Faculty of Social Sciences

MASTERS IN SUPPLY CHAIN MANAGEMENT

Postgraduate Dissertation

Primary Research in Inventory Management of Pharmacies in Greece

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Acknowledgements

Abstract

This study has analyzed the inventory management that privately owned pharmacies perform in Greece. It has focused on the strategic Inventory Management decisions over the last few years in order to witness how the recent pandemic outbreak has affected its supply chain's structure and day to day operations. The study began by providing a general description of Inventory Management principles and then it focused in the complexity and the parameters of the pharmacy's environment. The most fundamental and popular of Inventory Management models were briefly analyzed along with the most essential of Inventory Management Performance indices. The significance of a flexible procurement department was highlighted in terms of coordination and successful management of the supply chain.

For our analysis, the data utilized was collected with the use of two different methods. Firstly, an interview with a pharmacist was held on the grounds of pertinent issues. Based on the discussion, a questionnaire was formed. In addition, the structured questionnaire was handed out to pharmacists and pharmacy employees in order to gather information on Inventory Management and the corresponding distribution network. On the basis of the specific questionnaire, we attempted to comprehend the decision making philosophy and the professionals' interaction with the ongoing social and economic developments. With the help of this method, the inventory management strategies were explored and pertinent data was collected.

Based on this data, we attempted to highlight the point of view of professionals of the sector coming from diverse backgrounds, the decisions they are tasked with making in regard to the frequency and size of orders for each type of product and the degree to which this was affected by the recent pandemic. The corresponding results indicate that the recent socioeconomic developments have deeply affected the decision making process and have severely disrupted the supply chain. They also underline the practical nature and immediacy on which professionals of the sectors operate. As this is an extremely competitive market that is currently heavily reliant on product availability, the application of efficient strategies is essential for such businesses to compete and thrive.

Περίληψη

Στην παρούσα μελέτη, επιχειρούμε να αναλύσουμε την διαχείριση αποθέματος όπως αυτή ασκείται στα ιδιωτικά φαρμακεία ανά την Ελλάδα. Επικεντρωθήκαμε στις στρατηγικές αποφάσεις των εταιριών του κλάδου για την διαχείριση αποθέματος τα τελευταία χρόνια, ώστε να παρατηρήσουμε πως η πρόσφατη πανδημική υγειονομική κρίση επηρέασε την δομή της εφοδιαστικής αλυσίδας της και την ομαλή λειτουργία της. Ξεκινήσαμε περιγράφοντας γενικά την διαχείριση αποθεμάτων σε θεωρητικό επίπεδο και έπειτα επικεντρωθήκαμε στην πολυπλοκότητα και τις παραμέτρους του περιβάλλοντος του φαρμακείου. Αναφέραμε συνοπτικά τα δημοφιλέστερα συστήματα όσον αφορά την διαχείριση αποθεμάτων, και τους τρόπους αξιολόγησης των αποτελεσμάτων από την εφαρμογή τέτοιων συστημάτων διαχείρισης. Υπερτονίσαμε την σημαντικότητα ενός ευέλικτου τμήματος εφοδιασμού όσον αφορά τον συντονισμό ολόκληρης της αλυσίδας ανεφοδιασμού. Για την ανάλυση μας, αντλήσαμε τα δεδομένα μας χρησιμοποιώντας δύο διαφορετικές μεθόδους. Πρώτον, πραγματοποιήθηκε μια συνέντευξη με φαρμακοποιό για την ανάλυση ζητημάτων εφ'όλης της ύλης. Βάσει αυτής της συζήτησης διαμορφώθηκε ένα ερωτηματολόγιο. Δευτερευόντως, επιδώσαμε το δομημένο ερωτηματολόγιο σε φαρμακοποιούς και υπαλλήλους φαρμακείου για να αντλήσουμε πληροφορίες που αφορούν συνολικά την διαχείριση αποθεμάτων και το δίκτυο διανομής. Βάσει του συγκεκριμένου ερωτηματολογίου προσπαθήσαμε να κατανοήσουμε τον τρόπο λήψης αποφάσεων και την αλληλεπίδραση των επαγγελματιών του κλάδου με τις εξελίξεις . Με αυτόν τον τρόπο διερευνήσαμε την εφαρμογή στρατηγικών διαχείρισης αποθεμάτων και συλλέξαμε δεδομένα για την . Με βάση αυτά τα δεδομένα επιχειρήσαμε να εκτιμήσουμε την οπτική γωνία των επαγγελματιών του χώρου οι οποίοι προέρχονται από διαφορετικά υπόβαθρα και τις αποφάσεις που λαμβάνουν σχετικά με την συχνότητα και το μέγεθος των παραγγελιών ανεφοδιασμού κάθε είδους προϊόντος και κατά πόσο αυτά έχουν επηρεαστεί από την πρόσφατη πανδημία. Τα αποτελέσματα μας υποδεικνύουν ότι οι τελευταίες κοινωνικοοικονομικές εξελίξεις έχουν επηρεάσει βαθιά τον τρόπο λήψης αποφάσεων και την δομή της εφοδιαστικής αλυσίδας. Μάς υποδεικνύουν επίσης την πρακτική φύση και την αμεσότητα βάσει του οποίου πορεύονται οι επαγγελματίες του χώρου. Σε μια άκρως ανταγωνιστική αγορά που περιστρέφεται πλέον γύρω από την διαθεσιμότητα η εφαρμογή βέλτιστων στρατηγικών είναι απαραίτητη για την επιβίωση και την κερδοφορία των φαρμακείων.

Λέξεις- Κλειδιά: Διαχείριση Αποθέματος, ιδιωτικά φαρμακεία, Covid-19, διαταραχές εφοδιαστικής αλυσίδας, Ελλάδα, ελλείψεις

Πίνακας περιεχομένων

CHAPTER 1: INTRODUCTION

This study examines the practice of private pharmacies in Greece regarding Inventory Management.

The purpose of the dissertation is to examine the theoretical framework along with the practical implications of this line of work as it is an excellent topic for a study thanks to its timeliness and significance. The case of Greece is an excellent candidate for study due to the percentage of polypharmacy patients, its aging population and number of active businesses in the sector.

The data that was collected for the purposes of this study were obtained using the following methods: the interview with a professional that is actively involved in the field and the handing out of a questionnaire. Firstly, through the extensive conversation that took place a clear picture of the ongoing situation was formed and crucial information regarding the field was provided. Based on the data provided, a questionnaire was formed that included any information required to form conclusions. A follow up was arranged with the pharmacist and a few other pharmacists in order to look over the questionnaire and evaluate whether this reflected and addressed all obstacles faced by professionals of the field and whether certain intricacies were omitted. Upon approval of the concept, the questionnaire was either handed out in- person or forwarded via email. It was addressed to pharmacists, assistant pharmacists as well as pharmacy employees and participants were selected to fit. From the answers collected from participants an analysis was formed on the topic and conclusions were shaped from the findings of the research. Through this data we were able to examine the practical implications of Inventory Management in privately owned pharmacies in Greece by considering each professional's background. (John N.Yfantopoulos, 2018) (www.nbg.gr, 2022)

Certain restrictions that became apparent throughout the study were twofold. The size of the data collected was limited by the size of the sample and in turn by the willingness of the participants to share pertinent information. The other restriction is the timing of the research as this is a snapshot of the ongoing developments during a prolonged period of pandemic related disruptions.

Lastly, a concise explanation of the main points made by each following chapter is provided.

The second chapter shares an introductory insight on Inventory Management fundamentals. In order to comprehend the practical implications of Inventory Management in general and more specifically in the pharmacy environment it is vital to introduce rudimentary terms to the study.

The third chapter highlights the specific details of the pharmacies in Greece and how they are required to operate on multiple levels. It serves the purpose of framing the sector and underlining in what context they are allowed to provide healthcare services to the public, what products and services they should be distributing and the interaction with the entirety of the supply chain.

The fourth chapter deals with the theoretical approach of Inventory Management performance. Through a brief description and definition of pertinent ratios, the most valuable variables of a business' data are highlighted. These ratios could form a basis upon which performance is based.

The fifth chapter underlines the distinct circumstances that surround the Covid-19 pandemic. Firstly, the global events that transpired are highlighted, followed by certain by the pandemic's aftermath in Greece.

As a primary healthcare provider, pharmacies were tasked with added responsibilities and were clearly and severely affected by the pandemic.

The sixth chapter divulges into more detail regarding the methodology. The process is described in more depth and the reasoning behind each choice is provided. Every step of the process from forming the questionnaire to handing it out, to collecting the answers is highlighted.

The seventh chapter focuses on the findings of the research and how they are interpreted. By analyzing each group of questions , the philosophy behind it and the responses from the research that was conducted certain conclusions can be reached.

The eighth and final chapter presents the conclusions formed that are based on the research that was conducted. Limitations of the present research are underlined and through these obstacles, certain suggestions are made for the sake of future research. The findings of this research should incentivize third parties to duplicate the findings and extend the issue even further.

CHAPTER 2: INTRODUCTION TO INVENTORY MANAGEMENT

This chapter serves as an Introduction to the subject of Inventory Management, by closely examining its key elements and breaking down determining factors that tie them in.

2.1. Inventory Definition

Merriam-Webster dictionary defines inventory as "an itemized list of current assets" or "the quantity of goods or materials on hand". Inventory can become a defining factor for a business' success and analyzing its components is a necessary step towards pinpointing its significance.

2.2. Types of inventory

Diverse kinds of inventory are, in short, defined below. The equivalent kinds, expressed in terms of the pharmaceutical industry are also mentioned.

2.2.1. Raw materials

These materials are essential for the production process. In the pharmaceutical industry, raw materials are the active or non-active pharmaceutical ingredients used to manufacture pharmaceuticals. (world of chemicals)

2.2.2. Auxiliary materials

This particular category of inventory is ingredients that are going to be included into the completed version of the product in order to transform it. A relevant example of such materials are pharmaceutical mixtures prepared in the pharmacy's laboratory.

2.2.3. Semi-finished products

This type of inventory includes materials that have undergone some processing but are not yet considered a final product. An example of such components in the pharmaceutical industry could be pharmaceuticals before completing the final stages of production.

