



Masters in Logistics & Supply Chain Management
Department of Industrial Management and Technology
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Thesis:

Re-engineering Ship Spares Forwarding A Forwarder's Perspective

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ΔΗΛΩΣΗ

Η εργασία αυτή είναι πρωτότυπη και εκπονήθηκε αποκλειστικά και μόνο για την απόκτηση του συγκεκριμένου μεταπτυχιακού τίτλου.

Τα πνευματικά δικαιώματα χρησιμοποίησης του μη πρωτότυπου υλικού της ΜΔΕ ανήκουν στον/στη μεταπτυχιακό/ή φοιτητή/τρια και στο επιβλέπον μέλος ΔΕΠ εις ολόκληρο, δηλαδή εκάτερος μπορεί να κάνει χρήση αυτών χωρίς τη συναίνεση άλλου. Τα πνευματικά δικαιώματα χρησιμοποίησης του πρωτότυπου μέρους της ΜΔΕ ανήκουν στον/στη μεταπτυχιακό/ή φοιτητή/τρια και στον/στην επιβλέποντα/ουσα από κοινού, δηλαδή δεν μπορεί ο ένας από τους δύο να κάνει χρήση αυτού χωρίς τη συναίνεση του άλλου. Κατ' εξαίρεση, επιτρέπεται η δημοσίευση του πρωτότυπου μέρους της διπλωματικής εργασίας σε επιστημονικό περιοδικό ή πρακτικά συνεδρίου από τον ένα εκ των δύο, με την προϋπόθεση ότι αναφέρονται τα ονόματα και των δύο (ή των τριών σε περίπτωση συνεπιβλέποντα/ουσας) ως συν-συγγραφέων. Στην περίπτωση αυτή προηγείται γραπτή ενημέρωση του/της μη συμμετέχοντα/ουσας στη συγγραφή του επιστημονικού άρθρου. Δεν επιτρέπεται η κατά οποιοδήποτε τρόπο δημοσιοποίηση υλικού το οποίο έχει δηλωθεί εγγράφως ως απόρρητο.

Ο/Η Φοιτητής/Φοιτήτρια

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Ο/Η Επιβλέπων/Επιβλέπουσα

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Abstract

In today's rapidly changing business environment, businesses operate and are called upon to exist and grow today, becoming extremely competitive due to the severe economic crisis we are experiencing. An important factor for the survival of the business is the achievement of a high level of supply chain management. A milestone for the supply chain is the ability to contribute through transportation to the movement of goods internationally, which is dominated by maritime transport.

Current trends dominating the world such as intense competition, e-business and high customer expectations require the integration of technology in the supply chain and logistics. The role of technology is a catalyst in the survival and competitiveness of businesses and thus various technical products and systems are used in the broader sense of logistics management. The purpose of this diploma dissertation is to present the forwarding of re-engineering ship spare parts in maritime transportation and to understand how they benefit from the technological solutions provided based on current technology trends.

Keywords: Logistics, maritime transport, issues-problems, technology trends, re-engineering ship spares forwarding.

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1. Introduction

Merchant transport, as we know, is the transportation sector engaged in the provision of sea freight services. The shipping market is not a single market, but a series of individual markets differentiated in terms of cargo and vessel types, route requirements, and geographical divisions. However, in a certain sense and under certain conditions, it can be considered a single economic unit. The "Rochdale Report" of 1970 provides a complete and timeless definition of the shipping industry as follows:

Shipping is a complex industry in which the conditions that determine the processes of one sector do not necessarily apply to another. In some cases, it can be thought of as a set of interrelated industries. Base vessels vary greatly in size and type, providing a full range of transportation services for a wide range of cargoes that require short- or long-distance maritime transport.

However, while it is possible to separate sectors and markets within the maritime industry, important interactions and interdependencies cannot be ignored. It should also be emphasized that most of the shipping industry is engaged in the conduct of international trade, and therefore operates in a complex global context of economic, political, and social significance between shipping companies, shippers, government agencies and other relevant parties.

It is clear that the shipping market has changed radically in recent years since it is established that new changes are constantly taking place in technology, in the number of competitors, in transport services and in legislation. As a consequence of all this, the shipping market is becoming increasingly competitive and demanding. It makes sense, therefore, that shipping companies are constantly setting new goals and designing various commercial strategies in order to survive in this environment.

Today, shipping companies are trying to discover the wishes of their customers, to adapt their charter policy according to their needs, to provide, to provide appropriate transport services to meet their requirements, to negotiate the freight rate always according to what they offer as well as to communicate effectively with the market they target in order to achieve the most efficient and long-lasting commercial employment of their customers. their ships.

It is particularly important for every shipping company to ensure the uninterrupted operation of their ships, since a day delay in their itinerary can prove quite detrimental not only to their profitability but also to their reliability towards their customers.

This is not always easy due to the distance that separates the administrative unit (headquarters) of the company from its production unit (ship). The purpose of the administrative unit is to provide all the means required to carry out the continuous operation of the production unit without hindrance. In order to achieve the above objective, a significant share of responsibility lies with the Procurement Department of each shipping company.

In the era of globalization, unbridled competition and large economic fluctuations in the prices of products and services, procurement management is one of the most important factors influencing the results of use of organizations. Businesses have now recognised the need to improve the operation of procurement. This different and improved approach comes from the contribution to the business strategy (Gyziakis & Papadopoulos, 2006)

In the maritime sector and especially in the field of supplying and supplying ships with both consumables and spare parts, supplies are one of the main running costs and the main priority of businesses is to reduce costs as much as possible in order to save resources. Lysons (1996) notes three critical factors that established procurement as a function of major importance for any business. They are:

- 1) the contribution of commissions to the profitability and added value of the business,
- 2) the evolution of the purchasing profession;
- 3) recognition of the strategic importance of procurement.

2. A Forwarders's Perspective

2.1. Definitions of supplies and purchases

The terms purchases and commissions, although different as concepts, are often used identically. Because this approach is wrong, it is very important in this paper to emphasize the definitions of the two concepts in order to give their interpretations accurately (Lambert & Stock, 1993).

Lysons defines purchasing as the "*function responsible for obtaining, by purchase, hiring, or any other lawful means, machinery, materials, supplies, and services required by the enterprise for their use in production.*" In addition, purchasing strategy is defined as the process of planning, evaluating, implementing and controlling particularly important and critical procurement decisions (Lysons, 1996).

Monczka and others emphasize that in recent years the buying process within many companies has earned a reputation as a powerful tool for improving profitability. There are three main reasons why they focus on it:

1. is the main area through which cost reductions may occur;
2. has a direct influence on quality ('suppliers may nominate or dissolve a company');
3. assists in the technological development and improvement of products and design processes (Monczka, et al., 1979).

According to Lambert and Stock, the objectives of the markets are:

- To provide a continuous flow of materials, supplies and services necessary for the operation of the economic unit.
- Keep investment in stocks and losses at the lowest levels.
- Maintain a satisfactory level of quality standards.
- Identify or develop competing suppliers.
- Standardize, where possible, the items purchased.
- Purchase the required items and services at the lowest possible price.
- To improve the competitive position of the economic unit.
- To achieve harmonious, productive working relations with the other parts of the economic unit.

- Achieve market objectives with minimum administrative costs.

The term supply has a broader meaning than the term purchase and includes purchases, movement of goods, storage, and internal receipts (Lambert & Stock, 1993). Other individual procurement processes include searching for suitable suppliers through advertising, receiving offers from interested suppliers, inventory management and new purchase decisions, and regular procurement (Pittas, 2008).

Procurement function is defined as *"a systematic decision-making process for determining and selecting the quality, quantity, price, time, and source of purchase for goods, materials, products, goods, or services that are determined to be acquired."* (Kontaris, 2002).

The mission of the procurement department is to ensure the required materials and services in the right quality, quantity and time, from the right source and with the best possible financial terms. With regard to the term "correct" which refers several times to the mission of the procurement department, it is important to state the following:

- The term "right" is subjective: each organism defines the right thing differently.
- The term "right" is subjective: each organism defines the right thing differently.
- What is "right" can change depending on the conditions prevailing in the global procurement environment.
- The number of "right" ones mentioned above should be in line with the scope and strategy implemented by each organization to achieve its operational goals and objectives.
- In practice, sometimes some variables of the concept of "right" are not achieved simultaneously with each other, e.g., it is possible that the quality is correct but not the price.

It is understood from the above that the purpose of purchases and procurement in general is not only to achieve financial goals such as cost reduction but also some other equally important factors. The timely and safe delivery of materials, the assurance of the quality of goods, the efficiency of suppliers, the improvement of ordering and pricing means, the elimination of bureaucracy are elements that contribute to the complete and continuous satisfaction of customer requirements (Hampson & Lamming, 1996).

2.2 Stages in the evolution of the procurement procedure

In the initial stages of development of industrial production systems, the dominant means of production was de facto labor, since products were produced by the hands of the craftsmen of the time. The supply of materials and the disposal of products was easy because the production units were located close to the sources of raw materials and the sales of the products took place mainly locally.

The development of technology and the mechanization of production resulted in the specialization of labor, the production of complex products and the exponential increase of production quantities. As a result, sources of supply and product markets were removed from the places of production, and both the supply of materials and the distribution of products became particularly important.

At the same time, the process was accelerated by technological developments in the means of transport and storage of products (e.g., freezing of products made it possible to preserve perishable products for long periods of time) resulting in increased world trade. Especially in countries with high levels of industrial production, the management of supply and distribution networks became crucial, as product markets began to become internationalized at great distances from their (few) production points. The efficient operation of supply networks has been found to make it economically profitable to market products that have been produced in remote places and at a time regardless of their consumption.

Recent years have seen an explosion in technological developments and market structures, due to the rapid obsolescence of new products, direct communication access to potential customers from almost every part of the world, the emergence of the Internet, the reduction of restrictions on commercial transactions, the development of new distribution channels and means of transport, but also the stabilization of political and economic conditions. The new conditions have led to increased levels of competition between businesses both locally and globally.

It is noted that although these changes have had a progressive evolution, in recent years they have accelerated. Business executives initially turned their attention to internal operations improvement programs in order to reduce production costs.

It was later understood that new marketing strategies were needed to increase the degree of customer engagement with the business. As a result, research, design and

manufacturing functions were strengthened to support marketing with high-quality, low-cost products.

With the ever-increasing intensity of competition combined with technological development, companies had to produce new products at a rapid pace in order to maintain their comparative advantage. This led to more flexible forms of organization, such as reduction of management levels, increase of horizontal group activities, organization by program and strategic management of the supply base.

At the same time, it became clear that products, regardless of their quality, should be easily available to customers at all times. Making products available in the required quantities at the right time and place and at low cost was a new challenge that contributed to the creation of new distribution networks.

Under these conditions, communication and information technologies have led to a renaissance of the supply function, gradually introducing developments such as electronic data interchange (EDI), electronic fund transfer (EFT), e-commerce, the internet, enterprise resource management information systems (ERP) and paperless procurement (e-Procurement).

Many of the daily buying actions tend to disappear. The new systems will gradually enable the integration of all supply systems, inventory management and globalization of supply sources through transparent business-to-business information (Laios, 2010). The use of e-commerce technologies in procurement, according to research, brings significant benefits, such as:

- Reduction of the procedural cost of ordering and payments by 90%.
- 75% reduction in supply time.
- Reduction of the prices of purchased products by 10%.
- Improvement of the procurement compliance rate with the initial agreement by 30% (Panayiotou, 2008).

2.3 The concept of procurement management

Supply management is defined as a set of integrated activities that make it possible to obtain materials, equipment and services necessary to fulfill the mission of each economic unit. Thus, it is responsible for designing, implementing, optimizing and managing the

external and internal components that make up the supply system of a business or non-profit organization.

At a strategic level, supply management:

- Detects opportunities and threats from the supply environment
(Supply Market Analysis)
- Defines strategies for the procurement of all key inputs
(Planning of supply base and supply strategies)
- Shapes the relationships between the business and suppliers
(Supplier Relationship Management)
- Defines the value chain of products (Product design)
- Actively participates in the operational planning team (Supply Network Strategy and Corporate Strategies)

At an operational level, the supply administration:

- Converts all kinds of user requests into clear purchase descriptions (Description of applications and design of specifications)
- Identifies and selects the most suitable suppliers (Research sources, get quotes and select suppliers)
- Manage and cultivate the right relationships with suppliers
(Preparing, preparing, invoicing and managing contracts and negotiations)
- Minimizes supply costs both outside the enterprise at the supplier level and in-house when converting inputs into products and/or services (Forecasting, supply planning, inventory management and material requirements planning)
- Minimizes the risks of supply interruptions and excessive increases in purchasing costs (Price and cost analysis, fixed asset purchases, total cost) (Laios, 2010).

2.4 The supply cycle

The purchasing process in the business environment generally follows four phases. These can be characterized as groups of energies that evolve along the circumference of a circle. The realization by some users that a purchase is required triggers a series of actions that should be completed within a certain period of time.

The sequence of actions is completed with the receipt by the user of the purchased product or service. In particular, the main phases that are distinguished in the buying cycle are the following:

- Description of receivable: This phase mainly concerns the identification, definition and description of the purchasing need – requirement, while it includes actions such as issuing purchase requests, designing specifications, pre-estimating prices and purchase times, drawing up budgets and planning purchasing actions.
- Research of sources of supply: It concerns the research and evaluation of potential suppliers and includes actions such as supplier identification, interviews with suppliers, review and enrichment of supplier lists, evaluation and pre-selection of suppliers, visits to sectoral exhibitions, research of relevant literature and commissioning or self-construction studies.
- Selection and award of supply – Issuance of purchase order: This phase concerns the selection of the final supplier and the way the purchase is conducted and includes the evaluation and selection of suppliers, selection of pricing methods, definition of evaluation and performance criteria, conduct of tenders, negotiations, awards, preparation and conclusion of contracts and issuance of purchase orders.
- Order fulfillment: The processing phase of purchase orders includes contract management and monitoring, order acceleration, receipt, inspection, storage, issuance to users, accounting settlement with the supplier and invoice control.

The supply cycle offers a mental framework for describing actions included in the purchasing process. This does not mean, of course, that the actions implemented during a purchase are always the same, or are always carried out in a certain order (Laios, 2010).

2.5. Evaluation and selection of suppliers

In modern businesses, the evaluation and selection of suppliers is perhaps the most important activity of supply executives. Results from recent surveys show that the choice of suppliers significantly affects the performance of the business.

