021) included within his research that intensified collaboration was needed and therefore provided mainly in the starting phase of the covid pandemic. When comparing this with our research, which is focused on permanent health, it can be said that both sectors were actively engaged with such activities. It was stated within the interviews that, because tensions were high, a form of competition arose in this starting phase of the pandemic. A process that continued its way through a longer period. Something that was apparent also for these researched hospitals. Whilst this collaboration within each sector was at reach, lines put across those boundaries were thin whilst hospitals and permanent were both focused on their own problems and challenges.

As it comes to internal collaborations between personal and different departments within healthcare institution 1, similarities can be identified between them and the researched hospitals within Tip et al. (2021). Being that internal collaborations intensified during the start of the covid period. With the goal of creating a better distribution of supplies, making sure operations were performed more smoothly. At the same time there were tensions between departments as it comes to the distributions of these PPE's. Something that was actively mediated by top management to make sure collaborations were kept fully towards the interest of the company as a whole.

Comparing these strategic activities between both hospital and permanent health supply chains shows that the available options within these sectors tend to lie parallel. Trying to outperform competitors by having a bigger reach within the market and taking all the measures to maintain a resilient supply flow. It was expected from out the existing literature and having a valued amount of knowledge out of studies as a student that a purchasing organ within such institutions is fairly limited in its actions. Available strategies applied during the covid period were strictly focused on maintaining its resilience.

Fact is that within this research a clear picture is created for the strategic decisions within permanent health during the covid period. Decisive amounts of information already being available regarding the strategies of hospitals. The results have shown that even though permanent health was seen as less prioritized by governmental aid, the circumstances created a situation in which purchasing managers had to be creative. Drawing beyond the regular lines of management to make sure the highly needed supply was obtained. It can be said that hospital procurement spanned a bit further within the market than that of healthcare institution 1's direct activities. While the GPO in real small quantities and their main supplier had direct links with Asian regions during the buying process. They were not directly engaged in such while hospitals tended to reach that far.

As stated within the results, hospitals had more preparedness due to the fact that they had had settled active crisis management teams before the covid period (Zorgkrant, 2022), while permanent health was forced to put out these new branches within upper management to make sure the challenged faced were handled with care and full responsibility. It is a point of interest that between these two branches of healthcare there is a difference between the installed management handled before the crisis and therefor being able to adapt differently. Whilst hospitals challenges ought to be also more intensive looking at their role during the crisis and the overall care they provide. The intensity of the overall challenges must not be underestimated.

As mentioned by Chamola et al. (2020), it was made clear during the interviews that the vulnerabilities of the healthcare supply chain were left exposed. It could be identified that the Netherlands struggled to fully absorb the blows covid forced upon the market. Struggling to set up a new system with the central supply hubs to give aid towards all the Dutch organizations. Menezes et al. (2022) adding that the situation forced workers internally in such institutions to make an hasty attempt collecting the right amount of materials during the heat of the covid period. Something that was also identified within healthcare institution 1.

The parts researched within the contextualization part of this paper aimed to form a theoretical base for this research. Having identified the situation around the specificity of the healthcare sector as a sector. Creating an idea of how the Dutch healthcare is build up practically. While most part of the discussion was focused on the comparing both hospital sector as permanent sector, substantial overlapping was identified. Something that was expected from the researcher's part while even though the initial structure of hospital differs significantly, they have to force the same products from out the same hostile markets towards their locations. Introducing as a red line the same major challenges for upper management.

Within this research, interviews were taken from 3 individual organizations. One supplier, one GPO, and a permanent health institution. It was chosen with the idea that heaving such a wide range of entities within the healthcare supply chain, more critical points of interests could be identified. Whilst these organizations are in active collaboration with each other, additional strategic links could be identified. On the other hand, it must be said that by only having researched one active healthcare institution, a possible distorted outcome could be seen as it comes to the national picture. The GPO spoken to, which is actively engaged within the purchasing process of not only healthcare institution 1 and numerous other institutions, showed us the same trend of strategic activities parallel with the actions taken by healthcare institution 1 during covid. Having this extra coverage within this research paper compensates with the potential quantity shortage as earlier mentioned.

6. Conclusion

This research was focused to the strategic choices of procurement within the permanent healthcare sector. Trying to identify the problems and measures taken by these managers within a period that created a very harsh

market environment, backed up by an extreme form of performance risk. A healthy inflow of PPE supply was needed to make sure healthy circumstances were maintained for both workers and clients which was often directly linked to live and death for the weakest among them. It being therefor of high interest to research the way upper management reacted to the circumstances and in which way challenges thrown at them were tackled by strategy implementations.

It became clear during the interviews that a multifold of strategies could be identified as being applied during the covid period by long-term health institutions as it comes to purchasing . Summed up as active collaboration on horizontal levels, supplier management/optimization and multisourcing from both suppliers as non-supply businesses. It can be said that the overall scheme of actions taken by upper management were created by the utilization of all available options for more supply resilience creation. While incoming supply streams from aid programs governed by the government were not fulfilling enough to satisfy the needs within all parts of the Dutch healthcare. It being concluded within this research that external aid was distributed non accordingly between different branches of Dutch healthcare. Permanent health needed extra strategic measures to maintain a steady supply flow.