2.2.4. Final products

The last category of inventory are complete items that are ready to be transported and/or sold. These items correspond to the drugs ready to be distributed in warehouses.

2.3. Reasons for keeping inventory

In order to achieve a better understanding of maintaining a certain level of inventory at hand, the following definitions of categories of stock ought to be mentioned.

2.3.1. Seasonal stock

Demand for these goods in inextricably linked with and heavily affected by factors such as weather conditions. Sales for these commodities are considerably higher in certain periods and this is mirrored accordingly in the inventory level. (Shopify)

2.3.2. Cycle stock

Cycle stock is the level of inventory that is utilized for standard practices. It is based on demand forecasting and is intended to satisfy ordinary customer demand and does not involve or predict idiosyncrasies of the market. (Unleashed software)

2.3.3. Decoupling stock

Keeping decoupling stock is a tactic that involves quantities of materials being reserved for any potential shortages to avoid production deceleration. What differentiates safety stock from decoupling stock is their intended purpose; decoupling stock is designed to act as a shield against in-house production related uncertainties. (Net Suite)

2.3.4. Safety stock

Safety stock is a surplus of inventory intended to offset potential market uncertainties. It is used to lessen the impact of prospects such as demand fluctuations, suppliers' holdbacks, flawed forecasting and the obstacles they create. (Unleashed software) (Business)

2.3.5. Pipeline stock

It is inventory that is in the transitory state of delivery before having been sold to the final customer. There is some resemblance with the notion of work in progress for a good. (Mba skool)

2.4. Reasons for treating inventory as a liability

The arguments against keeping inventory are briefly explained below.

Firstly, buying excessive stock takes a toll in cash flow, reducing the business' flexibility and adaptability to potential supply chain disruptions. The seasonality of a product may render it impossible to sell and from fear of a stock out inventory may become dead stock.

Furthermore, excessive inventory is also a matter of storage. A part of the carrying cost is the variable of storage space. Spoilage cost is another determinant and an argument against keeping excessive stock.

2.5. Significance of Inventory Management

The significance of Inventory Management needs to be specified before proceeding to other issues of the study ahead.

Firstly, from a quantitative perspective Inventory Management is essential for improving a business's liquidity. Selecting the optimal number of orders and products, spaced appropriately between each other contributes to the minimization of total cost. The parameters of carrying and ordering should be balanced out in order to achieve this minimization.

Additionally, the concept of a stock out damages the business in both a level of customer satisfaction and maintaining a good relationship and the loss of potential profits. Efficient Inventory Management traces the optimal balance between excessive inventory and stock lacking to meet demand and to operate in a continuous way. Inventory Management is also crucial due to the control and monitoring of the inventory levels that prevent the business from being subjected to misuses. (Solventure Group) (Assignment point)

2.6. INVENTORY SYSTEMS

In the subsection below, two fundamental inventory models will be defined and described as part of the theoretical analysis of inventory management. These models are commonly used mainly because of their simplicity and comprehensiveness by business owners.

2.6.1 Economic Order Quantity (EOQ)

One of the fundamental assumptions for the EOQ model is that demand is constant.

In essence, the Economic Order Quantity model ensures that the parameters of order quantity, number of orders, inventory costs (holding costs, shortage costs and ordering costs are included) are optimized. The other assumption of the model is that inventory holding costs can be substituted by inventory setup costs, and that the minimization of the aforementioned costs brings about the minimization of the total cost.

The formula for the EOQ model is highlighted below.

EOQ = $\sqrt{(2 \times S \times D)/H}$, where S stands for Setup Costs, D stands for Demand and H stands for Holding Costs.

The essential benefits of this method are increased efficiency, optimization of cost and inventory space. Although the seasonality aspect of demand is not included in the model's assumptions, the EOQ model constitutes a convenient solution for day-to-day executive decisions on ordering procedures. (Investopedia)

2.6.2. ABC

One of the most important and widely used models of tracking inventory is the ABC model. The basic hypothesis behind this model is that the inventory is classified according to their value. Higher value inventory is assigned A, while slightly lower value inventory is assigned as B and the lowest value category inventory is assigned as C. The level of monitoring and specific attention paid to each classification is of descending importance. As level A merchandise is

deemed the most valuable, it will be prioritized in terms of inventory levels, cost minimization and customer service as well as aftercare.

The Pareto principle according to which 20 % of a business' products for sale contribute approximately 80 % of their revenue is in agreement with this specific inventory classification system. The parameters on which category each item falls under are mainly profitability, sales records, innovation, and competitive advantage. The ABC model in essence is strategically prioritizing resources in order to optimize efficiency, adaptability to customer demand and in turn profits. (Zip Inventory)

2.7. Inventory related costs

The types of cost related to inventory and inventory management are briefly defined below. Their connection to the environment of a pharmacy is also briefly explained.

2.7.1. Inventory Holding Cost

The costs that stem from having capital tied up in inventory. This category of cost is common in pharmacies as backups of products are needed in periods of unpredictable demand.

2.7.2. Ordering Cost

This type of cost varies according to the amount of inventory that is ordered or produced. Two types of ordering cost exist: the fixed cost which is not proportionate to the number of units ordered and the variable cost which is calculated on a per unit basis.

2.7.3. Shortage Cost

This subcategory of cost occurs when demand exceeds the existing stock. In a highly competitive environment, such as privately owned pharmacies, this includes lost sales when a customer calls upon the competitor for the product(s) in question.

2.7.4. Spoilage Cost

This type of cost involves perishable inventory stock that can be rendered useless if it is not sold in the appropriate time period. This is particularly common in the pharmaceutical industry where the vast majority of products are perishable and consuming them beyond their expiration date could be a health hazard.

CHAPTER 3 – IDIOSYNCRACIES OF Inventory management in Greek Pharmacies

This chapter serves as a brief introduction to the complexities of the Greek pharmacy as an environment.

Greek pharmacies are subjected to and a part of a highly complex environment with unpredictability rate next to impossible. The fast-changing pace of the surroundings, the complicated relationship with the market along with the stringent relationships with suppliers and customers alike that should be maintained at all times are the main components of this environment.

Not to be put aside, the regulatory authorities that supervise the healthcare system act as supervisors of the private pharmacies that are active in the Greek region. (Σαββίδου, 2013)

3.1. THE PHARMACEUTICAL SUPPLY CHAIN IN GREECE

The pharmaceutical supply chain, as a rule, can be illustrated by the figure above.
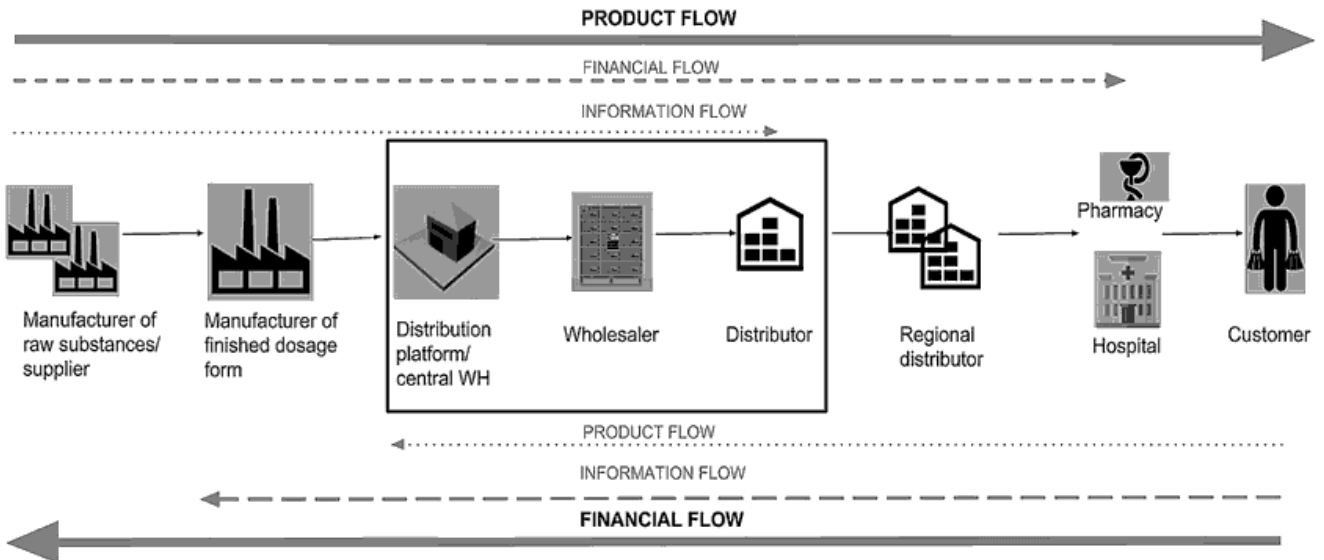
Figure 3.1 : Product, Financial and Information Flow throughout the Supply Chain

Source: Merkuryeva, Galina & Valberga, Aija & Smirnov, Alexander. (2019). Demand forecasting in pharmaceutical supply chains: A case study. Procedia Computer Science. 149. 3-10. 10.1016/j.procs.2019.01.100.

(available via license : https://creativecommons.org/licenses/by-nc-nd/4.0/)

The intricacies of the adjusted supply chain considering Greece's data are presented below.

MANUFACTURING

This part of the Supply Chain includes the manufacturers of raw materials utilized to mass produce pharmaceuticals. The most significant component of "pharma drugs" is active pharmaceutical ingredients (API), the most prominent suppliers of which are for the most part in India and China.

DISTRIBUTION

The distribution of pharmaceuticals in Greece is regulated by the National Organization of Medicines (also known as E.O.F.). This institution was created by the Ministry of Health is designed to supervise and certify public health and safety. All products being sold in a Greek pharmacy must have been inspected for safety reasons and must be up to Greek and European Union Standards. There are several pharmaceutical products that are distributed exclusively and directly to hospitals and clinics, but from this point forward the mention of pharmaceutical products is meant exclusively for products available for purchase in (Greek) pharmacies.