In order to achieve the objectives of quality, price, availability and service, the selection of suitable suppliers is a prerequisite. Suppliers who supply a business with critical materials are for it a capital and a source of know-how, just as valuable as the specialized personnel employed by the company itself.

Especially with regard to the development of new products, it is imperative to cooperate with marketing and research & development departments to select subcontractors or suppliers who will be involved in co-production. The evaluation and selection of suppliers are of particular value even for less obvious reasons. The immediate inclusion of a reputable supplier in the supplier file offers a significant time advantage.

The global trend towards a reduction in the number of suppliers is well known. Businesses with a supply base with reputable suppliers are sure to be able to offer their customers high-value products and services. The selection of the right suppliers is particularly important if we understand that more than 75% of the functionality of business supply chains is ensured by suppliers, which shows how critical supplier selection is.

2.6. Assessment criteria

The process of selecting and integrating suppliers into the strength of a business does not begin with receiving offers and does not end with the completion of an order. The supplier evaluation and selection procedures apply to at least four purchasing activities, such as those described below.

2.6.1. Assessment of potential suppliers

For the renewal of the supplier file, the potential of new potential suppliers, with whom the company intends to develop some future cooperation, is assessed. Naturally, this assessment is not always based on actual facts, but often uses information drawn from various sources in many ways. The process of evaluating and scoring the abilities of potential suppliers and their interest in entering into cooperation with the purchasing company is carried out with the help of indicators and measurement procedures which constitute a structured evaluation system (supplier appraisal/evaluation).

2.6.2. Evaluation of Tenders

Evaluation of suppliers is also carried out during the selection of tenders for the supply of an individual item. Of course, if the evaluation of potential suppliers has been preceded, the tender selection process is achieved without reducing its credibility.

2.6.3. Continuous evaluation of active suppliers

Each business keeps a record of suppliers which must be updated in a certain way. The performance trajectory of active suppliers must be continuously recorded with reliable indicators that are directly relevant to supply strategies. Such rating systems are known as vendor rating systems.

2.6.4. Evaluation for Corporate Partnerships

Evaluation for corporate partnerships with suppliers requires extensive assessments that are not limited to a simple assessment of their capabilities, but include processes with continuity and feedback. More specifically, in corporate partnerships, the supplier, after the initial evaluation, is usually called upon to implement various necessary changes in its procedures and organization, following relevant suggestions from its customer, which are then subject to a new evaluation. Throughout the partnership period, continuous improvement objectives are set, the achievement of which is reviewed at regular intervals.

3. Logistics in Maritime Transport

3.1. Preliminary remarks

In this chapter, there is a historical review of the route of Logistics and the definitions encountered internationally are mentioned. Then, the objectives of the logistics sector, its quality characteristics and the sectors in which it is applied are presented. It also analyzes the evolution of the supply chain industry in Greece, as well as the need for its general management and how it has increased over the years. Next, the main functions of Logistics, the existing means of transport of goods are analyzed and the comparison between them is made, which ultimately leads to the selection of the appropriate, per case, means of transport.

3.2. History

Logistics have existed as a human activity for many centuries. The etymology of the word Logistic comes from two words, "counting" and "image" or "knowledge of arithmetic skills through pictures". Logistics first appeared in the time of Herodotus, in the 5th century BC. In particular, they are found in the war preparations of the Persians against the Greeks, where the term supply chain describes the planning and support of the movement of products and people. The next reference to the term is in the 4th century BC, in the time of Alexander the Great, who used supply chain techniques in order to achieve proper supply and movement of his troops from one region to another in order to reduce costs.

As a standalone science, logistics was first examined in scholars' work in the early 20th century, but it developed more after the end of World War II, when the great demand for goods and services had to be met. Companies then aimed to meet existing demand ahead of their competitors, acquire the necessary raw materials and occupy new markets.

Around 1950, logistics was used alongside marketing ideology and thus was largely combined with customer services. In the 60s the concept of the total cost of operating a business was developed and then in the 70s the policy of stocks held by businesses was revised, introducing the philosophy of planning purchases. In the following decade (1980-1990), where there was great progress in telecommunications, new methods and techniques contributed to the optimization of communication, the high speed of information transfer and the overall better performance of the supply chain.

During this period, service and distribution companies began promising specific and strict delivery times. In the early 1990s, businesses implemented a specialization model, thus

expanding the supply chain. New production and distribution networks and individual supply chains were created that worked together and interacted. Businesses showed more interest in the field of Logistics Management.

The main causes were: the emphasis on customer satisfaction, the development of international trade and the appreciation that decisions about the distribution network are of strategic importance for the organization. It is noted that in this decade appeared the companies Third-Party Logistics (3PL's), to which companies subcontract basic services such as storage, transportation, distribution, etc. In the early 2000s, technological applications and solutions were applied for the first time in the transportation of products and services.

3.3. Logistics Definitions

Supply Chain / Logistics is described as an integrated network or value creation system, which includes the design, control, implementation and monitoring of the normal and reverse flow of products, services and the necessary information from their point of origin to their point of consumption, in order to meet customer needs and requirements. Many definitions of logistics have been given in international references. Some of them are chronologically as follows:

- *"The science of management, technical methodologies, and technical activities related to the planning, identification, acquisition, maintenance, and disposal of productive resources is a means of supporting organizational goals, strategies, tactics, and controls"* (SOLE Society of Logistics Engineers, 1966).
- *"Completion of two or more activities to design, implement and control the efficient flow of raw materials, manufactured goods and finished goods from the point of origin to the point of consumption in order to fully comply with customer requirements"* (CLM Logistics Management Committee, 1986).
- *"Management responsibility to design and manage flow control systems for the best interests of the enterprise and to strategically store materials, components, and final inventory"* (Williamson, et al., 1990).
- *"The process of planning, managing and controlling the flow of materials and information within a system"* (UNCTAD, 1992).
- *"The organized movement of services, goods, and sometimes people"* (International Logistics, 1994).

- *"A combination of transportation, warehousing, distribution management, and information technology to maintain control of global supply chains"* (Benson, et al, 1994).
- *"A set of business processes, from the end user of the product service to the initial supplier of materials, products, and information that can add value to the customer."* (Lambert, et al., 1998).

3.4. Logistics Objectives

Logistics has as its main goal the satisfaction of the company's customers, providing the right products at the right time and in the desired quantity at the lowest possible cost. More specifically, the objectives of logistics are:

- Achieve the desired level of service with the lowest possible inventory throughout the production process and product handling.
- We maintain the overall quality of our logistics services at a satisfactory level. More specifically, the consistency of transportation and run times and the ability of customers to track the path of their products are some of the indicator factors that have a significant impact on the quality of logistics services.
- The achievement of the set goals or the smallest possible deviations, difficulties and unforeseen factors are effectively handled.

3.5. Logistics Qualitative Data

According to the data presented by Gerakos, Kehras, Tsetsos (2008), the most important qualitative elements of logistics are:

- **Availability.** This is defined as the system's ability to always have sufficient inventory to meet the needs of production or customers. The system must always supply the required number of products so that the production and consumer needs are immediately satisfied.
- **Capacity.** It is defined as the system's ability to move the quantity requested or produced within a set time frame. For example, the speed at which order execution and how fast you achieve this rate on a daily basis affects capacity.

- Consistency. This is defined as the ability of the system to continuously and uninterruptedly deliver the desired product to the user in good condition, without errors.

In summary, a successful logistics system should have the best combination between the quality and quantity of the services provided over time, and should have as little inventory as possible, such as raw materials, packaging materials, intermediate products, finished products, and commodities at all stages of production. In addition, in order to be considered successful, you need to find a mode of transport that has the lowest transportation costs, correctly plans the route, and minimizes empty space as much as possible.

3.6. Fields of application of Logistics

Logistics is mainly applied in the following two fields:

1. In business. Businesses have as their main goal the maximum satisfaction of their customers. To achieve this objective, the appropriate organization of the inputs and outputs of its materials and products, as well as their targeted internal movement, is required.
2. In the supply chain. The supply chain is the whole route (businesses and organizations) that a product must follow in order to reach the end customer. For the proper functioning of this chain, in the highly competitive environment of the global economy, it is necessary to organize the flow of products and information efficiently.

3.7. Supply chain management

The proper management of a supply chain is the goal of the companies participating in it, as by optimizing processes, the added value for all transactions in the environment of each business is maximized. The object of management is the most accurate organization and distribution of all materials and information between companies participating in a supply chain.

The process of choosing the right supply chain management consists of the following steps:

1. The selection of suitable suppliers.
2. The selection of the optimal route for the transport of supplies.
3. The use of software programs for the management of relevant processes.

Some definitions of supply chain management found in the international literature, in chronological order, are:

- *"Management of a network of internally connected enterprises involved in the ultimate provision of packages of products and services addressed to end consumers"* (Harland, 1996).
- *"a set of methods and tools used to efficiently and harmoniously integrate producers, warehouses and retailers in order to produce and distribute the commodity in the right quantities, in the right locations and at the right time under the condition of minimizing the total cost along the supply chain and ensuring the desired level of service"* (Simchi-Levi, et al., 2000).
- *"Systematic and strategic coordination of traditional business functions within the enterprise and between enterprises within the supply chain, for the purpose of improving the long-term performance of individual enterprises and the supply chain as a whole"* (Mentzer et al., 2001).
- *"Alignment and coordination of enterprises that constitute a supply chain, aiming at the production and delivery of superior quality to the final consumer, at the lowest possible cost to the supply chain as a whole"* (Harrison, van Hoek, 2002).

3.8. The supply chain in Greece

It is noted that Greece has an advantage in the logistics market, due to its strategic geographical position, as it is located at the intersection of three continents. However, due to the lack of modern infrastructure and especially the unorganized rail transport, the development of the supply chain in Greece is lagging behind.

However, according to Euro2day (2013) data, it is estimated that logistics in Greece generate 12% of GDP and employ 5.4% of the workforce. According to the National Bank of Greece (2017), logistics businesses in Greece not only managed to survive the crisis the country is facing, but increased their contribution to Greek GDP to 2.9% in 2016, from 2.5% in 2008. Also, according to the same source, the cargo handling sector has improved, as the volume of cargo has increased by 60% over the last eight years.

According to the data presented in a report of the Hellenic Federation of Enterprises (2013), the following disadvantages are observed in the supply chain sector in Greece:

- low degree of specialization of Logistics companies.

- lack of organized Logistics Parks in Greece.
- Low standard storage spaces in both equipment and systems.
- unsuccessful level of cooperation between companies in the sector.

(Service level does not increase)

Finally, based on the data of the analysis of the National Bank of Greece, the growth that the logistics sector is expected to have over the next five years is strong and is estimated at around 30%.

3.9. Importance of Logistics and Supply Chain Management

Logistics and supply chain management are crucial factors in business financial planning because they account for a significant portion of sales. This is confirmed by data from Gattorna & Walters (1996), which states that logistics and supply chain management in a typical industry account for 20% to 25% of the company's turnover and 10% to 15% of the final cost of the final product.

This ratio is obtained by taking into account factors such as transportation costs, administrative storage costs of materials and goods, inventory maintenance costs, costs of transporting products within the business, fulfillment costs, labor costs, etc. According to the same data, the cost of fixed assets directly related to the logistics management process ranges from about 35% to 40% of the total fixed assets of the company.

More specifically, this percentage includes building facilities, as well as equipment for storage, production, handling and management of materials and goods, security equipment, information systems, etc. As shown by the above percentages, the effort to minimize costs and utilize all the tools available to a company for the processes of Logistics Management, always having as main goal the satisfaction of the customer, is a challenge for the management of each company.

In addition, in recent decades, businesses have turned to global markets in order to achieve cost minimization, which is one of the main demands, but also the most direct service of their customers through the acceleration of the design and implementation process of the products offered. However, the availability of capital of each company plays a key role in this process, as well as the close control of the cost and quality of the products and services produced, so as to achieve the best possible combination between cost and quality.

In this effort arose the need to find more effective methods for coordinating the flow of materials and information, both internally and externally. However, in order to achieve

the desired coordination, as Simchi-Levi et al. (2000) argue, relations between all levels of suppliers and partners should be closer.

In conclusion, the goal of every business is to adapt as quickly as possible to the constantly changing consumer demands, while managing to maintain the speed of product delivery, cost and reliability at a competitive level. The company, whose supply chain will achieve the above demands, will also be the one that will have the best conditions to gain the largest market share.

3.10. Reasons for increasing the importance of logistics

Factors that have led to increased interest in the logistics sector include:

1. The rise in oil prices in the 1970s led to an increase in transportation costs, which led to increased interest in the transportation system as a whole.

2. Liberalization of the transport sector, which began in the 1980s and continues to this day in Europe and the United States. This liberalization has brought about major changes in the transport sector and created new opportunities and options that did not exist in the past. Therefore, the transport policy of the enterprise has been adjusted in accordance with the expected benefits of these changes.

3. Peak production efficiency. Companies now attach great importance to the research and development of cost control processes as well as quality control, increasing performance and optimizing performance in these areas.

4. Changes in equity policy. Suppliers now need to not only have central storage and distribution points, but also improve distribution and delivery times and services.

5. Huge increase in production lines. This increase is due to efforts to meet the marketing needs of each customer to receive what they want.

6. The rapid development of technology and the rapid development of information technology and the use of computers. The computers and models developed have provided solutions to problems related to logistics, and they arise from a variety of solutions and products that make the system more complex and cumbersome.

7. The increase in the value of money, coupled with limited access to new capital, has increased the need to reduce costs and reserves.

8. With the development of telematics, the unit cost of information recording, transmission and processing has been greatly reduced, which has led to an increase in investment in information, which has greatly reduced transportation and storage costs.

9. Internationalization of trade. The geographical change in the centers of production and consumption was radical.

10. Reduction of production time. As a result, sales and distribution provide a great opportunity to reduce production time, giving your business a significant advantage in the competitive competition.

3.11. Main Logistics Functions

The basic functions of logistics, which are adjusted each time according to the needs of each business, are classified into the following four categories:

- Purchases – Consumables

Purchasing refers to the supply of goods and services from a third party that is part of the final product. More specifically, it involves acquiring equipment, raw materials and auxiliary materials, consumables, spare parts, intermediate products by lawful means to produce the final product or service. Acquiring all of the above directly depends not only on the needs and requirements of the company's customers, but also on the degree of service they want to achieve, always taking cost minimization as a criterion.

