Study on the supply chain for spare parts
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Abstract: The study aims to analyze the reasons for unpunctual service - aspects related to the absence of a spare part during and immediately after the launch of a new product (New Product Interoduction - NPI flag). The data collection for the survey research is based on customer interviews. The customer surveys were conducted with the help of the computer manufacturer of one of the companies that provide after-sales service for computer devices that are not manufactured by the same company and are therefore suitable for the research in order to determine the existing level of after-sales service with spare parts and the possibilities for its improvement. Data collection for the supply chain performance study was conducted from January 1, 2023 to January 1, 2024. The study covered 149,937 processed customer warranty claims from a computer manufacturer and showed the level of customer service over a one-year period. The biggest weaknesses in the supply chain for spare parts that provide after-sales service for new products are the uncertainty of future demand and warranty failures that these products will cause.

1   Introduction

The global interest and scale of distribution of this type of product raises questions about customer service, namely how this technology is maintained once it has been purchased and installed by the end customer. Supply Chain Management (SCM) is responsible for these issues and is constantly challenged by the ever faster development of technologies and their ever increasing distribution. This makes it necessary to explore the possibilities for their improvement in terms of efficiency, speed, cost optimization and offering flexible solutions, as well as working out the weak points of the supply chain through optimization work. Technical service is not only software, but often also hardware - in the form of spare parts. The material flows required for warranty service must be available in warehouses close to the customer and delivered within a short time so that the product can be repaired on time. A delay in delivery or the unavailability of a spare part to repair the device would affect the business of the customers who consume the product and negatively impact the image of the company that manufactures the same product. The introduction of new products in the computer market is a topic of great interest. The introduction of new products in the computer market is a topic of great interest and of great importance for the social, cultural and economic development of society in the context of the dynamism and rapid development of technology and the urgency of artificial intelligence in the personal and professional life of each individual. The sale of this type of product to customers all over the world is associated with the challenge of being technically maintained within the warranty and post-warranty period, not only in terms of software, but also in terms of spare parts, which must be available near the customer and delivered within a short time so that the product can be repaired with minimal loss to the customer's business.

2   Literature review

LeMay et al. [1] collected current definitions of supply chain management into practical and analytical use. Many researchers defined the concept of "supply chain management" (SCM) as an integrated [2,3]. The "supply chain management" (SCM) concept is an integrated management of suppliers and customers. A supply chain is characterized by the network of actors, the relationships between them, and the processes and activities that take place in it. Vodenicharova [4] derives the understanding of SCM from the concept of SCM: "If one adopts the entire concept of supply chain, its participants represent all companies and organizations with which a company interacts directly or indirectly through its suppliers and customers, from the production of raw materials and flow or management of material flow to the time of consumption of the product. A number of researchers are conducting research in logistics [5-9] and supply chain [11,12] in various sectors of the economy, which shows the interest and importance of the topic.

In the derived definitions of the supply chain, there are some unclear elements of logistics that lead to a lack of consistent terminology and clarity about the SC that exists with regard to the production of a final product and the one that exists to ensure after-sales service for the final product. These two chains (forward and backward/production of the end product-customer service) do not always exist at the same time. The finished ICT product is produced and sold for a limited time (usually 2 years, as the technology

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becomes morally obsolete faster and faster), while the after-sales service for the already sold ICT product can last dozens of years after it has already been taken out of production and sale [14]. Effective logistics management supports companies in adapting to changing customer needs and gaining a competitive edge is emphasized by many authors. The article by Christopher and Holweg combines insights of supply chain management with the service to connect fundamental customer requirements [13].