Pharmacists are able to procure their merchandise through the following sources;

• Pharmaceutical wholesalers

• Directly via manufacturing companies

• B2B, via another privately owned pharmacy

When referring to pharmaceutical warehouses or wholesalers, it is highly important to distinguish this source into two categories; the first is the Pharmacist's Cooperative that corresponds mainly to a Prefecture (e.g., Xanthi's Pharmacist Cooperative) and the second are larger scale wholesalers (e.g., Liafarm Pharmaceuticals geared towards the entirety of Northern Greece).

Firstly, Pharmacist's Cooperatives are founded by pharmacists operating in a general area such as a city or a Prefecture and serve as a common supplier located conveniently close to most of the participants. They form a network of collaboration and coexistence and pharmacists are offered stakes in the company when joining and becoming a stakeholder with varying benefits.

Pharmacist's Cooperatives can vary in size, range and variety of available products. They can operate on larger scale by accommodating differing regions, but many have selected to operate focused on a specific region and are located very close to it.

On the other side of the distributors is the larger scale wholesalers. These are privately owned companies seeking to provide pharmacies with the entire range of available pharmaceutical, parapharmaceutical and cosmeceutical products. Their competitive advantage lies in their ability to secure favorable pricing by buying larger quantities and being able to offer several alternatives. Their warehouses have a tendency to be located outside large cities in order to optimize the transportation of the products to as many areas as possible.

This distance could, however, discourage certain business owners from preferring said wholesalers over their local Pharmacist's Cooperatives as Cooperatives are able to provide any product immediately.

Manufacturing Companies

This includes communication with representatives from said companies or placing an order directly through the company's website, when possible. This method bypasses wholesalers and regional distributors and connects the company with the pharmacy in an immediate way.

B2B

Another practice preferred by pharmacists is providing each other with sought after products. This is also a possibility that includes pharmacies operating in the e-commerce, but for Para pharmaceuticals and cosmeceuticals only. Placing an order with another pharmacy can prove to be a convenient solution when dealing with an unknown product or doing a test-run with a limited quantity. Proximity, immediacy and non-existent or considerably low transport costs are this method's competitive advantages. This would eliminate the burden of having a minimum to place an order for smaller businesses.

Another form of sourcing is placing an order to the manufacturing company in collaboration with other pharmacies. This possibility enables each pharmacy to buy on a larger scale and have access to a better discount rate.

3.2 REQUIREMENTS

As it is dictated in article 4(1) of Law 1963/1991, "*prescription medicinal products and medical devices may be prescribed to patients by either EOPYY – contracted private doctors, private doctors or hospital doctors and they are dispensed through pharmacies*".

As a result, no sale of medicinal products or devices through other parties or channels is allowed under any circumstance.

According to Ministerial Decision D3(a) 46627/Government Gazette B 2285/2018, *"every pharmacy should possess stock of at least one package of generic product per each therapeutic class containing the active substances listed at the beginning of each year by IDIKA S.A".*

3.2.1 Responsibilities

Besides the legal requirements and framework in which a pharmacy must is obliged to operate, there is the Hellenic Code of Pharmaceutical Ethics. This is a guideline for the morals and ethics of a pharmacist or a pharmacy employee and structures the duty of providing adequate care for the patient with instructions for use, with guidance and caution and ensuring the products handed to the patient meet legal standards. Failure to do so may open the professional to potential legal action.

3.2.2. Reimbursement

The issue of the pharmacies' reimbursement for the services they provide is twofold.

Reimbursement by the patient is defined by the type of prescription provided by the medical professionals, which is a 10 % percentage for medication destined to treat chronic illnesses and a 25 % percentage for other cases. The exception to this framework is the 0 % participation of destitute citizens that are granted the right to medication for free.

Reimbursement by Social Insurance Institutions (i.e. EFKA) is the other component and it is funded by the patients' insurance expenditures. (Pharmaboardroom)

3.3 Number of businesses in Greek territory

Using 2020 as an index year for the statistical rundown of number of businesses and professionals in the territory, the results are as follows according to the Hellenic Statistical Authority (ELSTAT) (statistics, 2021)

- 10.427 pharmacies were active in Greece.
- Approximately 35 % of them were located in the region of Attica.
- 9,7 pharmacies per 10.000 citizens is the ratio that is derived from the results.
- 11.415 pharmacists are actively employed in pharmacies.
- Once more approximately 35 % of them were employed in the region of Attica.

In comparison to the EU, Greece is above the average in terms of number of active pharmacists per 100.000 inhabitants. With the predominance of EU members having between 50 and 110 active

pharmacists, the remote exception is the Netherlands with a number considerably below that (21). (Eurostat)

3.4. Selection of products in Greek pharmacies

The selection of products available for sale in Greek pharmacies are divided in the subsequent three categories; 1. Pharmaceuticals, 2. Parapharmaceuticals and 3. Cosmeceuticals. Each distinct category has certain slight differences in terms of their Supply Chain.

3.4.1. Pharmaceuticals

This category includes the entirety of medication and medicinal mixtures.

It should be noted that pharmaceutical mixtures consist of a minute percentage of a pharmacy's sales and are given little attention as far as inventory management related decisions are concerned. (Petrone Group) (Biorythmos)

3.4.2. PARAPHARMACEUTICALS AND COSMECEUTICALS

3.4.2.1 PARAPHARMACEUTICALS

It is clarified that the term Parapharmaceuticals refers to Non-pharmaceutical products, such as cosmetics, food supplements, etc., for which a prescription is not required and in no case should they be confused with drugs.

Parapharmaceutical products such as medical devices including diagnostic exams, contact lenses and contact lenses solutions, colostomy products, general antibiotics and broadly every product with the CE branding; sanitary aids; food destined to a specific diet (dietaries, gluten free foods and food for infants); products for personal hygiene and cosmetics.

Parapharmaceutical Supply Chain

The Supply Chain for Parapharmaceuticals is similar to the pharmaceuticals one, in the sense that they are regularly being manufactured by the same companies, being marketed by the same representatives and being sold by pharmacies as well. Nevertheless, there is no exclusion for them to being sold in other parts of the marketplace as is with pharmaceuticals.

3.4.2.2 COSMECEUTICALS: DEFINITION AND SUPPLY CHAIN

Coined by dermatologist Dr Albert Klingman in the early 1980s, the idiom "cosmeceutical" originated from the combination of the words cosmetic and pharmaceutical.

Similarly to their name origin, cosmeceuticals extract benefits from both cosmetic and medical products, and their main purpose is to enhance the well-being of the epidermis. Cosmeceuticals' active ingredients serve purposes ranging from protection from the sun to anti-aging and they affect skin cell function. (Dermcoll)

Cosmeceutical Supply Chain

Comparably with parapharmaceuticals, many pharmaceutical companies expand their reach with the production and distribution of cosmeceuticals. The company representatives are assigned the promotion of cosmeceuticals along with the entire array of products, while orders may also be placed via the local

pharmacist's cooperative, the company's website as well as some larger-scale warehouse. Another particularity of the Greek pharmacy environment is that many Greek cosmeceutical companies utilize the richness of raw materials from the country's flora and deliver products with therapeutic epidermis effects.

3.5 Drug consumption in Greece

According to surveys conducted and published by Eurostat, in prescribed medicine, Greece ranks relatively low among the EU countries with a reported approximate 40 % of civilians aged 15 and over having consumed medicine in the previous two weeks. (Eurostat)

As far as non-prescribed medicine is concerned, the same survey underlines that nearly one out of five participants in Greece consumed these products in the same two week period, which is also on the lower end of the result spectrum. (ingentaconnect)

3.6 Profit margin and drug pricing

Drug pricing in Greece is strictly regulated by governmental institutions. The retail sale of pharmaceuticals is controlled by Legislative Decree 312/1992. The framework in which the drug pricing policy is laid out is set by the Greek Ministry of Development. A committee responsible to shape the appropriate policies that are valid throughout the country is formed by representatives of the Ministry of Finance, Ministry of Health and Ministry of Labor and Social Affairs as well as representatives from EOF and the Panhellenic Pharmaceutical Association. (Ministry of Health)

Prices are formed according to the standard set by the countries of the European Union. The lowest price margin is defined by the average price of the two countries with the most affordable product. In case there is a significant increase in the price of the product in the Greek market the price is driven down to match the average mentioned above accordingly.

Pharmaceuticals are taxed strictly at 6 % VAT as essential products.

3.7. Reverse logistics

As with any business, reverse logistics is a significant parameter to consider when examining the operational qualities of an environment. As the element of the pharmacy as a healthcare providing business is added, certain characteristics must be identified.

3.7.1. Returns and unsold goods

Products returns and dead stock even to a minimum are an obligatory part of the pharmacy business. The entirety of the products being marketed to the end customer is labeled with a shelf life which limits the time span that a product can be distributed in a safe way.

The terms and conditions of returns on merchandise can be a make-or-break point for supplier relationships. Pharmaceutical companies or wholesalers may offer a discount for ordering larger amounts of products or favorable return policies as an incentive. This policy ensures that should any demand disruptions occur, the business owner does not suffer a great loss of income. A

widely used policy by vendors is the reimbursement of part of the purchase price of a product upon its return. (Jungle Works)

3.7.2. Product recalls

As part of the end customer health and safety protocols, the EOF agency carries out several checks for batches of products currently sold in the market. In the event of a suspicious or potentially harmful substance being traced in a product, the entire batch of products is recalled, and an announcement is made to the public so that the appropriate products are discarded immediately. Consumers are generally advised to hold on to the packaging that clearly states a product's batch number.

3.7.3. Claw backs and rebates

A requirement of the current system is that companies that are active in the sector rebate a fraction of the sum of their sales on an annual level to the National Organization for the Provision of Health Services (EOPPY). This entails a 9 percent discount on production price as well as a 2 to 21 percent discount that varies conditionally according to the kind of unit and the level of the expenditure.