- Safekeeping

This includes the design, organization, and operation of the warehouse. The design of the warehouse depends on the nature of the goods, the quantity to be received and the storage system to be selected, and is always aimed at the safety of the product and its protection from wear and tear factors such as weather conditions, theft, etc. The storage of goods must be carried out in such a way that it can be supplied directly to the transport chain, and it is necessary to ensure the continuous flow of goods in accordance with the requirements. The current trend of warehouses means creating large storage centers to meet the needs of a large geographical area.

- Inventory Management

It's about calculating the appropriate inventory levels of products that each industry needs to maintain so that it can successfully respond to its activities.

- Transportation and distribution of products

It is about choosing the right method for the physical movement of the product. It refers to the use of appropriate means of transportation to deliver products on time to customers, whether they are privately owned or not. The cost of this process has a significant impact on the overall cost of running your business.

Advances in transportation technology have made it possible to dispose of goods in almost any part of the world, regardless of where they are produced. The terms transportation and distribution refer to the transportation from a warehouse or premises of a company to a customer, but transportation refers to the movement of a small number of a few and a few customers, while distribution refers to the movement of a large number of products in small quantities and a large number of customers.

3.12. Specificities of maritime transport

Shipping makes a significant contribution to the sustainable economic development of each country, increasing the national production of European countries and strengthening the strategic position of the European Union and its bargaining power in international organizations. In addition, the global economy and its proper functioning depend on the transportation of large quantities of bulk cargo, such as raw materials, fuels, and food, which are mostly done by sea.

Thus, ships became the link between production and consumption, constituting the foundation of the world economy and development. This special position of maritime transport in the economy of a country is the result of several special characteristics compared to other modes of transport. Vessels on which sea transport is carried out are considered the only means of transport that ensure economically and technologically advantageous transportation of large quantities of cargo and large quantities.

Undoubtedly, ships occupy the most important and largest part of the world transport chain among all types of cargo, and this is due to the fact that the development of maritime transport is closely linked to and directly dependent on world trade. This is due to the fact that the ships are designed and improved by specialized shipbuilders, taking into account the ship adaptation required for cargo accommodation facilities, and therefore adapt to the specific requirements of the transport product.

A positive factor in sea transport is the reduction of processing time. Since most of the products are packed in containers, the loading and unloading time is very fast, and it can

even be faster than the corresponding loading and unloading time of the aircraft. This is because, when empty cells are available, ships can be loaded and unloaded at the same time, while aircraft must first fully unload and then begin loading.

Of course, we should not overlook the fact that ships operate circular routes in relation to air transport, which, together with a reduction in the frequency of routes and the limitation of minimized goods, makes them less profitable in small quantities. The nature of maritime transport is international. The fact that the mass movement of raw materials and energy materials was practically possible and advantageous only by sea was one of the first factors that internationalized maritime transport.

Therefore, ships are the main means of conducting world trade and play a leading role in international trade. The prospects for the development of other means of transport do not seem to be the same as threatening the dominant position of ships in the near future. In addition, sea transport is differentiated from other modes of transport due to its low cost. This gives special advantages to sea freight and makes it the best alternative to land transport, but such cargo can be handled at port loading and unloading points.

Sea freight is an environmentally friendly option for transporting products, and these benefits take precedence over maritime transportation, especially when environmental protection is required in every business today. At the same time, attention is paid to ensuring and upgrading maritime safety and the protection of the marine environment, which is one of the priorities of the Union.

Despite the many positive aspects that transport offers, there is another dark side, which is also responsible for the negative and sometimes leveled image that prevails in public opinion about it. Ships as a means of transport lag behind the speed at which they can develop compared to other means.

However, if you compare the volume of transport with the distance traveled, this can be overlooked, as the negative consequences of low speeds are negligible. Of particular importance is the possibility of continuous operation. The 24-hour operation is an additional feature that to some extent compensates for the speed advantage of short-haul air transportation over sea freight.

The rapid development of human activity has led to the growth of industry, economy and, consequently, shipping. These developments have contributed to increasing pressure on

marine ecosystems through disasters that occur on the seabed and, in the long run, leading to environmental pollution and climate change.

Due to the high risk of maritime transport, which is second only to air transport, it was essential to further analyze maritime accidents. Therefore, the International Maritime Organization (IMO) conducted research on these accidents, focusing on the causes in the artificial and natural environment. Studies have shown that 80% of accidents are caused by human factors.

In addition, an important factor in determining whether or not sea transport is carried out in sea transport is weather conditions. Globally, adverse wind and wave conditions are taken into account in the route and transportation that each vessel must follow, depending on the cargo they are transporting, as the arrival or departure of ships may be delayed. In addition to strong winds and strong waves, fog also causes problems for navigation, forcing ships to move using only radar, which puts a strain on the total travel time.

3.13. Categories and types of ships

An important factor for maritime transport to be efficient is the type of vessel used. Due to the specialization of maritime transport, ships have been built according to the needs and characteristics of the cargo being transported, which makes the goods safer and cheaper to transport.

More specifically, merchant ships engaged in maritime transportation are classified into four main categories:

- Cargo ships are divided into dry cargo, liquid cargo and intermodal transport vessels.

More specifically, dry cargo ships are divided into ships carrying similar bulk carriers, such as sugar, wheat, coal, coal, fertilizer, bauxite, and general cargo ships. General cargo can be electrical appliances, electronics, clothing, and generally anything that can be stacked inside a container and transported by a container ship. In addition, a general cargo ship is a vehicle carrier (Roll-On/Roll-Off) that allows vehicles to enter the vessel and load or unload cargo.

- A liquid cargo ship is an oil tanker, which, depending on the type, is loaded with crude oil and its derivatives (e.g., kerosene), liquefied gas (e.g., natural gas), medicinal oils and vegetable oils (e.g., caustic soda

and ammonia). Tankers include vessels carrying liquefied petroleum gas and liquefied natural gas.

There are also special bulk cargoes that are transported by cargo ships and require special handling during loading and unloading. Examples of such cargo are refrigerated products, vehicles, prefabricated houses, which, of course, are not loaded in large quantities, but are transported in large quantities in units.

- An intermodal cargo ship is a vessel that transports alternative liquid and dry cargo bulk cargo. It is divided into two categories: ore/bulk/oil carriers (OBOs) and ore/oil carriers
- Passenger ships transport passengers and cargo and vehicles under certain conditions. Some of these vessels were configured to transport vehicles and small quantities of goods.
- Special purpose vessels created due to the need for fast transportation or the development of technology. Special purpose vessels are vessels such as refrigerated ships, fishing boats, offshore vessels, cable vessels, training vessels, and meteorological vessels.
- An auxiliary vessel that does not carry cargo or people and helps the rest of the vessel pass safely and smoothly.

Such vessels are icebreakers, tugboats, dredgers, pilot boats, light ships, floating derricks, salvage boats.

3.14. Changing customer needs

There are constantly new market challenges for carriers to consider. The solutions provided by Logistics must be tailored to the needs of each customer. Full transparency of orders, visibility from the raw material phase to the final sale of goods, and reverse supply chain have become almost standard for many product groups. With so many variables in the global supply chain and many parties involved, maintaining the level of customer service is a challenge for logistics companies.

A recent example of a challenge facing the market is the tendency of shipping companies to form alliances. The impact of technology is changing the way carriers and their competitors can manage their businesses, as well as serve their customers. Finally, market expectations continue to focus on increasingly fast and cheaper deliveries.

3.14.1. The routing of modes of transport

A crucial decision for all transport is the path that the means of transport will follow. The aim is to find the most effective route between two positions, as well as to define alternative routes to be followed in case of problems or risks on the predetermined route.

By choosing the right route, the cost of transporting goods from one location to another is significantly reduced. Of course, routing must be done quickly and accurately in order to maintain the competitiveness of logistics companies. Comprehensive and correct routing should provide directions, travel distances and estimated travel times.

It should be noted that, when launching the means of transport, the following must be taken into account:

- The importance of customers, since priority is usually given to serving customers who generate more turnover.
- incompatibilities between customers. Due to the competition between neighboring customers, many times the company tries to serve them from different routes.
- the time of visit. Vehicles must serve some points of the network between certain time limits.
- Service time. This time is usually fixed. In practice, however, it depends on the customer, but also on the quantity delivered.

3.14.2 Timely delivery

On-time delivery includes responding in a timely manner to market dynamics, customer requirements and how to manage all changes. Products must reach customers accurately and quickly, since delivery times have now been minimized. If a business cannot respond in time, then customers look for another business that promises faster delivery, as delays are no longer acceptable. It is now understood that time is a factor of competition between logistics companies.

In fact, the more diverse the geographic reach of customers and warehouses, the more critical the time. The fact is, customers are looking for companies that provide speed, detail, and good service at the same time.

3.14.3. The lack of adequate infrastructure

Infrastructure problems, particularly in developing countries, are a serious problem. With thousands of vessels serving trade around the world, the problem of lack of infrastructure has become clearer recently. Most of the terminals are still not ready to accept such large vessels and serve them. This causes congestion problems in some terminals.

3.14.4. Safety of goods

This issue is a growing concern for the logistics industry due to the shift of goods from supplier to supplier. The more data you have about your shipping supply chain partners, the more you can record and access them in all aspects, the safer your shipment will be.

The market challenge is to maintain the integrity of the shipment. Overall, all partners in the supply chain transporting cargo should be as involved in the security process as possible, as they all participate in the monetary loss if the cargo is damaged or lost.

In other words, there is a need to raise awareness among all parties to prevent criminal activity, engage law enforcement, and help recover stolen products. Product quality and reliability are very important. The combination of effective security solutions, intelligence, law enforcement engagement, and analytics is critical to ensuring logistical security.

3.14.5 Capacity increase

The increase in production capacity is putting pressure on logistics providers to step up their efforts. For example, it leads them to hire more workers, build facilities, and adapt to new shipping methods.

Consumers are able to order goods from all over the world with great ease. Retailers have found ways to reach an international consumer base and this forces the logistics industry to constantly find better methods to deliver these goods quickly and hassle-free.

It is now clear that if the global logistics industry hopes to consolidate its position in a future-growing technology market, service providers need to make significant changes and develop innovative new solutions. Thus, they will maintain their current customer base while attracting new companies and consumers.

3.14.6. Fuel costs

One of the highest costs affecting transportation costs is fuel prices. Higher fuel prices are likely to increase transportation costs. Rising prices of petroleum products increase surcharges added to freight rates, which cuts transport companies' revenues and profits. The choice of fuel supplier and the place where refueling will take place is a critical decision for the profit of the business.

3.14.7. Circulation of information

The transportation of products and materials nowadays must be accompanied by the knowledge of their location on the map, in real time. This information is vital for customer satisfaction, as well as for sound decision-making within the business. Thus, information must be available to all those involved in transport, i.e. suppliers, transporters, warehouses and customers.

In conclusion, careful monitoring of information is essential for the effectiveness of logistics. In addition, it protects companies from common mistakes, such as wrong orders, lost packages, and delayed shipments, during busy times of the year.

3.14.8 Optimizing the use of the transport fleet

The larger the company, the larger its fleet of means of transport. This means that more assets will have to be organized by the logistics manager. This can be good, but it can also be negative, as it requires organized and effective management. Continuous monitoring of procedures is required in order to avoid losses and to use the available means as much as possible.

3.14.9 Exceptional risks

Unsurprisingly, the longer the supply chain, the greater the risk exposure. The risks that are characterized as extraordinary are the natural disasters that can occur, which have an impact on Logistics. An example of an emergency is the multiple earthquakes that occurred in Japan some years ago, which disrupted the supply of many global companies, such as Toyota and Sony. To deal with such adverse situations, it is important to have an emergency plan from logistics companies that helps mitigate the risk.

3.14.10. High costs

Cost is the main measure by which logistics efficiency is often measured. There is no doubt about how significant the cost is. But the company needs to be careful. Cost control

and management are important factors for business profitability. Minimizing the cost of various logistical elements, such as freight transportation and warehousing, can degrade logistics efficiency and reduce customer satisfaction. However, high cost does not guarantee better service and correspondingly low cost does not necessarily cover logistics needs.

In addition, there may be currency conversion issues that affect costs. The conversion of currencies may create adverse or favorable cost fluctuations, which, however, are not related to the performance of Logistics. Examples of events that can give rise to such issues are:

- carriage of goods by air is indicated in the currency of the country of origin,
- Charges at ferry terminals are also in the currency of the country of origin,
- product warehouses in destination countries invoice products in the currency of the country of origin

4. Methodology

4.1. Purpose of investigation

International shipping transports more than 80 percent of global trade to peoples and communities around the world. Shipping is the most efficient and cost-effective method of international transport for most goods. It provides a reliable, low-cost means of transporting goods worldwide, facilitating trade and helping to create prosperity among nations and peoples. Various repair and maintenance methods are used to reduce ship downtime costs and downtime. In this thesis, the reconstruction of ship spare parts will be analyzed, from the perspective of suppliers.

In particular, the objective of this diploma thesis is to identify the most important spare parts, which are compatible with a number of ships belonging to the fleet managed by a specific shipping company. Next, the forecasting of the needs for these spare parts for the entire fleet and the creation of an appropriate replenishment strategy, so that this diploma thesis becomes a tool to support the purchasing decisions of the procurement department.

4.2. Research Questions

The research questions are determined by the dependent variables and are as follows:

1. What are the key challenges of the sector?
2. In what ways is the industry more efficient?
3. How employees in the sector should be trained in order to serve more effectively.

4.3. Limitations of Research

The questionnaire is a form that includes questions about the topic on demand for the purpose of collecting data. The advantage of the questionnaire is the large collection of data on specific questions that becomes statistically significant so that through a statistical package they can be analyzed and conclusions can be found from them. In addition, the sample increases compared to face-to-face interviews as it takes less time and expense.

On the contrary, some negatives are identified with the use of this research tool, such as the commitment of respondents to answer the specific questions of the questionnaire, without being able to add additional things and opinions. In addition, there may be misunderstandings since the researcher is not present to explain each question and generally any questions the participant has. At the same time, it is observed that there is no safety valve

for finding it honesty of the respondents and their subjective understanding of the questions, as well as the accuracy of their answers.

To prevent and limit the above negatives, the researcher has tried to structure the questionnaire as clearly as possible with simple and understandable questions. Also, a paragraph was created where it highlights the definition of the topic of the questionnaire so that the clarification of the questions is smoother and this leads to the correct answers of the participants.