Many researchers [15-17] describe that a well-configured spare parts supply chain (SC) can reduce costs and increase the competitiveness of spare parts retailers. This makes it necessary to consider the after-sales service supply chain as a separate SC, since the challenges it faces after the production of the final product is completed mainly concern the availability and quality of spare parts and all activities in the chain related to the storage and maintenance of obsolete spare parts or their procurement on the gray market. All these activities are part of SCM for spare parts, which deals with the after-sales service of ICT and is not explained in the definitions above. Customer service is extremely important, as is service during the conclusion and execution of the transaction. It creates security for the customer and the conviction that the company understands their needs and offers solutions to their problems. Many companies do not pay attention to the after-sales supply chain as they often suffer from understaffing and underinvestment in this area. However, after-sales services are an important source of revenue for industrial companies. The focus is primarily on the supply chain for manufacturing new products that are sold and have a direct impact on companies' financial performance, so the supply chain required to perform warranty servicing of the same products plays a secondary role in companies' business strategies. Traditional after-sales service and support models are still heavily dependent on human factors, as artificial intelligence is not yet as widespread and the after-sales service supply chain often does not receive enough attention and focus. According to Yao Li et al., companies need to invest heavily in their spare parts supply chain to achieve a high fulfilment rate and reliability [18]. Centralized production is the preferable supply chain configuration in the article Siavash et al. They research provides guidance for the development of additive manufacturing machines and their possible deployment in spare parts supply chains [19].

The importance and role of the supply chain in bringing new products to market should not be overlooked, as this would lead to unsuccessful product positioning combined with high costs, unsatisfied demand, unsatisfactory warranty service and ineffective after-sales service. This in turn would affect the company's competitiveness, regardless of how attractive and innovative the new product is with which it wants to compete in the market. In order to identify the place of the supply chain in the introduction of a new product, the main phases of the introduction of a product in the high technology sector are presented, namely: 1) planning; 2) concept development; 3) system design; 4) detailed design; 5) system testing and improvement; and 6) production. The position of the SC in each of these phases is shown in Figure 1.
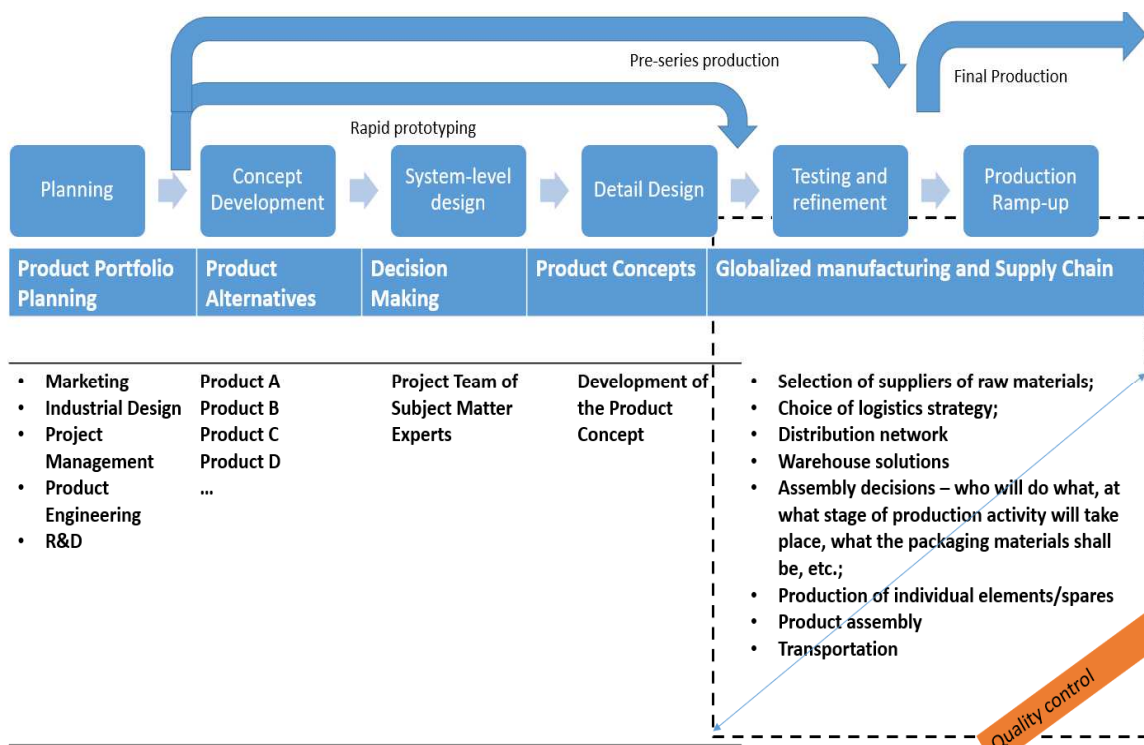