The planned annual expenditure for EOPPY does not include the entire planned expenses and the remainder is covered by pharmaceutical companies. According to the General Manager of the Hellenic Association of Pharmaceutical Companies (SFEE), this system is the strictest in Europe and is criticized by businesses of the sector that often suggest this results in overprescription and overconsumption. (A glance at the evolution of the pharmaceutical clawback in Greece) (Pharma Boardroom)

3.7.4. Proper disposal

Part of the reverse logistics aspect of the pharmaceutical products is the proper disposal of such. Pharmaceutical products, when unused, must be handed out to pharmacists, who in turn will arrange for their disposal at the appropriate bin so that remnants of their active ingredients do not end up polluting subsurface groundwater.

3.8. Pharmaceutical exports

Lockdowns and supply chain disruptions in India and China greatly restrict the accessibility to drug starting/raw materials. This negatively affects or halts production whatsoever. This development has modified the export scenery on a global scale with shortages being a constant in the pharmaceutical market. (USP)

3.8.1. Current situation in Greece and government measures

The vastly different scenery has negatively affected the Greek market as noted below.

As a result of the vastly different pricing level of pharmaceutical products and the rapid growth of the Greek pharmaceutical industry, pharmaceutical wholesalers from Greece decide to export these products. This decision, however, has led to many product shortages locally. Even though there are local

manufacturing facilities, they are not able to fully cover the country's needs for pharmaceuticals. The most noteworthy shortages that pose a risk during flu season are pediatric medications, including antibiotics. Pharmaceutical warehouses have opted for a policy of increased exports and the remaining quantity seems to fall short of fulfilling the domestic needs. (Trading economics)

In an attempt to bring the escalating situation under control, the government has announced restrictions on exports by wholesalers. The imposed restrictions have evolved into export bans in order to contain the worsening situation. The Ministry of Health has advised physicians and pharmacists to cooperate in order to achieve higher efficiency in prescribing alternatives to stocked out products. Pharmaceutical warehouses and wholesalers are additionally required to undergo inspections from the National Organization of Medicines. These inspections include follow-ups regarding whether the exports are over the legal limit. Declining to comply with the imposed guidelines or even forego the inspections altogether, could and has resulted in temporary closure of business by the institution. (China Covid Shortages, 2022)

Correspondingly, pharmaceutical warehouses have imposed a cap in the number of products when distributing to local pharmacies. In the event of a supply shortage, limitations are enforced even in the most common analgesic drug. In certain Prefectures, the corresponding Pharmacist's Cooperative issues a lower than usual cap in orders, regardless of the frequency of orders, so that each member is fairly awarded a portion of the available products. In extreme cases, warehouses distribute no products whatsoever and restart distribution when adequate amounts are secured and delivered.

The issue at hand has recently evolved into a substantial one with opposing political parties questioning the government's stance and effectiveness in providing essential pharmaceutical products to the public. As it has been observed by both the public and professionals , product shortages are at an all-time high. Unfortunately, the shortages are negatively affecting the even distribution of products ranging from highly popular over-the-counter painkillers to specialized treatments for chronic diseases. A vivid example of the extent of the phenomenon became evident to me during the handout of the questionnaire. There were many instances of civilians wandering from pharmacy to pharmacy in search of an analgesic and antipyretic syrup designed for children. The search, as noted by both pharmacists and the civilians in question, is frequently unsuccessful.

All the developments mentioned above have resulted in a noteworthy disruption in the pharmaceutical supply chain. (China's Covid-19 outbreak raises fear of medicines shortage in France, 2022)

CHAPTER 4: INVENTORY MANAGEMENT PERFORMANCE

4.1 Performance Indices

The indices by which Inventory Management Performance can be measured are briefly introduced below along with how they are applied or examined in a pharmacy environment.

4.1.1. Inventory turnover ratio

This means of measuring performance indicates the amount of time the business needs to let go of its inventory. The formula is highlighted below.

Inventory turnover ratio = Sales/ Average Inventory (Investopedia)

4.1.2. Days of sales in Inventory

Days of sales in Inventory is an efficiency metric indicating the time period that is required to turn inventory into sales (this includes works in process). In a pharmacy environment, where products can fulfill very specific needs this can highlight errors in the practice.

The formula is highlighted below.

Days of Sales in Inventory = Average Inventory/ Daily Sales (Investopedia)

4.1.3. Inventory to net working capital

Being a liquidity ratio, this underlines the exact fraction of working capital (Current Assets – Current Liabilities) that is held up in Inventory. As with many other ratios, this should be studied in corroboration with Inventory Turnover. Pharmacies can be inventory dependent as businesses, therefore this ratio being high does not indicate mishandling of its inventory.

The formula is highlighted below.

Inventory to Net Working Capital = Average Inventory/ (Current Assets – Current Liabilities) (Carbon collective)

4.1.4. Proportion of order cycles without stock outs

This particular metric is calculated by dividing the number of order cycles without stock out with the number of order cycles. This ratio is directly linked to the level of service provided by the business. In the case of demand not being met the pharmacy could deal with losing a client, especially if this occurs repeatedly.

4.1.5. Proportion of demand met directly from shelf (fill-rated)

This is another efficiency metric designed to highlight the instances of successful fulfillment of customer orders. In turn, the business' effectiveness and customer satisfaction are affected by this ratio. In a highly competitive field such as pharmacies, fulfillment is crucial for maintaining a proper client relationship. (Upwork)

4.2. Supplier Relationship Management

Supplier Relationship Management is a fundamental concept across the study and practices of Supply Chain Management. It mainly focuses on examining each individual supplier's performance and how each link advances the general aim of the business.

A framework of reference for the implementation of Supplier Relationship Management is presented below.

According to the Procurement Intelligence Unit (PIU,2011) the process could be structured as follows and the acronym for it is SAME:

- Select suppliers to build a relationship with

- Align control, communication, and arrangement.

- Measure performance with the tool of scorecard exchange

- Exchange advancement prospects and endeavors.

4.2.1. Supplier Selection
The setting stone towards successful Supplier Relationship Management is the selection of the appropriate supplier. This is a crucial element of efficient Inventory Management and it involves making an informed decision based on qualitative and quantitative criteria.

4.2.2. Building a relationship
The potential ways of building trust mutually would include commitment, delivering and receiving constructive feedback all with a promise of a progressively more beneficial relationship in terms of product availability as well as cost efficiency. Building a relationship might include agreements for exclusive cooperation, scaled discounts, first choice in newly developed products or forgiving return policies to avoid excessive unsold goods.

4.2.3. Supplier Performance evaluation
All processes within Inventory Management should be constantly subjected to evaluation, and this includes Supplier Performance. At any point that the relationship is not delivering the desired results whether it be a stock out due to untimely order delivery or failing to ensure the most profitable (mutually) deal.

4.2.4. Make or break factors for supplier relationships.

Failure to deliver upon the aforementioned requirements and commitments would considerably damage the existing relationship with a supplier. Offering similar or more favorable proposals for cooperation to competitors would also signify a strained relationship with the other party.

On the other hand, securing exclusive partnerships with a business being the sole representative of a company or the sole vendor of a product or a line of products would greatly benefit their relationship.

CHAPTER 5: INVENTORY MANAGEMENT AND THE COVID-19 PANDEMIC

5.1 COVID-19 PANDEMIC

According to the World Health Organization (WHO), Corona virus disease (Covid-19) is the disease brought on by the SARS-CoV-2 virus.

As of January 2023, the Covid-19 pandemic is nearing 700 million cases worldwide with a death toll of almost 7 million. While presently Covid-19 is no longer considered a pandemic by the WHO, it is vital to recognize and discuss in brief the events that took place. (gov.gr) (Michigan's Thumb)

On 30 January 2020, the outbreak was declared a Public Health Emergency of International Concern. This was a wake-up call from the WHO that urged countries to immediately take steps to get the situation under control. Despite the global efforts, the outbreak grew at an alarming rate with 2020 being a year that saw entire countries on strict lockdown mode. The healthcare systems and personnel were under immense pressure as more civilians got infected. Production in China and many other regions shut down completely with catastrophic consequences in the supply chain.

It was not until late 2020 that the first vaccines began being administered to the public. There have been many spikes in cases and deaths ever since, but the number of doses administered has neared 13 billion on a global scale. The disruptions caused to the supply chain and global economy have continued enveloping and their toll is still evident today.

5.2. THE COVID-19 PANDEMIC IN GREECE

In Greece, over the span of the Covid-19 pandemic there was note from medical authorities (WHO as well as local authorities) for over 6 million cases with a death toll of nearly 37 thousand. The events that took place and shaped the situation as is, are described in short below.

The first documented case of Covid-19 in Greece was on the 26th of February 2020 and on the 23rd of March the first lockdown was imposed. From then on, nationwide lockdowns were extensively utilized as a preventative measure of spreading the disease and the country halted many of its crucial operations for several weeks as a result. In the most austere of lockdowns, the only businesses that were allowed to operate were supermarkets and HORECA professionals in general along with medical practices, pharmacies, and essential parts of the public governance offices. A campaign was launched from the Ministry of Health ("*Menoume Spiti*"), aimed at discouraging civilians from non-essential circulation.

As circulation was strictly controlled and permitted for specific purposes only, citizens were allowed visits to medical facilities, food stores, or attendance to ceremonies of their immediate family. Schools and universities were shut down for almost the entirety of the school year and classes were held with the help of online platforms. Remote work was imposed for the entirety of the workforce that is able to operate in such a way. Entrance to the country was not permitted for tourists and inhabitants were not permitted to travel abroad for leisure.

Business fields such as the food and tourism industry were heavily hit by the strict measures and retail stores were also severely affected. A great deal of interest was expressed in online shopping as stores with a physical presence were initially closed and then permitted to operate in a click away fashion with customers picking up their orders following communication with the store. Courier services and transport

companies were unprepared for the onslaught of orders coming in as medical professionals were coping with the rising number of cases and hospitalizations. (WHO)

5.3 Increased responsibility of pharmacies during the pandemic

As hospitals were strictly focused on the treatment of Covid-19 patients and were unable to handle other minor cases, the sole accessible place of healthcare provision became the pharmacies. Pharmacies were tasked with the distribution of scarce materials, such as masks and antiseptic fluid, amid the uncertainty into which the country was plunged.