4.4. Participants

The selection of the sample was made by the method of ease sampling. Because of the survey sampling method the sample was conveniently available and of any kind. Further generalization is limited exclusively to populations, which have similar characteristics with those of the sample. A total of 32 employees employed in the shipping sector participated in the survey.

5. Results

1. Maritime Profession

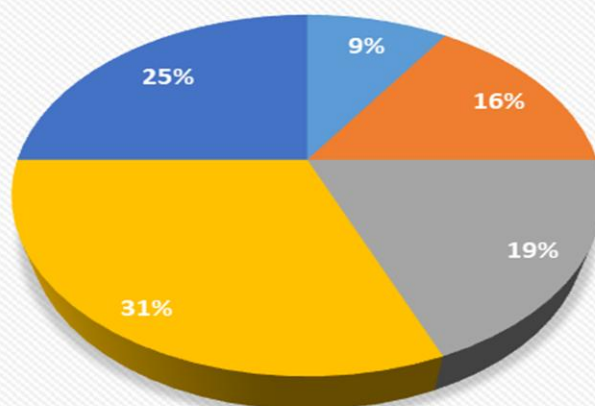
Question: What is your role within the maritime industry?

A/A	What is your role within the maritime industry?	FREQUENCY	PERCENTAGE
1	I work as a superintendent engineer responsible for vessel maintenance and operations.	3	9,375
2	I am a logistics manager working for a shipping company, overseeing supply chain operations.	5	15,625
3	I'm a procurement officer in a maritime organization, handling the acquisition of ship spares.	6	18,75
4	I am a marine logistics coordinator / forwarder for ship spares	10	31,25
5	Other in the maritime industry	8	25
		32	100

Table 1. Distribution of respondents by maritime profession.

In the table above it is observed that most employees with a percentage of 31,25% work on the subject we study and here are various other specialties that are not included in the table by percentage 25%.

What is your role in maritime industry?



- I work as a superintendent engineer responsible for vessel maintenance and operations.
- I am a logistics manager working for a shipping company, overseeing supply chain operations.
- I'm a procurement officer in a maritime organization, handling the acquisition of ship spares.
- I am a marine logistics coordinator / forwarder for ship spares
- Other in the maritime industry

Figure 1. Distribution by Profession

2. Level of Experience

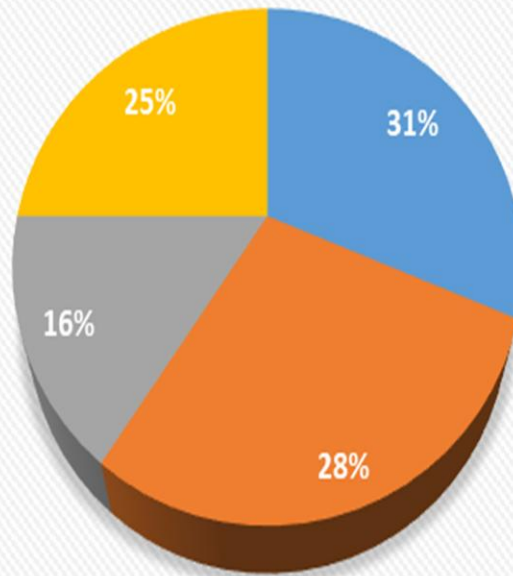
Question: How many years have you been occupied in the maritime industry?

A/A	How many years have you been occupied in the maritime industry?	FREQUENCY	PERCENTAGE
1	0-5 years	10	31,25
2	5-10 years	9	28,125
3	10-15 years	5	15,625
4	Over 15 years	8	25
		32	100

Table 2 Years of experience of respondents.

The above table reflects the years of experience of the employees. The largest percentage of experience is held by employees who have experience in the marine sector up to 5 years, followed by employees with up to 10 years of experience while employees with more than 10 years occupy the smallest percentages.

How many years have you been occupied in the maritime industry?



■ 0-5 years ■ 5-10 years ■ 10-15 years ■ Over 15 years

Figure 2 Experience

3. Academic Background

Question: What is your academic background?

A/A	What is your academic background?	FREQUENCY	PERCENTAGE
1	High School	1	3,125
2	Bachelor's Degree	13	40,625
3	Master's Degree	18	56,25
4	PHD	0	0
		32	100

Table 3Main challenges in ship spares forwarding

The table presents the academic background, the percentages they occupy are as follows: Master's Degree(56.25%), Bachelor's Degree (40.625%) and High School (3.125%).

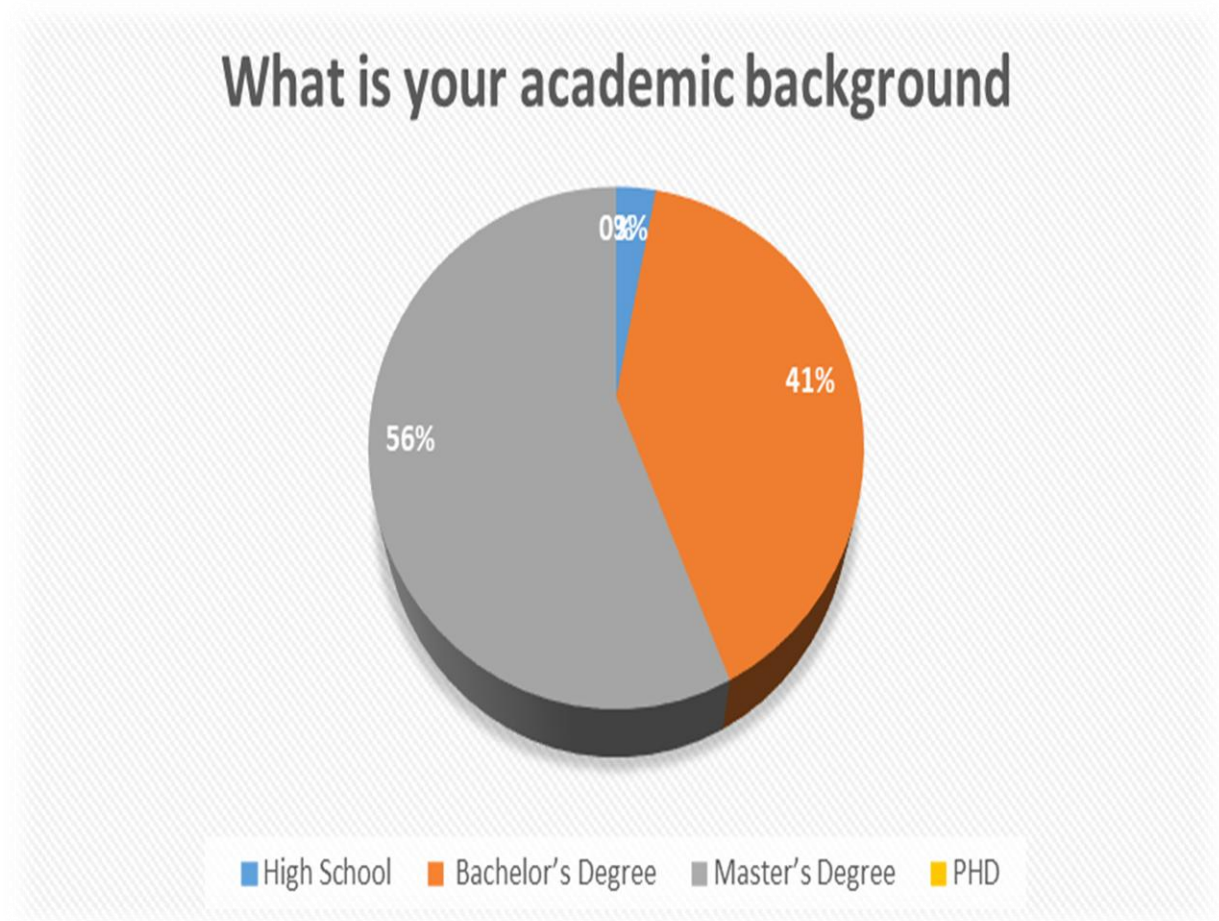


Figure 3 Academic Background

4. Familiarity with Ship Spares Forwarding

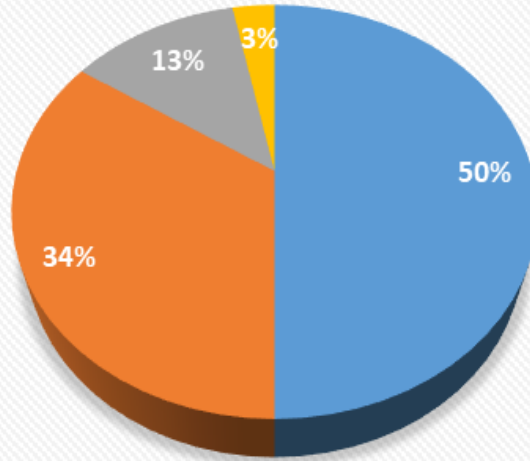
Question: How familiar are you with the concept of ship spares forwarding?

A/A	How familiar are you with the concept of ship spares forwarding?	FREQUENCY	PERCENTAGE
1	I have extensive knowledge, having dealt with ship spares forwarding for over a decade.	16	50
2	I'm moderately familiar, having encountered ship spares forwarding situations occasionally.	11	34,375
3	I'm somewhat aware of the concept, but I would appreciate more information.	4	12,5
4	I'm not familiar with ship spares forwarding at all.	1	3,125
		32	100

Table 4 Management of time-critical ship spares

The above question concerns the familiarity of respondents with the sector of ship spare parts distribution of interest shows that the largest percentage has more than ten years of experience, noting 50% followed by people with less experience and a percentage of 34.375%, followed by respondents who are not so relevant with percentages of 12.5% and 3.125% respectively.

How familiar are you with the concept of ship spares forwarding?



- I have extensive knowledge, having dealt with ship spares forwarding for over a decade.
- I'm moderately familiar, having encountered ship spares forwarding situations occasionally.
- I'm somewhat aware of the concept, but I would appreciate more information.
- I'm not familiar with ship spares forwarding at all.

Figure 4 Familiarity

5. Main Challenges Faced

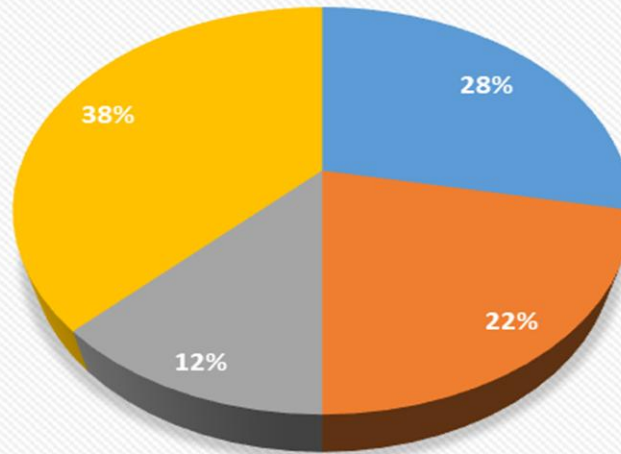
Question: In your experience, what are the key challenges associated with the timely delivery of ship spares?

A/A	In your experience, what are the key challenges associated with the timely delivery of ship spares?	FREQUENCY	PERCENTAGE
1	Customs clearance delays and transportation bottlenecks are common challenges.	9	28,125
2	Unforeseen port restrictions and inadequate communication among stakeholders can cause delays	7	21,875
3	Ensuring accurate documentation and managing last-minute changes are major hurdles.	4	12,5
4	Balancing urgency with cost considerations often leads to complex decision-making.	12	37,5
		32	100

Table 5 Management of time-critical ship spares

In the above table, the respondents in terms of the difficulties they face in shipping ship spare parts are the answer Balancing urgency with cost considerations often leads to complex decision-making 37,5%, Customs clearance delays and transportation bottlenecks are common challenges 28,12%, Unforeseen port restrictions and inadequate communication among stakeholders can cause delays 21,87%, Ensuring accurate documentation and managing last-minute changes are major hurdles 12,5%

In your experience, what are the key challenges associated with the timely delivery of ship spares?



- Customs clearance delays and transportation bottlenecks are common challenges.
- Unforeseen port restrictions and inadequate communication among stakeholders can cause delays
- Ensuring accurate documentation and managing last-minute changes are major hurdles.
- Balancing urgency with cost considerations often leads to complex decision-making.

Figure 5 Key Challenges

6. Determining Factors for the means of Transport

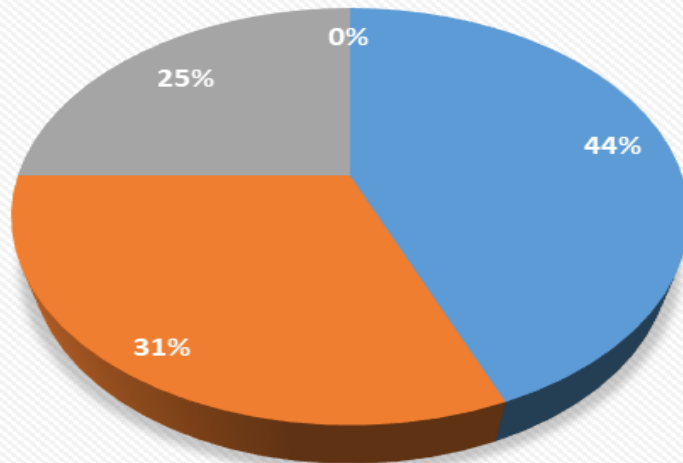
Question: What factors influence the decision to transport ship spares via air, sea, or other modes of transportation?

A/A	What factors influence the decision to transport ship spares via air, sea, or other modes of transportation?	FREQUENCY	PERCENTAGE
1	Urgency dictates air transport, while sea transport is preferred for cost-effectiveness.	14	43,75
2	The nature of the spare part, distance, and delivery timeline guide our mode of transportation.	10	31,25
3	We assess shipping costs, transit time, and availability of carriers to choose the optimal mode.	8	25
4	Environmental impact, cargo volume, and regulatory requirements impact our transport choice.	0	0
		32	100

Table 6 Factors for the means of Transport

The table above shows the percentages of answers to the question concerning the factor that determines the transfer of the exchange. A larger percentage is occupied by the answer such as Urgency dictates air transport, while sea transport is preferred for cost-effectiveness 43,75%, The nature of the spare part, distance, and delivery timeline guide our mode of transportation 31,25% and the answer :We assess shipping costs, transit time, and availability of carriers to choose the optimal mode 25%.

What factors influence the decision to transport ship spares via air, sea, or other modes of transportation?