Figure 1 Sequence of activities within a company when introducing a new product to the market
Source: Adapted by [20]

The place of SC, which is visible in all phases of the process, begins in the planning phase, in which the decision is made as to which product the company will put into production. A prototype is then created. In this phase, the production/operations departments are involved and discussions are initiated with the suppliers of the raw materials, components, and services required for production. In the following phases of the process, and especially in the last two, just before the product is launched, decisions are made about outsourcing, the logistics sector and/or production, which is usually carried out in countries with low labor costs. Decisions on where to produce, which logistics strategy to follow, where to assemble and through which distribution channels to distribute finished products and spare parts for maintenance are also made as part of the process of launching a new product. Quality control is carried out at every stage of the logistics cycle and in every functional area: Procurement, Production, and Distribution.

In order to determine the role of the supply chain in the introduction of a new product, it is necessary to look at it from the perspective of its most important functional areas: Procurement, Production and Distribution and to what extent the new product is influenced by the decisions and activities of the SC in each of these areas. One of the main goals and tasks of procurement is to ensure an appropriate quality of material flow management. When introducing a new product and in the decision-making phase of the SC design area required to produce and service the final product, procurement plays a strategic role in the success of the company's new product introduction.

The quality characteristics are defined in the design of the end product or service that the company produces and markets. The design of products and services is carried out by a team of specialists from different areas, including logistics. The tasks and role of procurement experts in this product design process begin with product definition. For this purpose, innovative ideas are collected, some of which originate within the company itself, but some of which are also stimulated by the development of technologies and the needs of the market during product definition. Procurement is involved in providing information on new material and technology developments on the market and, to this end, holds discussions with suppliers, investigates suppliers' design and production capacities through direct visits, attends trade fairs and reviews publications in trade journals. This information can be useful for marketing and design specialists in their search for new product ideas. The ideas received are evaluated in terms of their technological feasibility, market opportunities and financing possibilities. The procurement specialists evaluate the components in terms of their cost-effectiveness, functional properties and market availability. The possibilities of in-house production or purchasing are analyzed for each component. Procurement plays a key role in this process as it provides information on the costs, quality and market availability of material flows and components.

The components and production technology are determined on the basis of the assessments carried out and by other experts. Quality standards in the form of specifications are developed for the most attractive alternatives (taking into account the technical restrictions). They provide the supplier with information about the characteristics of the products to be procured and form the starting point for the search for a suitable supplier and the preparation of delivery orders. In addition, the information contained in them is also necessary for the supplier, who uses it when executing the order in order to meet the customer's requirements. The specifications are used to compare the results of inspections, tests and quality controls of the products. Depending on how the quality characteristics of the materials are described, a distinction is made between two groups of specifications: detailed specifications and regulations/instructions. Detailed specifications can take the form of quality standards designed by the organization - technical drawings and specifications that specify the material and manufacturing method of the product. Instructions provide more general information about the quality characteristics of the product and may take the form of a verbal description of the product function, a brand or trademark, a quality certificate, samples, etc. [21-23].