During the first months of the pandemic, the production of essential equipment to prevent the spread of the disease was far from sufficient. Local factories and facilities took on the production of related supplies and to a certain extent supplies were donated by other countries and imported to cover the needs of the medical personnel and the public.

Covid testing was initially administered exclusively in hospitals and only when necessary. As rapid tests became more accessible to the public with supply meeting demand, they were also utilized as a preventative measure to limit the spread of the disease. By returning to the place of work or education, the civilian had the obligation to prove he was Covid free and the way that was suggested was with a negative rapid test for those civilians that had not (yet) been vaccinated.

Pharmacists were tasked with administering these tests and allowed to be reimbursed for the provision of this service. Twice a week, pharmacists were obliged to swab citizens and offer the results of their Covid test to the potential patient and the authorities by submitting the results online.

The additional responsibilities for a pharmacist in Greece during the pandemic are also examined from a pharmacist's point of view in the section "Interview with a pharmacist" of this study.

CHAPTER 6 METHODOLOGY

6.1. Introduction

For the purposes of the present study, a survey was conducted in order to collect answers to the aforementioned research questions. The data provided will be analyzed below. The survey was conducted in the form of a questionnaire through Google Forms and was either handed out in person or forwarded through the author's personal email address. It is directed to pharmacists and pharmacy assistants currently active in Greece. The information obtained will set the basis for a theoretical analysis, serving the purpose of resolving the research questions.

The questionnaire was formed with the aid of a pharmacist and via the previous research on the topic of inventory management in pharmacies. A discussion was held on the main issues surrounding the pharmacy and the corresponding line of business. It was through the particular pharmacist's 15-year long

personal experiences in the field and her parent's 40-year spanning career as a pharmacist that a consensus was reached on selecting the appropriate questions.

Prior to the final selection of the questionnaire specific material, an extensive discussion was held that helped the transition from theoretical analysis to practical application. With fundamental Inventory Management principles in mind, the pharmacist was introduced to terms such as bullwhip effect, types of inventory, and Inventory Management models.

As part of some fundamental terminology, models like EOQ and Just in Time were selected in particular thanks to their relative simplicity and the ease with which the author would be able to explain them to the participants of the survey to follow. It was through examining each case in point that the terms to be used in the questionnaire were selected for their applicability in the daily operations of a pharmacy. In essence, the terms that were included in the questionnaire and the questions that revolved around them were specifically selected to match the existing practices of professionals of the sector and test the extent of their knowledge on the subject matter.

6.2. FORMING THE QUESTIONNAIRE APPROPRIATELY

The purpose of the questionnaire was to collect the widest range of pertinent information possible in the least pervasive way. The basic direction communicated to me was for the form to be as brief and concise as possible with comprehensible questions. Therefore, it was limited to twenty questions that covered the entirety of the issues at hand, as well as certain inquiries on the participants' demographics.

The first section of the questionnaire is comprised of seven questions. The information gathered on the participants included their age, gender, level of education, region of employment, years of experience in a pharmacy environment, number of employees in the business and its storage capacity. The aforementioned variables were selected to test whether the responses differentiated in diverse groups of participants. Let it be noted the answers to the storage capacity question are based on the premise of a pharmacy's obligation to uphold the standard of a 5 m² storage space.

The second section, divided into two subsections is comprised of 20 questions designed to gather the necessary information from participants. The first subsection includes 18 close-ended questions while the second one includes an open-ended question where the participants share their personal insight in regards to the effect of Covid-19 and the state of the sector and the economy in general.

Regarding the close-ended questions the use of a 5-point Likert scale was deemed appropriate, ranging from 1 (Never) to 5 (Always) for frequency, from 1 (Not Important at All) to 5 (Extremely Important) for significance and from 1 (Strongly Disagree) to 5 (Strongly Agree).

Firstly, it was deemed vital that each participant state the frequency of their involvement with Inventory Management issues such as placing an order or follow the level of inventory in merchandise and the perceived importance of the matter for their business. The course of the questionnaire follows the course of the Inventory Management process, starting with assessing the current data and concluding with evaluating the final outcome.

Afterwards, the determining factors in making Inventory management related decisions needed to be established. The participants pinpoint the exact significance they place on each of the factors, which are directly linked to the components of the pharmacy's environment and facilities (storage restrictions, suppliers, product availability, state of the market and nature of the product). The next questions involve

stating their preference over keeping inventory or not and whether the volume, storage needs, life cycle and seasonality of a product would discourage them from procuring great amounts of it.

The following questions zero in on demand prediction and which methods are preferred by pharmacists. The options provided are a range of instinctive and empirical methods to prediction models. The same philosophy was adapted for determining the optimal order quantity and cost efficiency.

In order to gain a better understanding of each business' strategy, the sourcing of products is examined both on a recurrence and a cost basis. Pharmacists are asked to answer how frequent the orders from a specific source are and whether that carries the same weight on terms of cost. The answers provided are components of the Greek pharmacy as analyzed before (Pharmacist's Cooperative, large-scale wholesalers, manufacturing companies etc.).

Additionally, the necessity for determining the elements that complicate Inventory Management is addressed. Once again, the alternatives provided make up the entirety of the pharmacy's surroundings which are disruptions in the form of shortages or pandemic related consequences, customer demands, interaction with peers in the form of unfair competition and government policies. Evaluation of the management process is the subject of the following question that sees to the selection of the appropriate criteria (customer satisfaction or financial performance). Similarly, pharmacists are quested to assign significance to each of the determinants of supplying a product. The categories utilized for this question are client appeal (affordability, sustainability), visibility (marketing to the public and/or doctors), and availability and strong relationships with the product or its distributors.

Lastly, two open ended questions on closing remarks on the repercussions of the pandemic and the general overview of the experience of being a working pharmacist in Greece nowadays complete the questionnaire. The information collected by these inquiries will be analyzed to guide the discussion and aid to form decisive conclusions.

The questionnaire will be included in the end of the study, in the appendices section.

6.3. Pharmacies Questionnaire
6.3.1. SAMPLE CHARACTERISTICS
DEMOGRAPHICS ANALYSIS

Before advancing to the analysis of the results and the exploration of relationship between variables, it is vital that the demographics of the sample for the survey are highlighted.

As mentioned beforehand, the author was able to secure fifty questionnaires. There was an equal share (25) of male and female participants.

Almost half (24) of the contributors are between the ages of 18 to 34 and 23 of them are between 35 and 49. Therefore, approximately the entirety of the sample (47) is in the age bracket is under 50 years old as there are only 3 contributors over the age of 50. This was not a coincidence as a request was extended to many potential contributors that fit the category but the overwhelming majority of them firmly declined.

The potential answers provided covered the whole spectrum of levels of education. In the particular sample, almost three fifths of contributors (29) are in the Bachelor's Degree level, just over a third of them (17) are Master's Degree Students or Holders and only a small minority of contributors (4) replied

that they had graduated High School. There were no people who answered the survey either at a Primary Level or at a PhD level.

Additionally, just over half of the participants (27) are active in the Region of Eastern Macedonia and Thrace while less than a fifth (8) operates in Central Macedonia. A tenth of participants (5) operate in the region of Attica, and the remaining fifth of answers are derived from the regions of Thessaly (3) and Epirus (2), while the regions of Western Macedonia, Western Greece, Northern Aegean, Southern Aegean and Peloponnese each have one answer. There were no participants from the Regions of Ionian Islands, Crete and Central Greece.

As far as years of experience in the pharmacy are concerned, two fifths of participants (20) fall into the category of 6 to 10 years of experience. Just over a quarter of participants (13) have brief experience with 0 to 5 years in the pharmacy. Hence, three quarters of all participants have under a decade of experience in the field. A fifth of participants in this study (10) has the vast experience of 11 to 15 years, while a small number of participants (3) possess the vast experience of between 16 and 20 years. Lastly, only one participant had been in the practice for 26 to 30 years and another had been in the field for over 30 years.

Proceeding to the category of number of employees, the sample under examination is an exclusively small business one, with 46 of the replies (92%) falling into the less than 5 employees currently working category. The remaining 4 replies fall into 5 to 10 employees' category.

The last category of demographics that is included in the present study is the size of the storage space in each business. The options provided are centered around a Greek pharmacy's obligatory minimum storage space of 5 m². This was opted by less than a fifth of the contributors (7), whereas a substantial proportion (36) prefer to keep additional to the obligatory minimum storage inside the pharmacy. The remaining 7 contributors opt for an outer warehouse area, which is separate from the pharmacy.

6.3.3. HANDING OUT THE QUESTIONNAIRE

The attempt to approach was met with great resistance as a whole as many potential participants were reluctant to devote time to the survey and expressed hesitance towards disclosing data even when they were assured their anonymity would be protected.

The questionnaire was either distributed in person or forwarded through the author's personal email address. In both cases, the participant was informed and had provided clear consent of participating in the survey. Questionnaire was handed out translated in Greek in order to simplify the process and not alienate any participant not fluent in English. Between receiving the questionnaire and submitting their definitive answers, a two-week time frame was provided. At the end of that, fifty answers had been successfully collected, which was deemed as satisfactory and a safe sample size in order to reach conclusions.

A brief conversation accompanied the approach of the prospective contributor to the survey. After agreeing to participate, each pharmacist provided certain comments concerning the ongoing developments and their perception of it. These comments will be included in the analysis of the results, as an insider's insight into the situation. Part of the discussion also included an attempt to familiarize pharmacists with fundamental principles of Inventory Management, striving to ensure that all concepts were communicated properly. Briefly defining Economic Order Quantity models, Just in Time concept and cost breakdown was part of this process. The majority of participants were not fully aware of these concepts but were able to connect the theoretical framework with its practical application almost instantly.

QUESTIONNAIRE RESULTS

As previously mentioned, each subsection of questions has been carefully selected in order to cover any and every aspect of Inventory Management in a Greek pharmacy. The following section dissects each inquiry and the results collected through the handout of the aforementioned questionnaire.

6.4 Pharmacist Interview

The interview and the subsequent discussion with the pharmacist that served to provide further input to the issue of the study.