- Urgency dictates air transport, while sea transport is preferred for cost-effectiveness.
- The nature of the spare part, distance, and delivery timeline guide our mode of transportation.
- We assess shipping costs, transit time, and availability of carriers to choose the optimal mode.
- Environmental impact, cargo volume, and regulatory requirements impact our transport choice.

Figure 6 Mode of Transport

7. Forwarder Reliability Importance

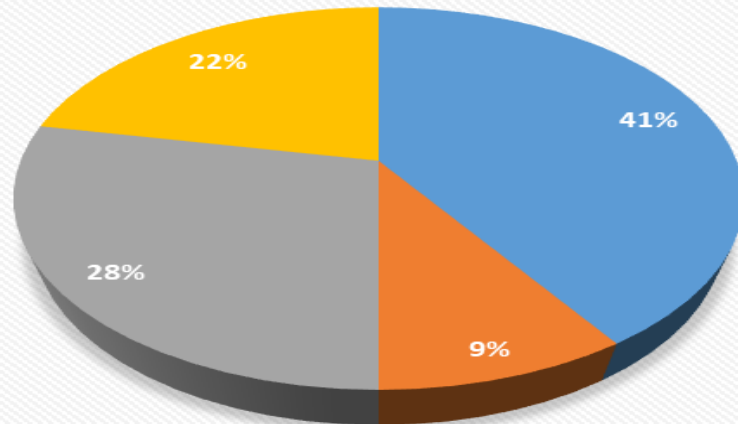
Question: How important is reliability in the delivery of ship spares to the overall operational efficiency of a vessel?

A/A	How important is reliability in the delivery of ship spares to the overall operational efficiency of a vessel?	FREQUENCY	PERCENTAGE
1	Reliability is paramount. Delays in receiving critical ship spares can lead to prolonged vessel downtime and financial losses.	13	40,625
2	It's crucial. Operational schedules are tightly managed, and any disruption due to unreliable spares delivery affects the entire fleet.	3	9,375
3	Reliability is significant. Timely spares delivery ensures vessels can maintain their schedules and fulfill contractual obligations.	9	28,125
4	Reliability is a key concern. Unforeseen delays in receiving spares can hinder maintenance plans and impact vessel performance.	7	21,875
		32	100

Table 7 Forwarder Reliability Importance

In the table above, respondents were asked to answer how important it is for a critical spare part to arrive on time, the answers were as follows: Reliability is paramount. Delays in receiving critical ship spares can lead to prolonged vessel downtime and financial losses 40,62%, Reliability is significant. Timely spares delivery ensures vessels can maintain their schedules and fulfill contractual obligations 28,12%, Reliability is a key concern. Unforeseen delays in receiving spares can hinder maintenance plans and impact vessel performance 21,87%, It's crucial. Operational schedules are tightly managed, and any disruption due to unreliable spares delivery affects the entire fleet 9,37%.

How important in the delivery of ship spares to the overall operational efficiency of a vessel?



- Reliability is paramount. Delays in receiving critical ship spares can lead to prolonged vessel downtime and financial losses.
- It's crucial. Operational schedules are tightly managed, and any disruption due to unreliable spares delivery affects the entire fleet.
- Reliability is significant. Timely spares delivery ensures vessels can maintain their schedules and fulfill contractual obligations.
- Reliability is a key concern. Unforeseen delays in receiving spares can hinder maintenance plans and impact vessel performance.

Figure 7 Importance of Reliability

8. Basic Documentation

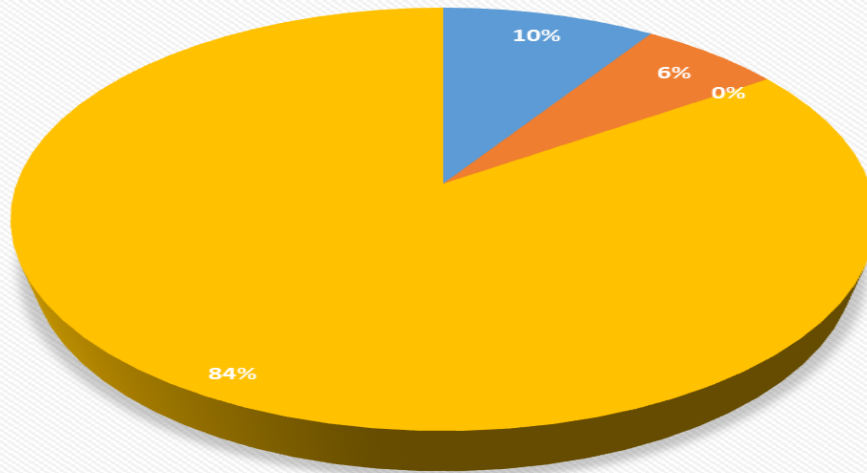
Question: What documentation and information are typically required when forwarding ship spares?

A/A	What documentation and information are typically required when forwarding ship spares?	FREQUENCY	PERCENTAGE
1	Customs declarations, commercial invoices, packing lists, and information on the part's specifications are commonly needed.	3	9,375
2	Bill of lading, packing certificates, certificates of origin, and details about the spares' technical specifications are essential.	2	6,25
3	Shipment manifest, certificates of compliance, documentation of hazardous materials (if applicable), MSDS doc, and proper labeling are usually required.	0	0
4	All the above	27	84,375
		32	100

Table 8 Basic Documentation Needed

In the table above reference is made to the necessary paperwork accompanying ship spare parts all answers from the question are contained in the last answer containing them all.

What documentation and information are typically required when forwarding ship spares?



- Customs declarations, commercial invoices, packing lists, and information on the part's specifications are commonly needed.
- Bill of lading, packing certificates, certificates of origin, and details about the spares' technical specifications are essential.
- Shipment manifest, certificates of compliance, documentation of hazardous materials (if applicable), MSDS doc, and proper labeling are usually required.
- All the above

Figure 8 Documentation

9. Regulatory Compliance

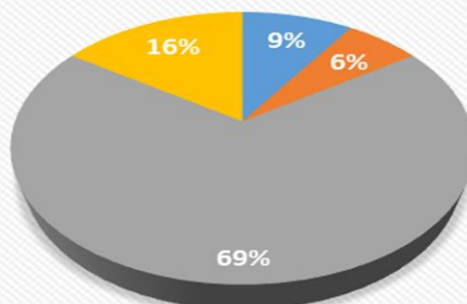
Question: Are there any regulatory or customs-related hurdles specific to shipping ship spares internationally?

A/A	Are there any regulatory or customs-related hurdles specific to shipping ship spares internationally?	FREQUENCY	PERCENTAGE
1	No, ship spares in transit are very easy to navigate across the globe.	3	9,375
2	Absolutely, navigating import duties and taxes for temporary equipment imports can be challenging.	2	6,25
3	There are often challenges in complying with destination countries' customs regulations and items restrictions.	22	68,75
4	Customs documentation can be complex, especially when temporary importation or re-exportation is involved.	5	15,625
		32	100

Table 9 Regulatory Compliance

In the table above, the largest percentage of respondents answered : There are often challenges in complying with destination countries customs regulations and items restrictions 68.75%, Customs documentation can be complex, especially when temporary importation or re-exportation is involved 15.62%, No, ship spares in transit are very easy to navigate across the globe 9.37%, Absolutely, navigating import duties and taxes for temporary equipment imports can be challenging 6.25%.

Are there any regulatory or customs-related hurdles specific to shipping spares internationally?



- No, ship spares in transit are very easy to navigate across the globe.
- Absolutely, navigating import duties and taxes for temporary equipment imports can be challenging.
- There are often challenges in complying with destination countries' customs regulations and items restrictions.
- Customs documentation can be complex, especially when temporary importation or re-exportation is involved.

Figure 9 Regulatory Compliance

10. Packing – Special Goods

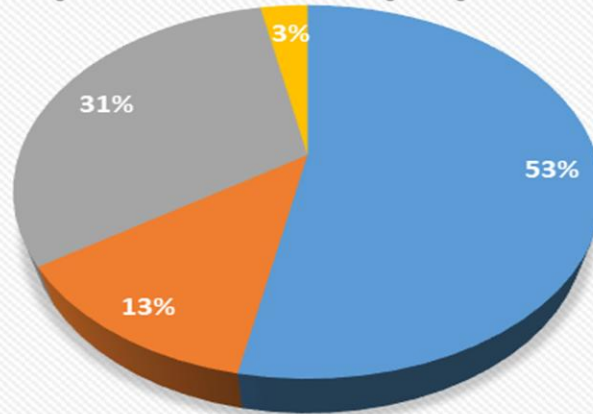
Question: How do you ensure the proper packaging and handling of delicate or specialized ship spares?

A/A	How do you ensure the proper packaging and handling of delicate or specialized ship spares?	FREQUENCY	PERCENTAGE
1	We work closely with vendors to ensure spares are appropriately packaged and labeled to withstand the rigors of shipping.	17	53,125
2	Specialized crating and cushioning materials are used to protect delicate spares, and handling instructions are clearly communicated to carriers.	4	12,5
3	Spares are packaged according to international packaging standards, and we provide carriers with guidelines for safe handling and storage.	10	31,25
4	We collaborate with specialized packaging suppliers to design custom solutions that ensure delicate spares arrive in optimal condition.	1	3,125
		32	100

Table 10 Packing and Special Goods

In the table above, the respondents' answers are as follows: We work closely with vendors to ensure spares are appropriately packaged and labeled to withstand the rigors of shipping 53.12%, Spares are packaged according to international packaging standards, and we provide carriers with guidelines for safe handling and storage 31.25%, Specialized crating and cushioning materials are used to protect delicate spares, and handling instructions are clearly communicated to carriers 12.5%, We collaborate with specialized packaging suppliers to design custom solutions that ensure delicate spares arrive in optimal condition 3.12%.

How do you ensure the proper packaging and handling of delicate or specialized ship spares?



- We work closely with vendors to ensure spares are appropriately packaged and labeled to withstand the rigors of shipping.
- Specialized crating and cushioning materials are used to protect delicate spares, and handling instructions are clearly communicated to carriers.
- Spares are packaged according to international packaging standards, and we provide carriers with guidelines for safe handling and storage.
- We collaborate with specialized packaging suppliers to design custom solutions that ensure delicate spares arrive in optimal condition.

Figure 10 Packing

11. Technology Implementation

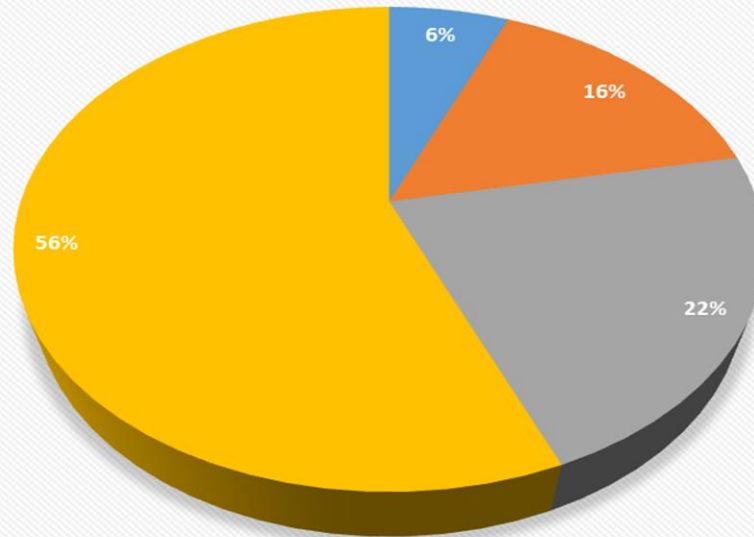
Question: What technologies or tracking systems do you find most effective in monitoring the movement of ship spares?

A/A	What technologies or tracking systems do you find most effective in monitoring the movement of ship spares?	FREQUENCY	PERCENTAGE
1	GPS-enabled tracking devices provide real-time location updates, helping us monitor spares' progress accurately.	2	6,25
2	RFID tagging combined with IoT systems allows us to track spares within warehouses and during transit.	5	15,625
3	Advanced logistics software provides end-to-end visibility, allowing us to anticipate delays and adjust plans proactively.	7	21,875
4	We use a combination of supply chain management software and carrier-provided tracking systems to monitor spares' movement and ETA.	18	56,25
		32	100

Table 11 Technology

The above table presents the answers regarding the effectiveness of the replacement parts positioning system, the answers of the respondents are as follows: We use a combination of supply chain management software and carrier-provided tracking systems to monitor spares' movement and ETA 56.25%, Advanced logistics software provides end-to-end visibility, allowing us to anticipate delays and adjust plans proactively 21.87%, RFID tagging combined with IoT systems allows us to track spares within warehouses and during transit 15.62%.

What technologies or tracking systems do you find most effective in monitoring the movement of ship spares?



- GPS-enabled tracking devices provide real-time location updates, helping us monitor spares' progress accurately.
- RFID tagging combined with IoT systems allows us to track spares within warehouses and during transit.
- Advanced logistics software provides end-to-end visibility, allowing us to anticipate delays and adjust plans proactively.
- We use a combination of supply chain management software and carrier-provided tracking systems to monitor spares' movement and ETA.

Figure 11 Technology

12. Communication

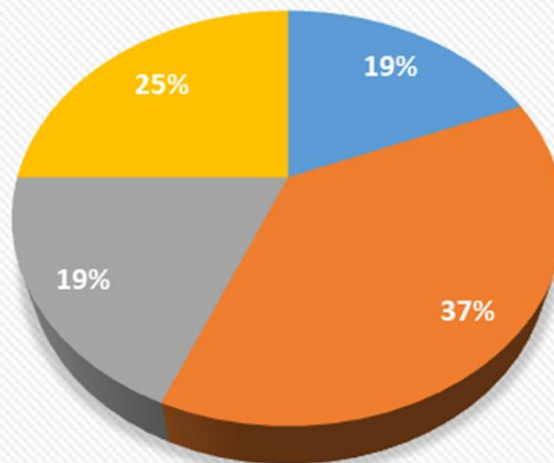
Question: How do you manage communication and coordination among various stakeholders involved in ship spares forwarding?