While this research has given an overview of active choices by the institutions interviewed, specific statements can be made as it comes to the adaptability and capabilities in terms of future calamities. While situations turned grim during the covid period it must be said that managers were able to fulfill the needs during these times almost always satisfactory. Creating non-major disruptions within its functioning making sure clients were protected on sufficient levels. Of course, virus outbreaks within not only health institution 1, but also other businesses in the same sector could not fully be contained. While this was out of the hands of purchasing managers. A major theme that arised evidently during the interviews is that these institutions learned a lot from this crisis. While circumstances like these have not occurred in recent periods, it can be said that managers were forced to use their full potential. Mistakes were of course made by upper management, mainly in the further distribution of supplies, but these mistakes can and will be translated into new policies. By analyzing these implications, getting clear what actions could have been done better or different. A clear insight could be created in such a form enabling effective communication with all levels of the company. Making the internal full supply chain process more resilient in future challenges. The main goal being the continuously increase of supply chain resilience. For starters upper the potential capacity within the whole line to make sure an increase can be handled accordingly. This can both be applied within the distribution and storage while also within supplier management. Making sure that the connection span and the thereby belonging collaboration and exchanges are actively maintained and expanded where needed. Maybe these actions are not relevant today, but future scenarios give all the reasons to stay vigilant towards such extremes.

Linked with the supply resilience goal as a whole, managers spoke about care continuity. Both resilience and the continuity of the chain are goals to maintain and strategically support. Additionally, policy plans are or will be written within these institutions, gathering the knowledge gained and translating it into a solid policy plan. Acting timely and actively gathering the right information relevant to this business to make sure actions could be taken to be prepared for challenges also within the relevant markets. As mentioned before, making sure that the linkage between upper management and different locations is thinner overall. Making the distribution and connected planning more effective and efficient. Something that caused some bottlenecks in the covid period within multiple institutions. A more proactive form of management is needed in which more information is integrated and kept up. Information on locational level which means individual subparts of such institutions is taken into consideration. Giving customized management fitting to the subparts of the company . Build up from out centralized policies and management. Making it both resilient for both external as internal fluctuations. Being able to react more quickly to these signals and learn from the mistakes made within the adaption process.

Conclusively, it is interesting having discovered that over the whole span of Dutch healthcare, mistakes were made and shortages were created from out the centralized PPE distribution organized by the government. Both hospitals and permanent health had problems despite the existing aid programs. Additionally, concluding that despite the different kind of health programs, hospitals and permanent health lie mostly parallel in their actions. While internal infrastructure and precise resource needs will not be fully corresponding. The choices made are fully focused on utilizing the possibilities within the difficult setting Covid-19 proposed. Spanning from both internal optimizations towards trying to efficiently managed external markets and partners vital towards the companies incoming supplies.

Within future research, more can be emphasized on the precise care continuity plan. Specific consecutive actions that can be undertaken in the heat of a next pandemic or global crisis. One that will have intensive impact on the working medical supply chain of not only PPE’s. Adding potential insights towards more efficient collaborations between the different healthcare branches in the Netherlands. Making not only permanent healthcare more resilient, but create an overall stronger healthcare service enabling good care for all potential patients.

7. Limitations

Limitations in this research mainly lie within the buildup of interviews. Not having an extensive reach within the active Dutch healthcare. Whilst having additional interviews with other institutions and also involving hospitals, a stronger literature bases could be acquired. Expectations are that even though interviewed numbers were limited, a solid picture has been sketched within this research as it comes to strategic supply chain related activities performed by permanent health during covid

times. Potential expansions content wise are mentioned in the discussion.

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Appendix 1: interview guideline

Background

1. What are your positions and duties within your company?

2. How long have you been employed

a. …in activities related to supply chain management?

b. …with your current company?

Challenges

3. When and how did you first recognize the COVID-19 problem as being a threat to your organization, particularly with relation to the availability of supplies?

5. During the COVID-19 crisis, what were the primary difficulties your organization's supply chain, and in particular your procurement function, faced?

6. How did these difficulties impact your interactions, hierarchies, and interdependencies with your suppliers and clients?

7. What functioned the government in such regard? How did the actions of these actors influence your ability to obtain or distribute medical supplies connected to COVID-19?

Tools to improve

8. What did your company do to resolve the difficulties mentioned earlier and guarantee the availability of medical goods relevant to COVID-19, for example, how did your procurement strategy change?

b. What adjustments did you make to the way you coordinated with your current exchange partners?

c. How much did you work with fresh exchange partners?

d. How did you coordinate with public agencies and governments?

9. What additional steps do you intend to take in the next months to guarantee the availability of medical supplies?

10. What structural adjustments are you preparing for in case a pandemic occurs in the future?

11. How will things change in the future?