6.4.1. Interview and discussion with a pharmacist

At its beginning, the discussion highlighted the pharmacy's identity. Located in the center of a small town in Northern Greece, the particular pharmacy was founded in the late 1970s. Due to its central and favorable location, this particular business was able to garner enough foot traffic from the city centre and been convenient enough for its loyal customers. This particular element, thus, elevated this testament to a higher level of expertise from the plethora of experiences the business' employees and owners have lived through.

Proceeding to the discussion at hand, one of the first issues that had to be tackled was the significance of inventory management in the pharmacies. It was agreed, from the beginning, that the principal issue in regards to managing a pharmacy was exactly that; efficiently managing its inventory. The relevant variables in this equation are mainly selecting suppliers, managing the relationship with them, acquiring the right products in the optimal quantity, predicting accurately demand patterns and offsetting any obstacles in the course.

 In addition, the pharmacy's highly complex environment comes hand in hand with a highly complex supply chain. Therefore, successful interaction with the pharmacy's environment is the essential determinant in efficiently managing its inventory. Communication with local pharmacies and the Pharmacist's Cooperative, which remains the principal source of procurement for the majority of pharmacies in Greece, is vital. Maintaining a strong relationship with representatives of noteworthy manufacturing companies is also required as their tactics influence the entirety of the supply chain. Moreover, operating a smaller pharmacy and having a relatively restricted clientele underlines the necessity of maintaining a loyal customer base.

At a later note, the conversation inevitably shifted to adversities the modern pharmacist had to face in inventory management. The product shortages are the latest and most prominent example of these adversities. Supplies are alarmingly low even for very frequently administered pharmaceuticals and consumers are justifiably irritated by the situation. Pharmacists are unable to cater even to their loyal customers, which is met with profound disappointment. As pointed out by the interviewee, customer loyalty also translates into expectations towards the pharmacist even in predicaments out of their control such as the present.

As a subsection of the aforementioned adversities, the conversation included Covid-19 related complications. Ever since the beginning of the pandemic, the level of complexity in the pharmaceutical supply chain has risen dramatically. Simultaneously, pharmacists have had to take on a whole set of

added responsibilities and duties serving the public health sector, such as administering Covid tests. During the pandemic, pharmacists and pharmacy employees were tasked to inform the public further on the ongoing developments, offer some direction for the readjustment of the customer's daily routine to the pandemic standards as well as be a point of reference by continuously providing their services to the public.

Upon discussing the public's reactions in the height of the pandemic, heightened frustration was the principal response that was highlighted. Government policies, preventative measures and even pharmacists themselves were met with suspicion. This was consequently translated to the demand patterns during lockdowns. In the early stages of the lockdown there was a spike in demand in fear of extended lockdowns. There was also a meteoric rise in demand of pandemic related products such as hand sanitizer, masks, and dispensable gloves and steep decline in demand for non-related items. What ensued following the catastrophic financial aftermath of the lockdowns was a steep decline in demand and sales due to uncertainty, low consumer sentiment and reduction of the disposable income. Due to the sudden change in demand, inventory management related decisions proved to be considerably inaccurate. A large proportion of products that were acquired the previous period remained unsold or was returned. This sharp decline in demand and sales proportionately affected the seasonal products as well.

Navigating all the aforementioned adversities greatly damages pharmacists' ability to efficiently manage inventory and by extension the business itself.

7. QUESTIONNAIRE RESULTS

7.1. CLOSE-ENDED QUESTIONS ANALYSIS
IMPORTANCE OF INVENTORY MANAGEMENT

Continuing with the close-ended questions analysis, the first one that introduces the subsection entails stating how frequent the participant's involvement is with Inventory Management. Almost three fifths (29) of the sample replied that they are "always" involved with such issues, whilst approximately two fifths (19) are reportedly "often" preoccupied with them. Solely a small minority of participants are "occasionally" coping with Inventory Management. As has been demonstrated, the issues revolving around Inventory Management are a vital part of a pharmacist's routine.

DETERMINING FACTORS OF DECISION MAKING

The following question is taking on Inventory Management related decisions and the pertinent factors taken into account. As demonstrated in the following table (Table 7.1.), participants were asked to pinpoint the level of importance they place on each factor.

List of factors	Not Important at All	Slightly Important	Neither Important norUnimportant	Very Important	Extremely Important
Business' current liquidity	1	3	7	23	16
Size of storage space	4	9	8	18	11
Ordering Cost	1	5	5	23	16
Lead time	4	12	8	15	11
Risk of stockout	1	1	5	11	32

Product shortage	0	2	0	10	38
Good faith/relationship with supplier(s)	2	3	11	22	12
State of the market and the economy (unemployment rate, inflation)	3	6	10	21	10
Nature of the product (volume, seasonality, life cycle)	0	3	6	27	14

Table 7.1. : Determining factors and their perceived significance

As far as the business' liquidity is concerned, 39 of the contributors (78 %) deem it as very important (23) and extremely important (16). 7 of the contributors (14%) remain neutral on the subject whereas 4 of them (8%) place no (1) to little (3) importance on the factor.

Opinions seem to vary on the subject of storage capacity, as approximately three fifths (29 contributors and 58%) deem this of high (18) and utmost (11) importance. 8 of the contributors (16%) remain neutral on the issue, while 13 seem to not consider it as important. Proceeding with ordering cost, just over a tenth of contributors (6 and 12 %) view this facet of the issue as not significant, one tenth of them take a neutral stance whereas a significant proportion of them (78%) view this as very (23) or extremely (16) significant.

In regards to the component of lead time, the weight balance seems to differentiate. Almost half of the contributors (24 and 48%) stated that either they deemed the component as not particularly significant or they would not be greatly influenced by it in making pertinent decisions. Similarly, slightly more than half of contributors (26 or 52%) would consider it as important (either very or extremely) and would factor in lead time when for example placing an order.

The component of stockout is demonstrated as of great importance to the contributors asover four fifths (43 or 86%) of contributors reportedly consider it as very (11) and extremely (32) important. Less than a fifth of contributors consider as not important (1), slightly important (1) or neutral (5) to the decision-making process. On a similar note, product shortages are definitively significant to the decision-making process as 48 or 96 % of contributors would deem as very (10) or extremely (38) significant.

Moreover, maintaining a strong relationship with suppliers or having faith in the existing one would greatly influence 34 (68%) of the participants. While slightly over a fifth (11) of participants remain neutral on this particular component's influence, one tenth of them would not factor it in as far as inventory related decisions are concerned.

In addition, just over three fifths of participants (32) would take into account the state of the market where as approximately a fifth (9) would not consider it as a contributing factor. The remaining fifth of participants remain neutral on this matter.

Finally, on the complex nature of certain pharmaceutical products, over four fifths (41) of participants stated that this would alter their decision-making process. A small minority of participants (3) stated the element is of trivial importance whereas slightly over a fifth of participants remain unchanged by the factor.

Overall, the most decisive factor in regards to taking appropriate decisions is overwhelmingly the current product shortages. On the other hand, the least decisive is appears to be lead time with a fairly balanced percentage of participants not being greatly affected by its performance.

KEEPING INVENTORY

The following section will analyze the results of the close-ended questions focused on instances of keeping inventory and the pertinent determining factors.

Types of products	Yes	No
Best-selling products	29	21
Products that were recently hard to stock	36	14
Low-cost items	10	40
Repeat purchases from loyal customers	35	15
Less bulky items	5	45
Products with a long shelf life	16	34
Other	2	48

Table 7.2 : Determining factors for keeping inventory

As demonstrated by the table above, almost three quarters (36) of participants are for keeping inventory of products that were recently scarce to find and just under three fifths of participants (29) favored keeping inventory of products with a strong sales performance. A substantial proportion of participants (35) was also for keeping inventory of an item on the instance of it being a repeat purchase by a customer. Contradictorily, contributors were overwhelmingly against keeping inventory of more affordable items with four fifths (40) being against it, and even more against keeping inventory smaller items at a 90% in disagreement with the practice. Two replies were noted in the "other" response bracket and both referred to being for keeping inventory that will most likely be sought out for in the near future based on their predictions.

The following questions examine the significance of certain characteristics of pharmaceutical products and the degree to which these characteristics have an influence on purchasing habits by pharmacists.

Initially, interviewees were asked to state their opinion on whether an item being bulkier would dissuade them from acquiring it. Approximately half of participants (24) stated they would not be affected by this particular characteristic, whereas less than a fifth of them (7) agreed with the statement. On the contrary, just over a third (17) of participants disagreed with the hypothesis that an item's volume would affect their decision of acquiring it.

Continuing on to a product's singular storing needs (i.e., refrigeration), the consensus reached points to the direction of it not being a factor against acquiring it. Slightly less than two fifths of contributors remain neutral on this issue in addition to approximately half (23) of participants disagreeing, strongly or not, with the statement that it would prevent them from acquiring a product with particular needs of such. Therefore, less than a fifth agree or strongly agree with the aforementioned statement.

On the contrary, an item's (short) shelf life would indeed prevent the vast majority of participants from acquiring it. Approximately 9 out of 10 participants (44 participants and 88%) would consider against ordering a product that might reach its expiration date before being able to sell it. A small minority of

participants (4) take a neutral stance on the topic, while an insignificant number of participants (2) disagree with it.

As far as the seasonality of a product is concerned, slightly over three fifths of the contributors (31) would not be eager to acquire vast amounts of products from fear of not being able to sell it. Just over a fifth of contributors (11) state that the seasonality of a product would not influence their decision of acquiring it, while a small number of participants (8) replied that they would not avoid acquiring large quantities of a seasonal product.

BULKY ITEMS	SPECIAL STORING NEEDS	SHELF LIFE	SEASONAL PRODUCTS
Strongly Disagree	Strongly Disagree	Strongly Disagree	Strongly Disagree
2	7	0	2
Disagree	Disagree	Disagree	Disagree
17	16	2	6
Neither Disagree nor Agree	Neither Disagree nor Agree	Neither Disagree nor Agree	Neither Disagree nor Agree
24	19	4	11
Agree	Agree	Agree	Agree
7	6	34	28
Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
0	2	10	3

Table 7.3 : Disparaging product characteristics for keeping inventory

PREDICTING DEMAND

In regards to demand prediction techniques, the following questions attempt to map out pharmacists' practices and the accuracy of attempted predictions.