A/A	How do you manage communication and coordination among various stakeholders involved in ship spares forwarding?	FREQUENCY	PERCENTAGE
1	We utilize a centralized communication platform to keep all stakeholders informed about shipment status, changes, and potential issues.	6	18,75
2	Regular conference calls and email updates help maintain seamless communication between procurement, logistics, carriers, and vessel crew.	12	37,5
3	An integrated system allows real-time sharing of information among vendors, shipping agents, and vessel operators to ensure everyone is on the same page.	6	18,75
4	We assign dedicated liaisons to each project who oversee communication between all parties and facilitate quick decision-making via email.	8	25
		32	100

Table 12 Communication

The above table lists the question concerning the interconnection and location of warehouses at the various points where spare parts are located, the questions are formulated as follows: Regular conference calls and email updates help maintain seamless communication between procurement, logistics, carriers, and vessel crew 37.5%, We assign dedicated liaisons to each project who oversee communication between all parties and facilitate quick decision-making via email 25% The next questions an integrated system allows real-time sharing of information among vendors shipping agents, and vessel operators to ensure everyone is on the same page 18.75% we utilize a centralized communication platform to keep all stakeholders informed about shipment status, changes, and potential issues 18.75%.

How do you manage communication and coordination among various stakeholders involved in ship spares forwarding?



- We utilize a centralized communication platform to keep all stakeholders informed about shipment status, changes, and potential issues.
- Regular conference calls and email updates help maintain seamless communication between procurement, logistics, carriers, and vessel crew.
- An integrated system allows real-time sharing of information among vendors, shipping agents, and vessel operators to ensure everyone is on the same page.
- We assign dedicated liaisons to each project who oversee communication between all parties and facilitate quick decision-making via email.

Figure 12 Communication

13. Forwarder Performance Feedback

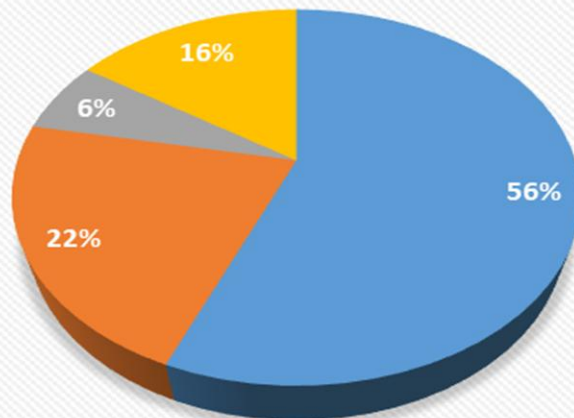
Question: Which of the below examples of successful cases where efficient ship spares forwarding positively impacted vessel operations do you consider most important?

A/A	Which of the below examples of successful cases where efficient ship spares forwarding positively impacted vessel operations do you consider most important?	FREQUENCY	PERCENTAGE
1	Prompt delivery of critical engine components prevented a vessel's unscheduled downtime, saving thousands in potential losses.	18	56,25
2	Timely arrival of navigation equipment spares allowed a vessel to complete its voyage without disruption, meeting contractual obligations.	7	21,875
3	Rapid transport of specialized repair tools enabled onboard maintenance, minimizing delays in a vessel's departure schedule.	2	6,25
4	Expedited delivery of safety equipment ensured compliance with regulations during port inspections, preventing penalties and delays.	5	15,625
		32	100

Table 13 Performance Feedback

In the table above and in the question Which of the below examples of successful cases where efficient ship spares forwarding positively impacted vessel operations do you consider most important? The respondents replied as follows: Prompt delivery of critical engine components prevented a vessel's unscheduled downtime, saving thousands in potential losses 56,25%. Timely arrival of navigation equipment spares allowed a vessel to complete its voyage without disruption, meeting contractual obligations 21,87%. Rapid transport of specialized repair tools enabled onboard maintenance, minimizing delays in a vessel's departure schedule 6,25%. Expedited delivery of safety equipment ensured compliance with regulations during port inspections, preventing penalties and delays 15,62%.

Which of the below examples of successful cases where efficient ship spares forwarding positively impacted vessel operations do you consider most important?



- Prompt delivery of critical engine components prevented a vessel's unscheduled downtime, saving thousands in potential losses.
- Timely arrival of navigation equipment spares allowed a vessel to complete its voyage without disruption, meeting contractual obligations.
- Rapid transport of specialized repair tools enabled onboard maintenance, minimizing delays in a vessel's departure schedule.
- Expedited delivery of safety equipment ensured compliance with regulations during port inspections, preventing penalties and delays.

Figure 13 Performance

14. Risk Mitigation

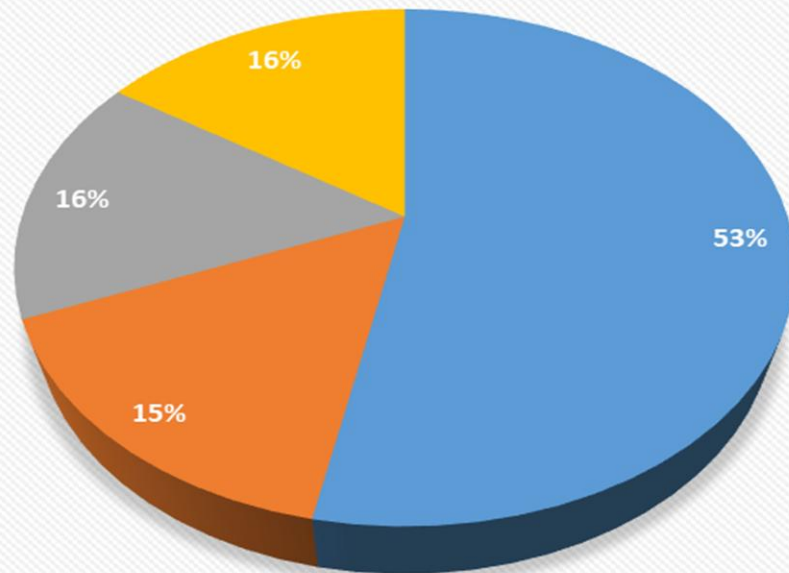
Question: What strategies do you employ to minimize the risk of delays or disruptions in ship spares delivery?

A/A	What strategies do you employ to minimize the risk of delays or disruptions in ship spares delivery?	FREQUENCY	PERCENTAGE
1	We maintain a network of reliable carriers and alternate transport options to address unexpected disruptions.	17	53,125
2	Thoroughly vetting customs requirements in advance and having contingency plans in place help mitigate potential delays.	5	15,625
3	Regularly updating stakeholders about potential challenges and providing buffer times for shipping variables are part of our strategy.	5	15,625
4	Predictive analytics and historical data analysis assist us in identifying potential bottlenecks and proactively planning around them.	5	15,625
		32	100

Table 14 Risk Mitigation

In the table above and when asked about strategies to reduce spare parts delays, respondents answered as follows: We maintain a network of reliable carriers and alternate transport options to address unexpected disruptions 53.12%. Thoroughly vetting customs requirements in advance and having contingency plans in place help mitigate potential delays 15.62%. Regularly updating stakeholders about potential challenges and providing buffer times for shipping variables are part of our strategy 15.62%. Predictive analytics and historical data analysis assist us in identifying potential bottlenecks and proactively planning around them 15.62%.

Which strategies do you employ to minimize the risk of delays or disruptions in ship spares delivery?



- We maintain a network of reliable carriers and alternate transport options to address unexpected disruptions.
- Thoroughly vetting customs requirements in advance and having contingency plans in place help mitigate potential delays.
- Regularly updating stakeholders about potential challenges and providing buffer times for shipping variables are part of our strategy.
- Predictive analytics and historical data analysis assist us in identifying potential bottlenecks and proactively planning around them.

Figure 14 Risk Mitigation 1

15. Cost and Time Efficiency

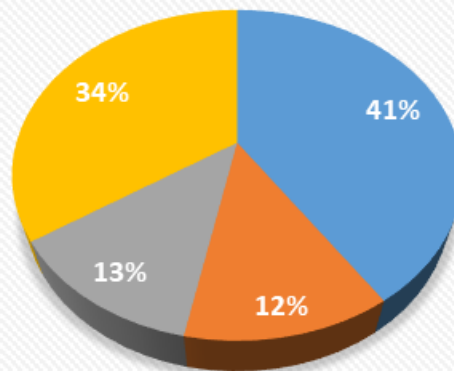
Question: How do you balance cost-effectiveness and timely delivery when making decisions about shipping methods?

A/A	How do you balance cost-effectiveness and timely delivery when making decisions about shipping methods?	FREQUENCY	PERCENTAGE
1	We assess the criticality of the spare, urgency of delivery, and potential impact on operations before deciding on shipping methods.	13	40,625
2	A cost-benefit analysis guides our decisions, taking into account potential losses due to delays versus the added cost of expedited shipping.	4	12,5
3	We collaborate with procurement to determine the spares' value and urgency, using this information to weigh shipping options.	4	12,5
4	Our approach depends on the broader operational context. For critical spares, timely delivery takes precedence, while for less urgent items, cost savings are prioritized.	11	34,375
		32	100

Table 15 Cost and Time Efficiency

In the table above, the answers to the question are formed: How do you balance cost-effectiveness and timely delivery when making decisions about shipping methods? : We assess the criticality of the spare, urgency of delivery, and potential impact on operations before deciding on shipping methods 40.62%. A cost-benefit analysis guides our decisions, taking into account potential losses due to delays versus the added cost of expedited shipping 12.5%. We collaborate with procurement to determine the spares value and urgency, using this information to weigh shipping options 12.5%. Our approach depends on the broader operational context. For critical spares, timely delivery takes precedence, while for less urgent items, cost savings are prioritized 34.37%.

How do you balance cost-effectiveness and timely delivery when making decisions about shipping methods?



- We assess the criticality of the spare, urgency of delivery, and potential impact on operations before deciding on shipping methods.
- A cost-benefit analysis guides our decisions, taking into account potential losses due to delays versus the added cost of expedited shipping.
- We collaborate with procurement to determine the spares' value and urgency, using this information to weigh shipping options.

Figure 15 Cost and Time Efficiency

16. Critical Cases

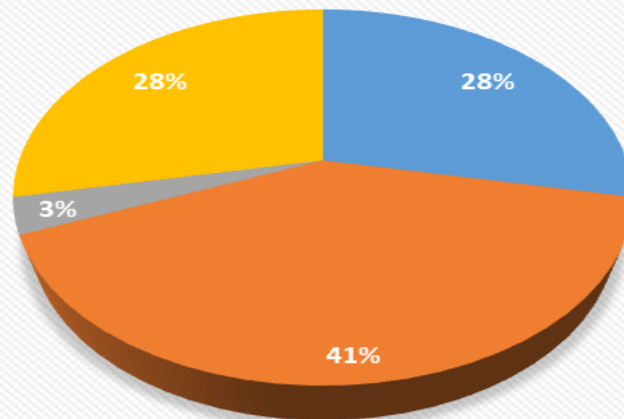
Question: Are there instances when expedited shipping for ship spares is crucial? Can you elaborate on such situations?

A/A	Are there instances when expedited shipping for ship spares is crucial? Can you elaborate on such situations?	FREQUENCY	PERCENTAGE
1	Expedited shipping is essential when a vessel faces imminent departure and needs critical spares to meet its operational schedule.	9	28,125
2	In emergency breakdown scenarios, expedited shipping is necessary to minimize vessel downtime and avoid contractual penalties.	13	40,625
3	Time-sensitive repairs, such as in volatile weather conditions, require expedited shipping to ensure crew safety and operational continuity.	1	3,125
4	Expedited shipping becomes critical when there's a risk of escalating mechanical damage or compromising the vessel's stability.	9	28,125
		32	100

Table 16 Critical Cases

To the question Are there instances when expedited shipping for ship spares is crucial? Can you elaborate on such situations? Respondents responded as follows Expedited shipping is essential when a vessel faces imminent departure and needs critical spares to meet its operational schedule 28.12%. In emergency breakdown scenarios, expedited shipping is necessary to minimize vessel downtime and avoid contractual penalties 40.62%. Time-sensitive repairs, such as in volatile weather conditions, require expedited shipping to ensure crew safety and operational continuity 3.12%. Expedited shipping becomes critical when there's a risk of escalating mechanical damage or compromising the vessel's stability 28.12%.

**Are there instances when expedited shipping for ship spares is crucial?
Can you elaborate on such situations?**



- Expedited shipping is essential when a vessel faces imminent departure and needs critical spares to meet its operational schedule.
- In emergency breakdown scenarios, expedited shipping is necessary to minimize vessel downtime and avoid contractual penalties.
- Time-sensitive repairs, such as in volatile weather conditions, require expedited shipping to ensure crew safety and operational continuity.
- Expedited shipping becomes critical when there's a risk of escalating mechanical damage or compromising the vessel's stability.

Figure 16 Critical Cases

17. Crisis Management

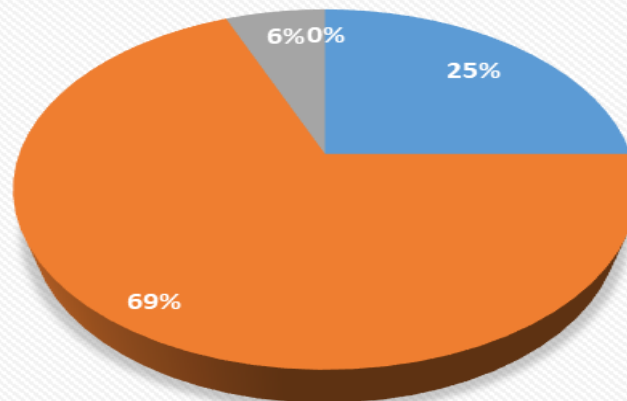
Question: How do you handle unexpected changes or challenges in the shipping process, such as port closures, sailing schedule changes, flight delays/cancellations or weather-related issues?

A/A	How do you handle unexpected changes or challenges in the shipping process, such as port closures, sailing schedule changes, flight delays/cancellations or weather-related issues?	FREQUENCY	PERCENTAGE
1	We have contingency plans in place that involve rerouting shipments, utilizing alternative ports, or adjusting delivery schedules as needed.	8	25
2	Rapid decision-making is crucial; we stay in close contact with carriers, consider rerouting options, and adjust plans accordingly.	22	68,75
3	We collaborate with meteorological services to anticipate weather-related disruptions and preemptively adjust shipping timelines.	2	6,25
4	A crisis management protocol outlines steps to assess the impact of unexpected changes and make quick decisions to minimize disruptions.	0	0
		32	100

Table 17 Crisis Management

To the question How do you handle unexpected changes or challenges in the shipping process, such as port closures, sailing schedule changes, flight delays/cancellations or weather-related issues? We have contingency plans in place that involve rerouting shipments, utilizing alternative ports, or adjusting delivery schedules as needed 25%. Rapid decision-making is crucial; we stay in close contact with carriers, consider rerouting options, and adjust plans accordingly 68,75%. We collaborate with meteorological services to anticipate weather-related disruptions and preemptively adjust shipping timelines 6,25%. A crisis management protocol outlines steps to assess the impact of unexpected changes and make quick decisions to minimize disruptions 0%.