When determining the quality and technical characteristics of product launches, it is important to consider the original flow of raw materials flow and its suppliers. The flow of materials and services requires strategic decisions such as "buy or make", as far as this is possible in the context of the new product to be developed and brought to market. Deciding who should supply the raw materials depends on factors such as location and delivery times. Quality control is a challenge, and in the event that the product contains unique components with specific technical characteristics that limit the list of possible suppliers, there is the issue of supplier dependency, transportation costs and regulatory requirements for importing the materials in question. At this early stage of launching a new product, it is important to seek the advice of procurement experts in order to make the most profitable decisions for the company.

Manufacturing costs are largely influenced by the complexity of the product to be manufactured and the ability to produce large quantities. The standardization of product components and their unification with the components used in the manufacture of the company's already marketed products reduces the likelihood that production lines will need to be reconfigured to accommodate a different manufacturing process required for the new product. Appropriate product design solutions would use standard manufacturing processes as a basis and shorten or postpone the differentiation and adaptation of production lines only with regard to the new product. The speed of manufacture, avoidance of reconfiguration of production lines, cost and reliance on proven production and control processes would be advantageous and require

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the opinion of production specialists with regard to the impact on the supply chain and the newly developed product. developed. Product design is an important factor in determining the degree of standardization during the manufacturing process [10]. According to Cantini et al. a structured method for configuring spare parts SCs should be used to determine whether to centralise or decentralise inventory management [15].

Distribution is the final phase of the logistics process. While the first phase is related to the procurement of the necessary material resources (supply) and the second to the control of processes within the company (production), the third phase (distribution) comprises the physical movement of products to the end customer and customer service. How distribution proceeds depends largely on the final outcome of the efforts of many participants in the previous phases of the logistics process. Good results are a prerequisite for increasing market share, achieving higher profits, and thus broader opportunities for product and technology innovation and, of course, for successful market positioning. A rationally organized distribution therefore promotes the partnership between suppliers, manufacturers, dealers, forwarders, and other companies involved in the supply chain and thus becomes a springboard for their success. Conversely, poorly organized distribution demotivates and discredits these companies and worsens their market position. The main objective of distribution is to minimize the cost of storing and delivering products - from manufacture to purchase, while achieving optimal customer service, i.e. delivering products when and where consumers want them, and at the time they would most like to buy them.

The customer's order triggers a series of actions aimed at meeting his requirements in terms of quantity, range, quality, price, delivery time and place of delivery. Distribution therefore begins with the receipt of the order, continues with its processing and compilation and ends with the transportation and delivery of the ordered products to the customer. These are generally the phases that make up the basic sales cycle. Distribution, which is considered the main functional area, consists of various elements, the most important of which are warehousing and transportation. These elements of logistics are considered in the context of making the right decisions for building an SC market when introducing a new product to the market. Most warehouses have standardized shelf sizes and store products on pallets. In the best case scenario, the packaging of the product allows for its optimal placement on a pallet, ensuring safety and stability and optimizing space in the warehouse. Due to their size, some products cannot be stored on a pallet or on pallets already set up in the warehouse, so they have to be stored in separate logistics elements and assembled immediately before delivery. This makes warehouse operations more expensive and leads to additional product handling. Wholesalers and retailers also have a hard time if the product characteristics are not standardized and require special storage and handling

methods before the finished product is delivered. The service becomes more expensive, which affects the final price of the product. The dimensions of the product (volume and weight) are the basis for the price of the transportation service, regardless of whether it is rail, air, sea or road transport. Sometimes the products are small in volume but specific in terms of their characteristics. They determine the packaging and the type of transportation, which has a direct impact on transport costs.

3 Methodology

The data collection for the survey research is based on requests to customers who are computer users in one of the three companies examined in the case study. The inquiries to the customers were conducted with the help of the computer manufacturer of one of the companies that provides after-sales service for computer equipment that is not manufactured by the same company and is therefore suitable for the research in order to determine the existing level of after-sales service with spare parts and the ways to improve it. The data was collected through feedback from customers following a warranty failure that required a replacement part to repair the product. The terms and conditions of the after-sales service company's response to the warranty request, as specified in the customer contracts, show how well the company was able to meet the customer's expectations in a timely manner. The respondents are private and corporate customers who use computer equipment (servers) and have active customer service contracts.