Initially, approximately 3 fifths of participants (28) act instinctively on predicting demand for a certain time period whereas slightly over two fifths (22) do not engage in this particular practice. A very significant proportion (40 participants or 80%) of participants base their predictions on the evolution of a product's demand in the most recent time period (here a yearly basis is utilized). Conversely, a considerably smaller proportion of participants (just over two fifths, 22) seem to base their predictions on the data of a handful of previous time periods compared to the ones utilizing solely the last period's sales and demand data.

Additionally, a small minority of contributors (4) are actively engaging in demand prediction with the aid of econometric models. In fact, the majority of contributors were not even familiar with the concept of prediction via this practice and had to be appropriately filled in by the author during the handout of the questionnaire.

Finally, slightly less than two fifths of the contributors adjusted their expectations and predictions of demand based on macroeconomic variables and the general state of the market, including unemployment levels and inflation rates.

Instinctively from my personal experience	Previous period's (year) data	Evolution of the demand over several previous periods (year)	Discussion and peers' relevant experiences	Econometric models based on predictions	Adjusting expectations according to state of the market and the economy
Yes	Yes	Yes	yes	yes	yes
28	40	22	8	4	19
No	No	No	no	no	no
22	10	28	42	46	31

Table 7.4: Contributors to the predictions of demand

The following question tackled the prediction accuracy as perceived by the participants of the survey. Slightly over three fifths (31) of participants concur that their predictions have a high precision rate, whereas just over a third of participants (17) remain neutral on the matter.

All in all, based on the data provided above the most favored practice by pharmacists is the previous time period's data while the least favored one is the utilization of econometric models to predict demand. A large proportion of participants are, also, confident in the accuracy of such predictions.

DETERMINING OPTIMAL ORDER QUANTITY AND COST DIVISION

OPTIMAL ORDER QUANTITY				
Economic Order Quantity	Stable quantity repeated over several previous orders	Identical quantity with the previous order	Minimum requirement to complete the order	The item's popularity/sales record over the previous periods
yes	Yes	yes	yes	yes
14	20	9	12	28
no	No	no	no	no
36	30	41	38	22

Table 7.5: Factors for determining order quantity

The following questions provide insight regarding the patterns contributors to this survey follow in order to optimize the order quantity as well as decrease the cost.

The least favorite method to select the order quantity is placing an order with the exact same quantity as the previous one as just under two fifths (9) of contributors select this. The approximately same number of contributors (12) select the minimum quantity required to complete the order. Slightly over a quarter of contributors (14) opt for the Economic Order Quantity (EOQ) method, while the patterns most frequently used by contributors are an item's sales record over several previous time periods with slightly under three fifths of the sample using it and the routine of order a stable quantity for several orders and during the span of several time periods, favored by two fifths of the contributors (20).

Cost division			
Inventory Holding Cost	Spoilage Cost	Shortage Cost	Ordering Cost
yes	Yes	Yes	yes
11	25	24	5

no	No	No	no
39	25	26	45

Table 7.6: Type of cost participants would be likely to reduce

As far as cost optimization is concerned, participants were tasked with selecting which cost component they would most likely attempt to reduce, based on its contribution to the total cost. The option least favored by the sample with one tenth (5) of participants selecting is the ordering cost. With just over one fifth of responses (11), decreasing Inventory Holding Cost is not deemed as the appropriate cost-cutting resolution. For both Spoilage cost and Shortage Cost, the contributors are divided equally as half of the participants (25) and approximately half (24) would consider reducing them, accordingly.

ORDER FREQUENCY AND MATCHING THE COST

	ORDER FREQUENCY				
Sources	Local warehouse/Pharmacist's Cooperative	**Larger scale wholesaler**	**Order directly from manufacturing company**	**B2B from another pharmacy (online or not)**	**In cooperation with other pharmacies to reach the order minimum/qualify for discounts**
Never	1	3	1	24	17
Rarely	0	6	3	10	15
Occasionally	2	8	16	7	9
Often	9	20	21	8	5
Always	38	13	9	1	4

Table 7.7: Sources of order and frequency

The following subset of questions aims to sort a pharmacy's orders on a frequency and a cost basis.

Sorted by frequency, the overwhelming majority of participants (47) replied that they either often (9) or always (38) select this method of procurement. An insignificant number of participants (2) replied that they occasionally place an order through the Cooperative while another one reportedly never prefers it.

Proceeding to the larger scale wholesaler, two fifths (20) of the participants frequently opts for an order through this channel, in addition to just over a quarter (13) of participants who always do. Just under a fifth of participants rarely or never place an order via this particular source. Ordering directly from the manufacturing company or via a company representative is a practice "often" favored by just over two fifths (21) of participants. Similarly, slightly under a fifth of participants (9) "always" show their preference for this method, where as just under a third (16) of participants place an order as such.

The following two practices are considerably less favored by participants. As demonstrated in the table, slightly over two thirds (34) never or rarely select the B2B system, while less than a fifth of participants (7) occasionally do. Comparably, approximately the same proportion of participants (32 or 64%) "Never" or "Rarely" opt for an order in collaboration with other pharmacies in order to qualify for larger scale discounts offered by companies. Finally, less than a fifth (9) "often" or "always" operate in collaboration with peers to place an order.

COST MATCHING				
Local warehouse/Pharmacist's Cooperative	**Larger scale wholesaler**	**Order directly from manufacturing**	**B2B from another pharmacy**	**In cooperation with other pharmacies to reach the order**

		company	(online or not)	minimum/qualify for discounts
1	4	2	30	20
2	5	6	8	14
3	11	17	6	6
8	17	20	6	5
36	13	5	0	5

Table 7.8: Sources of order and cost analysis

Comparably, the replies from the cost-based analysis ought to be examined.

The most popular among the alternative sources of procurement is once again the Pharmacist's Cooperative with the overwhelming majority of 44 participants (8 for "often", 36 for "always") highlighting it as their preferred source. A small number of participants claim to "rarely" (2) or "never" (1) use this way of ordering, while a small minority of participants (3) "occasionally" do.

Additionally, three fifths of participants (30) either "often" (17) or "always" (`13) use the large scale wholesaler hub. In contrast to almost one fifth (9) who, as is being shown in the table, do not prefer a large wholesaler as a habit, slightly over a third of participants (17) claim they occasionally place an order.

The cost division seems to be split in half for the order through the manufacturing company channel. Whereas half of contributors claim to accredit a significant proportion of their orders to the source, the other half would consider ordering from the source somewhat more inconsequential.

The practice of B2B orders via another pharmacy seems to be the lowest of priorities for the participants. Three fifths (30) would never opt for an order through this channel, while slightly over a quarter of participants (14) would "rarely" (8) or "occasionally" (6) do. Only just over a tenth of participants would often go forth with an order of this type.

Finally, a somewhat unpopular method of ordering is a collaborative effort with other pharmacies. One fifth of participants (10) base a significant proportion of their orders through this channel with two fifths (20) of participants attribute a trivial number of orders to the source. The remaining two fifths of participants either "rarely" (14) or "often" (6) prefer this method.

After analyzing the frequency and cost bases of ordering patterns from the contributors, the two variables need to be analyzed on a comparative basis. It has been made evidentthat a B2B order is the least popular method across the board. Similarly, the Pharmacist's Cooperative is preferred on quite a frequent basis and for a very considerable proportion on a cost basis by participants. As far as these two methods are concerned, the data seems to converge on both analyses.

Utilizing the larger scale warehouse/ wholesaler route is a relatively popular practice by both standards of analyses. The data remains relatively unchanged on both ends with slightly over three fifths of the contributors showing their dedication to the method. Contrarily, in regards to the collaborative order participants go forth with this method of ordering less frequently, as demonstrated by the data, but place more costly orders via this channel. Finally, ordering through the manufacturing company remains through both bases of analysis a somewhat popular technique. However, the frequency of orders is higher

than the comparable cost of ordering through this channel which is the exact opposite with the collaborative order.

All in all, divergence between the two analyses has been indicated on a very small scale, and only for certain variables.

INVENTORY LEVELS TRACKING AND DISPARAGING FACTORS

Proceeding to patterns of tracking inventory levels, tracking inventory for all types of products appears to be favored by the overwhelming majority of participants as over four fifths replied that they opt for it. All the other responses were considerably less popular with just over a quarter of participants (14) stating they track products with a short shelf life, less than a fifth (7) of participants monitoring inventory levels for worst-selling products and solely a small number (3) of participants keeping track of items taking up a lot of space. An alternative reply added by a participant was the tracing of the inventory level of a newly introduced to the business product.

List of factors	Product shortages	Covid-19 Supply Chain disruptions	Insufficient storage	Customer demands	Excessive variety of available products	Unfair competition	Government failure
Not Important at All	0	0	1	0	2	1	1
Slightly Important	0	2	7	1	6	4	4
Neither Important nor Unimportant	1	12	19	9	14	14	11
Very Important	8	21	15	24	17	17	19
Extremely Important	41	15	8	16	11	14	15

Table 7.9: Disparaging factors for inventory control and their perceived significance

Afterwards, the factors that impede inventory management are examined according to their perceived significance.

First and foremost, the most significant factor is product shortages, as noted by over four fifths (41) of contributors. Additionally, less than one fifth of contributors (8) consider product shortages very important.

The determinant of Covid-19 Supply Chain disruptions is characterized as especially significant by slightly less than three quarters of contributors (36), whereas slightly less than a quarter (12) of contributors state that managing their inventory remains relatively unaffected by Covid-19 disruptions. An insignificant proportion of contributors (2) consider this as inconsequential.

The sufficiency of storage in a business is a factor that greatly impedes inventory management according to approximately half (23) of contributors. On the contrary, slightly less than two fifths of contributors would suggest that storage capacity does not greatly affect inventory management, in addition to less than a fifth (8) of contributors who place little to no importance on the factor.