How do you handle unexpected changes or challenges in the shipping process, such as port closures, sailing schedule changes, flight delays/cancellations or weather-related issues?



- We have contingency plans in place that involve rerouting shipments, utilizing alternative ports, or adjusting delivery schedules as needed.
- Rapid decision-making is crucial; we stay in close contact with carriers, consider rerouting options, and adjust plans accordingly.
- We collaborate with meteorological services to anticipate weather-related disruptions and preemptively adjust shipping timelines.
- A crisis management protocol outlines steps to assess the impact of unexpected changes and make quick decisions to minimize disruptions.

Figure 17 Crisis Management

18. Innovation

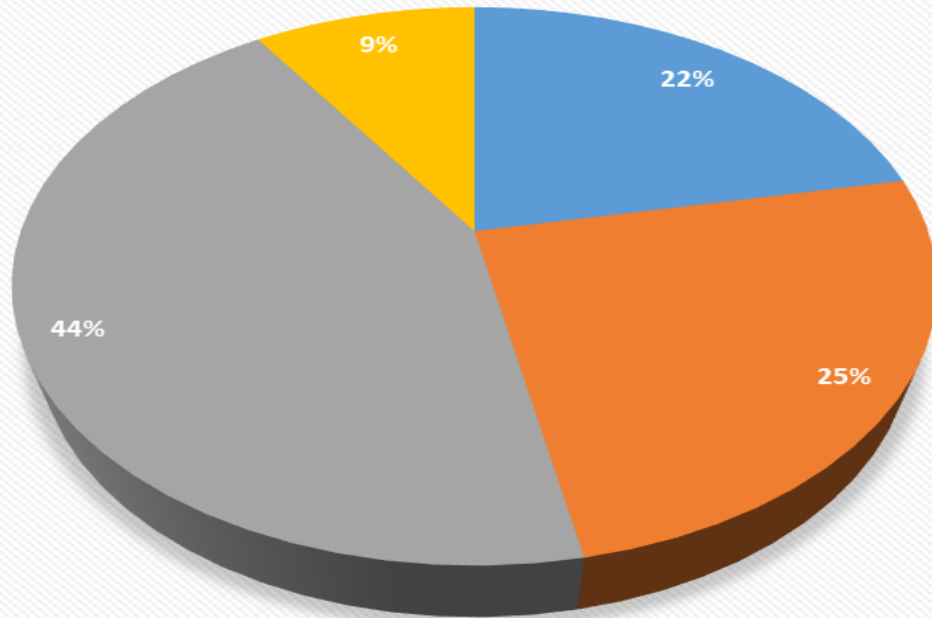
Question: Are there any of the below emerging trends or innovations in ship spares forwarding that you find noteworthy?

A/A	Are there any of the below emerging trends or innovations in ship spares forwarding that you find noteworthy?	FREQUENCY	PERCENTAGE
1	Drone technology is gaining traction for delivering urgent spares to vessels at sea, reducing transit time and enhancing responsiveness.	7	21,875
2	Blockchain-enabled supply chain platforms are improving transparency and traceability, reducing the risk of counterfeit parts.	8	25
3	Predictive maintenance analytics are being integrated to forecast spare part needs accurately, optimizing inventory and reducing downtime.	14	43,75
4	3D printing capabilities are revolutionizing spares availability by allowing on-demand production of certain critical components.	3	9,375
		32	100

Table 18 Innovation

The question in the table above concerns the innovations worth noting by the respondents above answered as follows: Drone technology is gaining traction for delivering urgent spares to vessels at sea, reducing transit time and enhancing responsiveness 21.87%. Blockchain-enabled supply chain platforms are improving transparency and traceability, reducing the risk of parts 25%. Predictive maintenance analytics are being integrated to forecast spare part needs accurately, optimizing inventory and reducing downtime 43.75%. 3D printing capabilities are revolutionizing spares availability by allowing on-demand production of certain critical components 9.37%.

Are there any of the below emerging trends or innovations in ship spares forwarding that you find noteworthy?



- Drone technology is gaining traction for delivering urgent spares to vessels at sea, reducing transit time and enhancing responsiveness.
- Blockchain-enabled supply chain platforms are improving transparency and traceability, reducing the risk of counterfeit parts.
- Predictive maintenance analytics are being integrated to forecast spare part needs accurately, optimizing inventory and reducing downtime.
- 3D printing capabilities are revolutionizing spares availability by allowing on-demand production of certain critical components.

Figure 18 Innovation

19. Optimization of Ship Spares Supply Chain

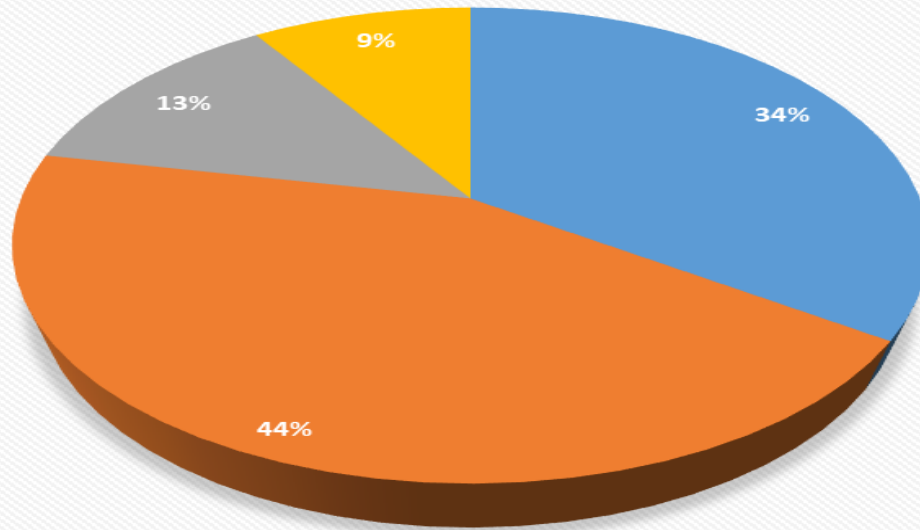
Question: What best practices do you recommend for optimizing the efficiency of ship spares forwarding operations?

A/A	What best practices do you recommend for optimizing the efficiency of ship spares forwarding operations?	FREQUENCY	PERCENTAGE
1	Adopt an integrated software solution that streamlines communication, tracks shipments, and provides real-time updates to all stakeholders.	11	34,375
2	Maintain a well-organized database of vessel-specific spare part requirements to expedite sourcing and forwarders/transport companies to expedite shipping processes.	14	43,75
3	Regularly review and update standard operating procedures to reflect lessons learned and adapt to changing industry regulations.	4	12,5
4	Foster strong relationships with reliable carriers, customs authorities, and vendors to ensure smoother coordination during spares forwarding.	3	9,375
		32	100

Table 19 Optimization

In the table above, respondents to the question: What best practices do you recommend for optimizing the efficiency of ship spares? They replied as follows: Adopt an integrated software that streamlines communication, tracks shipments and provides real-time updates to all stakeholders 34.37%. Maintain a well-organized database of vessel-specific spare part requirements to expedite sourcing and forwarders/transport companies to expedite shipping processes 43.75%. Regularly review and update standard operating procedures to reflect lessons learned and adapt to changing industry regulations 12.5%. Foster strong relationships with reliable carriers, customs authorities, and vendors to ensure smoother coordination during spares forwarding 9.37%.

What best practices do you recommend for optimizing the efficiency of ship spares forwarding operations?



- Adopt an integrated software solution that streamlines communication, tracks shipments, and provides real-time updates to all stakeholders.
- Maintain a well-organized database of vessel-specific spare part requirements to expedite sourcing and forwarders/transport companies to expedite shipping processes.
- Regularly review and update standard operating procedures to reflect lessons learned and adapt to changing industry regulations.
- Foster strong relationships with reliable carriers, customs authorities, and vendors to ensure smoother coordination during spares forwarding.

Figure 19 Optimization

20. ESG Compliance

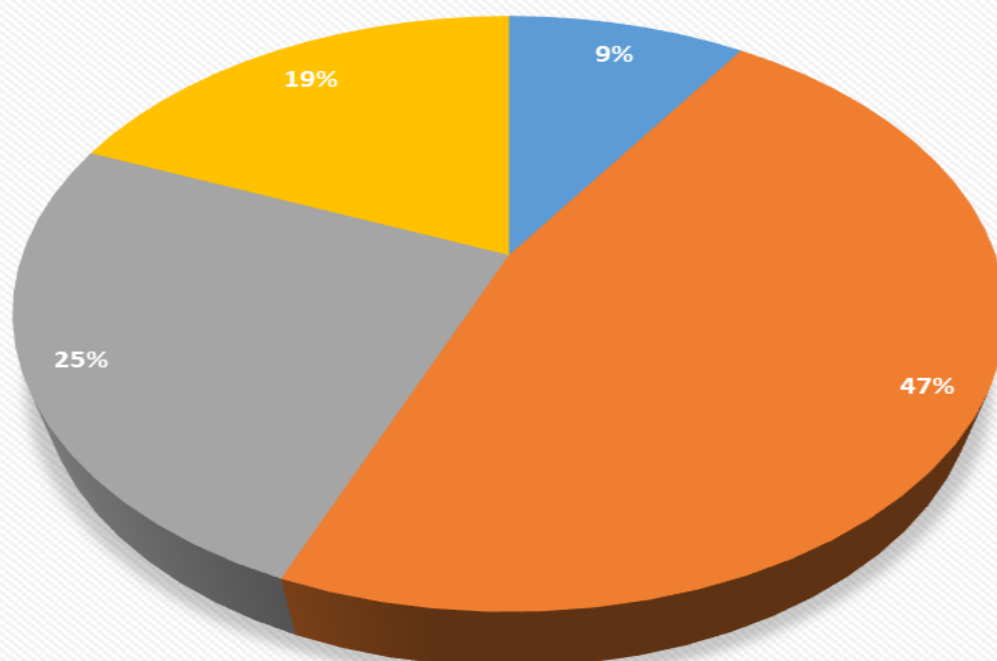
Question: How do you ensure compliance with environmental and sustainability standards in the shipping of ship spares?

A/A	How do you ensure compliance with environmental and sustainability standards in the shipping of ship spares?	FREQUENCY	PERCENTAGE
1	We prioritize carriers that adhere to eco-friendly practices and promote efficient fuel consumption during transit.	3	9,375
2	We verify that hazardous spares are packaged and transported in accordance with international regulations to prevent environmental risks.	15	46,875
3	Our choice of carriers considers their commitment to reducing carbon emissions and minimizing the ecological footprint of shipping.	8	25
4	We collaborate with industry organizations that promote sustainable shipping practices and incorporate their guidelines into our processes.	6	18,75
		32	100

Table 20 References

In the table above, respondents answered the following: We prioritize carriers that adhere to eco-friendly practices and promote efficient fuel consumption during transit 9.37%. We verify that hazardous spares are packaged and transported in accordance with international regulations to prevent environmental risks 46.87%. Our choice of carriers considers their commitment to reducing carbon emissions and minimizing the ecological footprint of shipping 25%. We collaborate with industry organizations that promote sustainable shipping practices and incorporate their guidelines into our processes 18.75%.

How do you ensure compliance with environmental and sustainability standards in shipping of ship spares?



- We prioritize carriers that adhere to eco-friendly practices and promote efficient fuel consumption during transit.
- We verify that hazardous spares are packaged and transported in accordance with international regulations to prevent environmental risks.
- Our choice of carriers considers their commitment to reducing carbon emissions and minimizing the ecological footprint of shipping.
- We collaborate with industry organizations that promote sustainable shipping practices and incorporate their guidelines into our processes.

Figure 20 ESG

21. Problem Solving

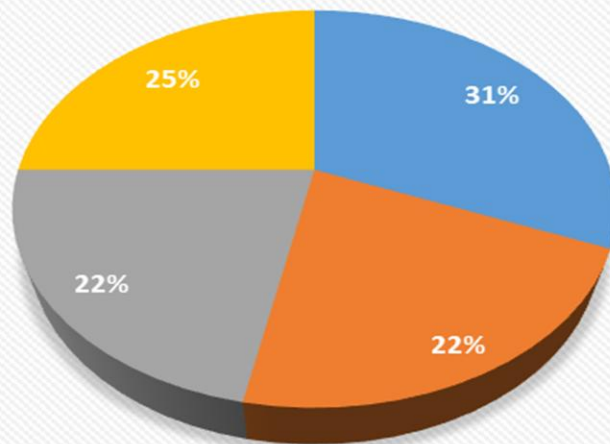
Question: Have you encountered instances where incorrect or damaged ship spares were delivered? How were these issues resolved?

A/A	Have you encountered instances where incorrect or damaged ship spares were delivered? How were these issues resolved?	FREQUENCY	PERCENTAGE
1	Yes, once a wrong spare was delivered. We expedited the correct part while managing vessel operations with temporary measures.	10	31,25
2	Damaged spares were received due to mishandling. We filed a claim with the carrier and arranged for replacements promptly.	7	21,875
3	Incorrect specifications in the order led to the wrong part being delivered. We collaborated with the supplier to expedite the correct one.	7	21,875
4	We faced an issue with a damaged spare due to inadequate packaging. The supplier took responsibility and promptly replaced the item.	8	25
		32	100

Table 21 Problem Solving

To the question Have you encountered instances where incorrect or damaged ship spares were delivered? How were these issues resolved? The respondents replied as follows : Yes, once a wrong spare was delivered. We expedited the correct part while managing vessel operations with temporary measures 31.25%. Damaged spares were received due to mishandling. We filed a claim with the carrier and arranged for replacements promptly 21.87%. Incorrect specifications in the order led to the wrong part being delivered. We collaborated with the supplier to expedite the correct one 21.87%. We faced an issue with a damaged spare due to inadequate packaging. The supplier took responsibility and promptly replaced the item 25%.

Have you encountered instances where incorrect or damaged ship spare were delivered? How were these issues resolved?