The data collection to conduct the after-sales service supply chain performance survey was conducted from January 1, 2023 to January 1, 2024. The study covered 149,937 processed customer warranty claims from a computer manufacturer and showed the level of customer service over a one-year period. The feedback from 1572 respondents (private and corporate customers of the company) was taken into account in the analysis. The respondents are mainly private companies (small and large), schools, hospitals, universities, banks and others that use computer equipment for their business. The data tracks the fulfillment of all registered cases of warranty claims of the company's customers using computer equipment.

Aspects related to the supply chain activities for spare parts immediately after the launch of a new product (up to 6 months) of computer equipment from the point of view of ensuring after-sales service. The data reflect the level of after-sales service provided to 101 customers of new product category (NPI flag) computer equipment who made 1294 requests for warranty services requiring a replacement part. This data is analysed to identify weaknesses in the after-sales service supply chain for replacement parts immediately following the launch of the new product. (The data comes from the survey of 1,572 customers, but has been filtered by the NPI flag, i.e. only

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the 101 customers who consume products that were launched less than 6 months ago).

Analyze the reasons for unpunctual service during and immediately after the introduction of a new product (data collection through a survey). The following data is collected in order to investigate improvement opportunities in the spare parts supply chain during and immediately after the introduction of a new product and to suggest improvement opportunities that should be implemented in the initial phase of the introduction of a new product: The internal activities of the spare parts supply chain during the introduction of a new product are analyzed from the perspective of ensuring customer service. The data includes: the number of new products introduced in the computer category (116 new products) and the product tree for each product (or the spare parts required for customer service (839 spare parts)). The time periods in which each newly introduced spare part must be available in the computer manufacturers' warehouse network and ready for after-sales service are taken into account. This data is analyzed to identify weaknesses in the spare parts supply chain during the introduction of the new product that are the cause of delays in ensuring the availability of spare parts required for after-sales service in the warehouse network

- Stage 1: Assess the level of timely introduction of spare parts when introducing a new product (using a balanced scorecard);

- Stage 2: Identify the main reasons for the lack of spare parts during and immediately after (6 months) the introduction of a new product using a Pareto analysis and root cause analysis;

- Stage 3: Identify the weak points in the after-sales supply chain during the launch of a new product by identifying the reasons for missed deadlines in the implementation of after-sales service for new products due to the lack of a spare part.

4 Results and discussion

Activities in the spare parts supply chain immediately after (up to 6 months) the introduction of a new computer product from a customer service perspective. Data shows the level of customer service for 101 new product category (NPI flag) computer device customers who submitted 1294 requests for warranty service requiring a replacement part. This data is analyzed to identify weaknesses in the after-sales service supply chain immediately following the launch of the new product. Table 1 shows the number of computer hardware products (116) and the number of spare parts (839) introduced by computer hardware manufacturers during the reporting period. The data is broken down by quarter and includes information on the percentage of cases where a replacement part was made available in time for the new product to be serviced. This is to ensure that a spare part required to service the new product is available in the warehouse network at the time of initial sale. In general, new generations of computer products are sometimes sold to customers years before they are manufactured and launched. The date of expected first service of new products is known to the company 90 days before the product is sold and installed at the customer's site. In the data, this date is referred to by the abbreviation FSD and is the target/date by which the company must ensure the stock of spare parts. Within 90 days prior to the FSD, the supply chain staff must ensure that all spare parts of the product tree of the new product that are expected to be needed for after-sales service are available in the warehouse network.