Moreover, excessive customer demands could derail proper inventory management according to four fifths of participants (24 consider it very important and 16 consider it an extremely important component).

The remaining fifth of participants either remain neutral (9) on the matter of it having a detrimental effect on inventory management or consider it of low importance (1).

Regarding the excessive variety of certain categories of products, just over half of participants would consider it a component with a damaging effect in their business. Nevertheless, less than a fifth (8) of participants view this variety as a factor of low to no importance, in addition to less than a third of participants (14) that maintain that their business remains unscathed by this component's effect.

Unfair competition is an element that just over than three fifths (31) of participants consider as quite damaging for effective inventory management. Whether it is derived from peers or larger-scale online pharmacies, only a tenth of participants believe in the insignificance of the factor. Once more, less than a third of participants (14) deem unfair competition as it having either a positive or negative effect.

Lastly, government policies and mismanagements are viewed by just over two thirds of participants (34) as a disparaging factor for proper inventory management. Solely a tenth (5) of participants considers it an inconsequential issue, whereas slightly over a fifth of participants (11) remain neutral on the issue.

INVENTORY MANAGEMENT EVALUATION

Customer satisfaction	Maintaining a strong relationship with supplier	Minimizing costs and maximizing profits	Minimizing unsold goods and returns	Other
YES	YES	YES	YES	YES
35	13	28	23	1
NO	NO	NO	NO	NO
15	37	22	27	49

Table 7.10: Inventory management evaluation components and their significance

Another process that is crucial for inventory management, is the evaluation of the process and it products. As a result, a pharmacist's perspective on which of the determinants they consider significant is essential.

Customer satisfaction is deemed significant by a large proportion of contributors, namely 7 out of 10 of them. Minimizing costs is a considerably significant element according to slightly less than three fifths of contributors (28). Nevertheless, maintaining a strong relationship with suppliers would be considered insignificant by slightly over three quarters of contributors (37), while minimizing unsold items and returns is not considered as important by slightly over a half of contributors (27).

Another alternative to the given replies is offered by a contributor with the suggestion of introducing an innovative product to the client.

INTRODUCING AND CONTINUING ACQUISITION OF A PRODUCT

The following inquiry deals with the significance of each determinant in introducing and continuing the acquisition of a product, as perceived by contributors to the study.

First and foremost, affordability seems to be the most crucial of the components as 94% of participants deem it either very (23) or extremely (24) important. Almost equally as popular among participants, the

confidence of the customer towards a product and/or the manufacturing company amasses well over four fifths (43) of participants that underline its significance. Another decisive factor for introducing a novel product is its guaranteed availability for the foreseeable future, as stated by four fifths (40) of participants in the survey.

Other components deemed significant by the participants are the marketing to doctors element, which was characterized as very or extremely significant by 7 out of 10 contributors. The property of a product acting as an alternative to recalled or out of stock options is also viewed as quite significant by slightly more than 7 out 10 participants (36). Moreover, a product being promoted via TV or social media would build on the confidence to introduce it to their business, as stated by slightly over two thirds of participants (34). What is more, covering a particular need or appealing to a distinct part of the market would persuade a large proportion of contributors (32) to introduce a product with such characteristics to their business.

The more inconsequential determinants would be the ecofriendly/sustainable characteristics of a product and the acquisition upon requested by a client. Both components are considered significant by approximately two fifths of the contributors (12) whereas slightly less than a quarter of contributors consider them only somewhat important. In addition to this, just over a third of contributors would categorize these particular elements as neither significant nor insignificant.

List of factors	Price affordability	Guaranteed product availability for the upcoming time periods	TV/social media promotion	Marketing to doctors	Covering a specific need	Confidence towards particular representative/manufacturing company	Customer confidence towards particular product	By request of a client	Product's ecofriendly character	Alternative to stocked out/recalled product
Not Important at All	1	1	0	1	1	2	0	2	4	0
Slightly Important	2	2	3	2	3	4	2	12	12	5
Neither Important nor Unimportant	0	7	13	12	14	12	5	17	17	9
Very Important	23	28	29	25	26	26	28	15	15	30
Extremely Important	24	12	5	10	6	6	15	4	2	6

Table 7.11: Determining factors for the introduction and procurement of a product and their perceived significance

7.2. OPEN-ENDED QUESTIONS ANALYSIS

An analysis of the commentary submitted by the participants will be dissected to aid in forming relevant conclusions.

Initially, what needs to be stated is that through the two final open-ended questions participants were given the opportunity to submit any relevant remarks in order to further aid the research. The inquiries were expressed in such a general manner in order to encourage feedback that would not be restricted by any direction given by the author. Participants were invited to share any pertinent experiences or observations on the issue of Inventory Management as well as any disruptions the Covid-19 pandemic may have brought on.

Generally, pharmacists and pharmacy employees that had agreed to participate in the study were quite eager to share their experiences and provide their personal perspective on the ongoing developments. A palpable sense of disgruntlement towards the current situation was evident through the remarks, especially in regards to the recent prolonged and generalized product shortages.

The same sentiment was carried through to the Covid-19 related observations. A sense of disappointment with the sheer number of added obligations the pharmacists were tasked to take on during the pandemic was expressed by the submitted comments while there were many replies openly challenging the ways the government bodies handled the outbreak and the evolution of the pandemic. Supply chain disruptions and complications have been consistent and considerably damaging to the pharmacy's functionality.

Added attention was paid separately to underlining the trying times for the profession as well as the consumers during these product shortages. An observation that was almost universally voiced by participants was that inventory management and planning was a practically impossible task nowadays as the shortages have become so intense that they prevent their businesses from being able to function properly.

In conclusion, this current period the pharmacies in Greece seem to be plagued by many far-reaching issues in terms of Inventory Management. Through participants' testimonies it becomes evident that the still ongoing pandemic as well as the prevalent shortages in combination with perceived government failures create a perfect storm of obstructions to the efficient management of a pharmacy nowadays in Greece.

CHAPTER 8: CONCLUSIONS

8.1. CONCLUSIONS

In conclusion, we could argue that the modus operandi of private pharmacies in Greece is rather unique. Through this study we have tried to analyze how this specific business operates in the current climate and how it interacts with its environment under the scope of Inventory Management. Specific attention was paid to the aftermath of the Covid-19 pandemic, and the shortages that were created due to its related disruptions.

In our analysis, we saw the framework in which the pharmacies operate in relation to regulations and in cooperation with the respective authorities. As it was noted, the margin in which pharmacies can function is narrow and laid on a specific path. On the contrary, the products and services it provides are numerous. They vary from being pharmaceutical and medicinal in nature to providing more of an aesthetic aid.

The study of previous research on the topic in corroboration with the essential conversation that was held with a pharmacist with rich experience in the field built the questionnaire that was utilized to further the research. This method was selected to underline the point of a view of a professional and how the issue of Inventory Management is applied in practice both in a general way and in a mid-pandemic scenery.

Through the responses that were collected by the participants, the conclusions that were formed are that intuitive methods are preferred for the application of Inventory Management. Sales records for the previous periods play a major role in the prediction and procurement-related decisions the appropriate manager has to take. Supplier relationships are built through mutual benefits and also carry a lot of weight in the process.

The ramifications of the pandemic have been immense, and the entire supply chain has been disrupted. Pharmacists have adjusted the number of orders and products contained in the order and have prioritized product accessibility over preference as brought on by the excessive shortages. In the conversational part of our survey pharmacists expressed frustration with the authorities' approach and the ongoing developments. They mentioned feeling lack of support by the authorities in combination with added responsibilities that they had to learn how to manage.

In contrast with the previous inventory management and demand prediction methods the participants had utilized in the past that were more intuitive, they modified their behavior towards a more targeted approach in terms of cost efficiency and avoiding stock outs. A consensus was reached from the feedback from survey participants that these tendencies and behavior modifications would revert back to the previous situation in the midst of such severe pharmaceutical shortages on a global level.

8.2. LIMITATIONS AND PROPOSALS FOR FURTHER RESEARCH

The present study is subject to quite several restraints and further investigation on the matter would strengthen the validity of its results as well as provide a more insightful understanding.

To begin with, the research aimed at the investigation of pharmacists' views and practices on inventory management during a particularly trying time for the profession. Through a brief questionnaire, some

insight was provided to the issue of the practices of active privately owned pharmacies in Greece. A more comprehensive insight could potentially be provided should the research be expanded to include hospital pharmacies.

As far as future research is concerned, this experiment can be duplicated to include more participants. Having a more forgiving time frame to conduct similar research can allow the interviewer to collect vastly more information as well as more participants. Adding check-ins with the willing participants can enrich the research with the feedback provided regarding the quality and quantity of questions. Cooperation with a local or larger scale warehouse can broaden the research's horizons by a lot. During this present study, this was not rendered possible due to a loaded work schedule that did not allow the warehouse's management to respond to specific questions.

Another potential improvement is interviewing a wider variety of applicants in a geographical sense. While almost all Regions and many Prefectures are included in the present study, diversifying the answers with pharmacies from more islands, which is a characteristic of Greece's geography would further contribute to the research. The idiom of islands and the scarcity of pharmacies and healthcare providing facilities would broaden the scope of the study.

Moreover, while the worst of the pandemic seems to be over, its repercussions are far from it. Therefore, the analysis can be repeated as soon as the Covid-19 pandemic reaches its final stage and the disease becomes endemic by that point. It would be wise to reexamine the issue at hand with a stronger knowledge of the pandemic's long-term effects in the economy. While in June 2023 Covid-19 is no longer the global threat it once was, the supply chain still suffers from pandemic induced disruptions.

Additional time for adjustment will be required for present or future pandemic related disruptions in the supply chain. It would be wise to revisit pharmacist's replies in a non-pandemic or post-pandemic scenery.

By analyzing the pandemic's aftermath and critiquing the way it was handled, it is vital to devise techniques to aid the system recovery in the event of a potential similar event in the future. The possibility of a pandemic occurring once or many times more in the future is extremely high. Setting up a system with increased preparedness in order to contain detrimental consequences for a future upset is the best possible resolution to an extremely upsetting shared experience.

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