- Yes, once a wrong spare was delivered. We expedited the correct part while managing vessel operations with temporary measures.
- Damaged spares were received due to mishandling. We filed a claim with the carrier and arranged for replacements promptly.
- Incorrect specifications in the order led to the wrong part being delivered. We collaborated with the supplier to expedite the correct one.
- We faced an issue with a damaged spare due to inadequate packaging. The supplier took responsibility and promptly replaced the item.

Figure 21 Problem Solving

22. Lessons Learned

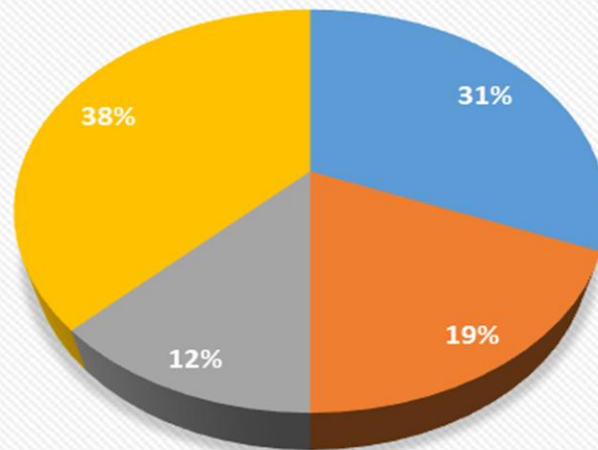
Question: Can you describe any lessons learned from past experiences that have influenced your approach to ship spares forwarding?

A/A	Can you describe any lessons learned from past experiences that have influenced your approach to ship spares forwarding?	FREQUENCY	PERCENTAGE
1	A delayed spare caused significant downtime. Now we prioritize timely communication and proactive planning to prevent similar incidents.	10	31,25
2	Customs clearance delays led to operational disruptions. We now ensure comprehensive documentation and early customs clearance.	6	18,75
3	Insufficient tracking led to uncertainty during transit. We've since adopted advanced tracking systems for real-time visibility.	4	12,5
4	Inadequate handling from ship spares forwarder caused mis delivery of spare part and excessive costs, partnering with a trusted forwarder is of most importance.	12	37,5
		32	100

Table 22 Lessons Learned

To the question Can you describe any lessons learned from past experiences that have influenced your approach to ship spares forwarding? The respondents answered the following A delayed spare caused significant downtime. Now we prioritize timely communication and proactive planning to prevent similar incidents 31,25%. Customs clearance delays led to operational disruptions. We now ensure comprehensive documentation and early customs clearance 18,75%. Insufficient tracking led to uncertainty during transit. We've since adopted advanced tracking systems for real-time visibility 12,5%. Inadequate handling from ship spares forwarder caused mis delivery of spare part and excessive costs, partnering with a trusted forwarder is of most importance 37,5%.

Can you describe any lessons learned from past experiences that have influenced your approach to shipspares forwarding?



- A delayed spare caused significant downtime. Now we prioritize timely communication and proactive planning to prevent similar incidents.
- Customs clearance delays led to operational disruptions. We now ensure comprehensive documentation and early customs clearance.
- Insufficient tracking led to uncertainty during transit. We've since adopted advanced tracking systems for real-time visibility.
- Inadequate handling from ship spares forwarder caused mis delivery of spare part and excessive costs, partnering with a trusted forwarder is of most importance.

Figure 22 Lessons Learned

23. Training & Development

Question: How did you develop expertise in ship spares forwarding? Can you recommend resources for someone interested in learning more?

A/A	How did you develop expertise in ship spares forwarding? Can you recommend resources for someone interested in learning more?	FREQUENCY	PERCENTAGE
1	Years of hands-on experience, coupled with mentorship from industry experts, have been instrumental in honing my expertise.	18	56,25
2	I attended specialized workshops on maritime logistics and spares forwarding, which greatly enhanced my understanding	2	6,25
3	Networking within the maritime community and participating in industry conferences provided valuable insights and knowledge.	7	21,875
4	Online courses on supply chain management and maritime logistics, along with practical experience, have contributed to my expertise.	5	15,625
		32	100

Table 23 Training and Development

In the table above, respondents answered the question about the resources that someone can raise in order to be informed of the following: Years of hands-on experience, coupled with mentorship from industry experts, have been instrumental in honing my expertise 56.25%. I attended specialized workshops on maritime logistics and spares forwarding, which greatly enhanced my understanding 6.25%. Networking within the maritime community and participating in industry conferences provided valuable insights and knowledge 21.87%. Online courses on supply chain management and maritime logistics, along with practical experience, have contributed to my expertise 15.62%.

How did you develop expertise in ship spares forwarding? Can you recommend resources for someone interested in learning more?



Figure 23 Learning and Development

24. Feedback

Question: Did you find the questions above relevant to the actual context of ship spares forwarding?

A/A	Did you find the questions above relevant to the actual context of ship spares forwarding?	FREQUENCY	PERCENTAGE
1	NO	0	0
2	MAYBE	2	6,25
3	ALMOST	5	15,625
4	YES	25	78,125
		32	100

Table 24 Questionnaire Feedback

When asked if the questions were constructive and corresponded to the real issues of spare parts disposal, the majority of respondents with a percentage of 78.1% answered YES

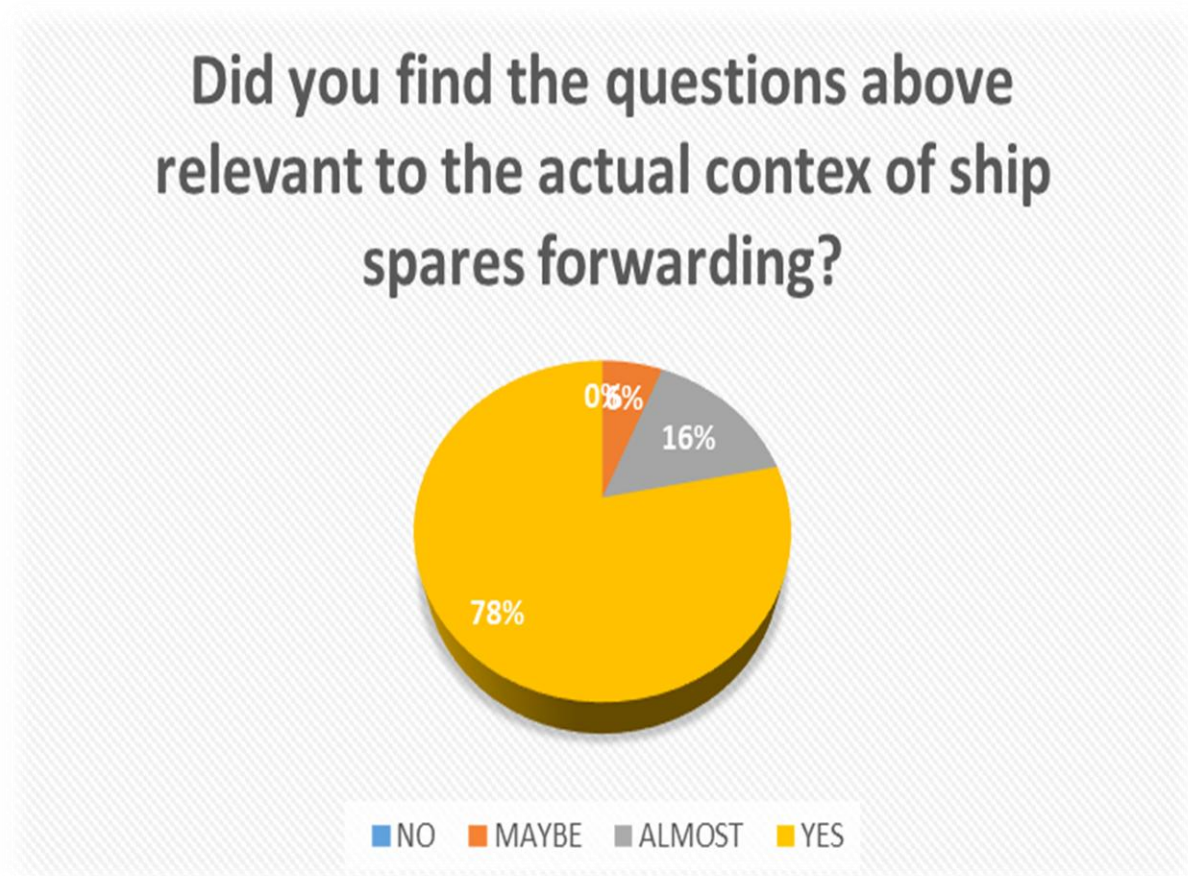


Figure 24 Feedback

6. Discussion – Conclusions

In particular, with regard to the research carried out, the main objective of the department is to provide the production units (ships) of the company with all those means (products & services) required for their smooth and continuous operation. In fact, the problems that arise and seek an immediate solution make the supply of ships a complex process that requires constant effort, complete and accurate information, proper communication, absolute synchronization and good information of all local and international markets.

The employees are responsible, not only for the procurement of ships with goods and services, but also for the preparation of successful budget forecasts and financial studies in cooperation with the Accounting Department. In addition, continuous and continuous cooperation with the Operations Department and the Technical Department is required, as lubricants, fuels, engine spare parts, as well as their auxiliary equipment are considered items of strategic importance for the company. The importance of these items for the operation of ships combined with the high cost and supply risk make it imperative to supply the former with them on time.

Therefore, successful forecasts of increases or decreases in the prices of the above items are required in order to choose the method of purchase to be made. An important role for the purchase method chosen for each product has the voyages performed by each ship, since depending on the port called, the corresponding purchases are made always based on the interest of the company.

At the same time, it is worth emphasizing that the evaluation criterion that has the greatest weight in the selection of purchased items is the quality of the products. The company selects suppliers who are certified in order to produce and / or sell products manufactured in accordance with international quality systems, have high technical specifications and provide full technical support. It prefers the purchase of branded and well-known products, especially spare parts, knowing that they have a higher cost than their anonymous counterparts as it wishes the uninterrupted operation of ships, while ensuring the highest degree of safety for them and their crews.

Finally, the contribution of technology to the improvement of communication systems between the ship and the procurement department contributes greatly to more

effective and closer cooperation between the two sides. Now the requirements in products and services are manifested immediately and are satisfied quickly without delays.

Repair and maintenance are among the most important processes in the operation of ships and the companies that manage them. Continuous efforts are being made to find more efficient and less costly methods in each area that may be needed. Repair is vital for shipping companies because it aims to ensure safe ship operation, environmental safety and cost-effective operation.

With the passage of time maintenance has passed from simple methods of scheduled maintenance, to maintenance methods aimed at predicting the failure first it occurs. Proper maintenance plays a key role in the shipping industry as shipping companies manage ships which are complex mechanical assemblies that can cause chain failures. Furthermore, shipping is in constant search for maximum safety in the industry international regulations as discussed above are constantly amended so as to provide maximum safety to personnel, ship and the environment. Finally, this paper analyzed CMMS maintenance programs as well as the way they are used in industry.

Today's business environment is characterized by strong competition, technological innovations, excessive information importance, short product life cycles, customers with high expectations and dominance of e-business. It is now clear that proper supply chain and logistics management is vital for business success.

More specifically, Logistics have managed to consolidate their presence and are gaining more and more ground in recent years by increasing competition and contributing to productivity growth, both internationally and in the Greek industry. The flow of goods from the point of production to their consumption, including, where necessary, their intermediate storage, as well as the actions of disseminating information, transferring capital, and all the people involved, compose the science of Logistics. It is commonly accepted that there are many possibilities for significant development of the Logistics industry. In Greece in particular, logistics can be a growth driver for the further recovery of the national economy, thanks to the undoubtedly important geographical position of the country.

Specifically for transport performed in Logistics, we conclude that maritime transport plays a dominant role in international trade, which is largely due to the morphology of our planet, since a large part of it is covered by sea.

Regarding the transport of logistics by sea, it is concluded that Greek shipping maintains its highly competitive character even during the period of global recession. Therefore, it is possible to establish that the sector is constantly able to adapt its operation to the constantly changing and demanding conditions of the environment, being a cornerstone of the Greek economy.

However, transport in logistics and specifically maritime transport has to face many peculiarities and overcome many problems. These problems act as a brake on the progress of the logistics industry and thus the immediate treatment, if not all, at least as many, is deemed necessary, both for the development of Logistics and for the increase of their profitability.

In particular, on the issue of the routing of means of transport, new sea routes are being created, thanks to the interventions that man is now able to make in the earth's crust. The exploitation of these new routes is crucial for the cost-effective routing of ships.

The issue of air pollution, as expected, also affects the logistics industry. With the overexploitation of the environment by various activities there is increased pollution. However, pollution is a major threat to all humanity, especially since the environment is home to all living beings, so all sectors of activity must and must help mitigate this phenomenon. Logistics companies are being asked to cut carbon emissions in half, a goal that is quite difficult to achieve. Of course, with the better efficiency of the fuels used by their fleet, it is estimated that they are capable of significantly reducing carbon dioxide emissions.

The development of all countries has not and is not happening at the same pace. The majority of countries in Asia and Africa continue to grow more slowly, lagging behind in infrastructure. Of course, many developed countries also have deficiencies in their infrastructure, due to the wrong planning they followed. This issue will continue to concern us until at least the most important infrastructure for each country is restored.

The number of logistics companies has greatly increased and thus the competition between companies is becoming more and more intense. This competition, as expected, pushes companies to promise very short deliveries of products, effectively setting themselves strict margins. Of course, these promising short deliveries are also driven by customer demand, which is constantly increasing.

Logistics now have a central role in the operation of companies, as noted, but the demands of the market and customers have created trends in the industry. The most important trend affecting the industry is the intensive use of technology in various logistics activities.

The main events that push the rapid integration of technology by Logistics businesses are the globalization of markets, the rapid technological upgrade, the emphasis on business restructuring, the intensity of competition and the transition to the era of e-business. Businesses understand the need to develop partnerships with mutual goals and benefits, which are feasible through the coordination of business processes and the full integration of information flows.

The role of technology in creating value and competitive advantage for businesses and the entire supply chain is explored. Technological solutions are implemented internally in each business and between members of the supply chain, which guarantee the strong operation of the supply network. The successful implementation of technological solutions in the supply chain facilitates and automates processes, and as a result, the business is able to reduce its costs, reduce or eliminate process times and ultimately reap high profits. In conclusion, the literature review showed that the adoption of technologies in Logistics is the most modern and competitive solution for the success of related businesses.

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