Table 1 shows that 116 new products were introduced within one year and 839 spare parts were added to the after-sales network to support these products. The performance of the after-sales service supply chain for spare parts is measured at a global level. It is measured and presented by comparing the number of spare parts that are not guaranteed to be available on the FSD date with the total number of spare parts that need to be provided for service support for each of the new products. The data in Table 1 shows that performance was below target in three out of four quarters during this period. Consequently, the Company's target of having spare parts available at FSD was not met. Table 1 contains data on the introduction of new computer hardware products and their spare parts as well as performance metrics for the customer service supply chain, as described in the text.

Table 1 After-sales service supply chain of spare parts regarding the provision of stocks for the first service order

Quarter	Number of New Products Introduced	Number of Spare Parts Introduced	% Spare Parts Available at FSD	Performance vs. Target
Q1	29	205	88%	Below Target
Q2	30	210	91%	Below Target
Q3	28	200	89%	Below Target
Q4	29	224	95%	Met Target

Note: FSD (First Service Date) refers to the target date by which spare parts should be available in the warehouse network

Having established that the performance of the spare parts supply chain in customer service does not achieve its goal of providing a stock of spare parts for the first service order, the reasons for this are examined using a Pareto analysis. Figure 2 shows a Pareto chart of the main reasons why the spare part did not arrive at the IT company's

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central warehouses in time to secure the first service order. Three main categories of reasons stand out. The main reason, which accounts for 32% of all cases where a spare part did not arrive in time for the first service order, is the MOQ — the minimum order quantity required by the supplier-manufacturer of the spare part from the computer technology manufacturers. The weakness in this case is that when new products are introduced, the company requires minimum quantities (insufficient to meet the spare part manufacturer's MOQ conditions) from the supplier-manufacturer of a spare part to position them in the stock network in case a warranty claim occurs in the first six months after the new product is introduced. These minimum quantities ensure availability in the warehouse network and guarantee that the company has a spare part in the warehouse network in the event of a warranty claim. However, the supplier of this spare part is not always prepared to fulfill the request in the quantities required by the computer companies, as this can disrupt their production plans and processes. Example: computer manufacturers, when launching a new product, only want to have 3 cables (one in each central warehouse/region) in stock in sufficient quantities to ensure warranty failures in the first 6 months after the launch of the new product (as no failures are expected with the new technology), while the cable manufacturer requires a minimum order quantity of MOQ 100 pieces. For certain categories of spare parts, such as cables, it would not be possible to link the after-sales service supply chain order to the order placed by the supply chain for the manufacture of the final product with the same cable manufacturer, as the manufacture of the final product is at "chassis" level - the requirement is for the same manufacturer to pre-assemble the cables in the chassis required to manufacture a final product. However, maintenance is done at the cable level, not at the chassis level, and for this purpose the same component, but at a different level, is ordered separately from the same manufacturer. Negotiations are held between the PC companies and the spare parts manufacturers to reduce the minimum order quantity or to agree that the same component will be purchased by the PC companies within a certain period of time and not only when a new product is launched. These time-consuming negotiations are the main reason for the delay in ensuring the availability of spare parts in the PC manufacturers' warehouse network at the time of the first service order.

In second place is GBU late release (firmware) with 22% of all cases in which a spare part did not arrive in time for the first service order. The reason for this problem lies in the lack of synchronization between the supply chain that deals with the production of an end product and the one that deals with after-sales service. When a final product in the computer category is manufactured, the after-sales service waits to validate all technical aspects related to the correct functioning of the new product and all its components before giving the green light to the service activity. One of these technical checks relates to the system board or motherboard of the new server. Before customer service receives the order to take the system board into stock, production must ensure that it is working properly and that the latest version of the so-called firmware is installed. The production delay on the software side affects the chain and delays the readiness to add the hardware system board to the company's stock network as a spare part. The production delay is not taken into account when updating lead times and end dates for spare part availability. This poses a challenge for the after-sales supply chain, as it is directly dependent on production and its deadlines.

In third place is "delays due to the installation of a new supplier" with 20% of all cases in which a spare part did not arrive in time for the first service order. This cause of delay occurs when the company enters into a new contractual relationship with a supplier with whom it has no previous experience. In the dynamic world of information technology, the emergence of a new supplier and its rapid rise in the market is no longer as rare as it was in the past. Despite the company's desire to consolidate its suppliers and work exclusively with a few key suppliers, it sometimes needs to establish a new relationship with a supplier with whom it has not previously worked in order to bring a new competitive product to market. Establishing a new relationship with a supplier that offers better quality or better pricing terms for spare parts (or both) that the company needs to manufacture a new product is a time-consuming process. Negotiating price contracts, return options for defective parts and repair contracts takes time and causes delays in the introduction and positioning of these parts coming from the new supplier with whom the computer manufacturers are technically building new relationships.

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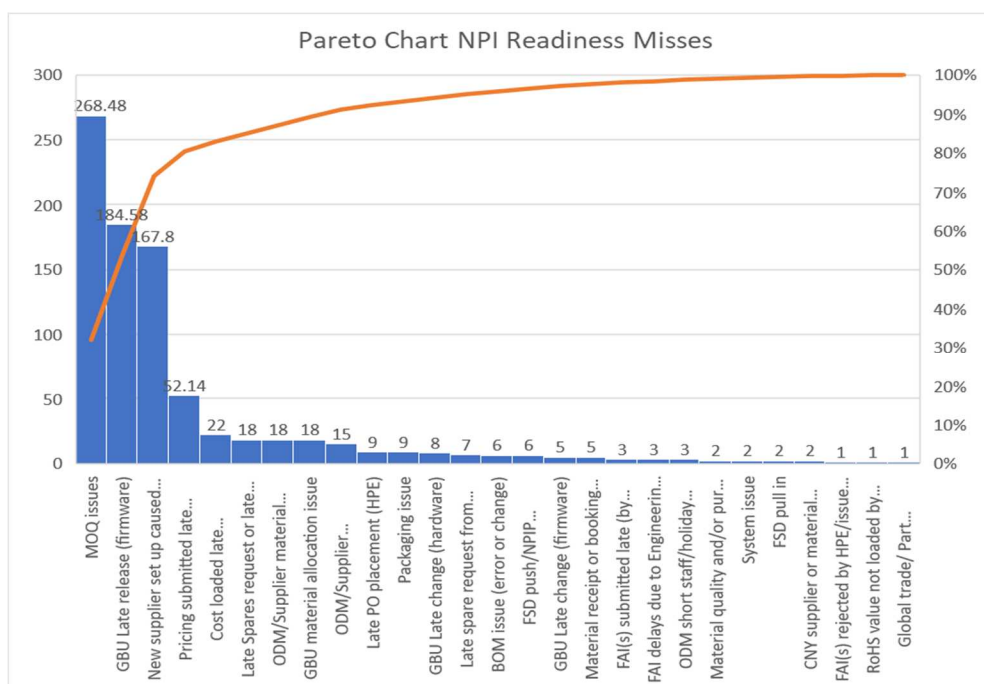Maria Vodenicharova, Yulia Genova

Figure 2 Pareto analysis of the causes of missed deadlines for providing spare parts on time, for servicing new products

In order to identify the main weaknesses of the after-sales service for spare parts when new products are launched, an analysis of the efficiency of the after-sales supply chain for spare parts is carried out immediately after the market launch (6 months) of a new product. The study focuses on the after-sales supply chain immediately after the new product has already been positioned with the customers (the service provided by the after-sales supply chain for spare parts of 101 customers was analysed) and the first (6 months after the product launch) warranty orders with spare parts have taken place (1294 requests). For the year under review (January 2023 to January 2024), Figure 3 shows that of all service orders (149,937), only 0.86% (1,294) concerned products that were placed on the market less than six months ago (NPI labeling).
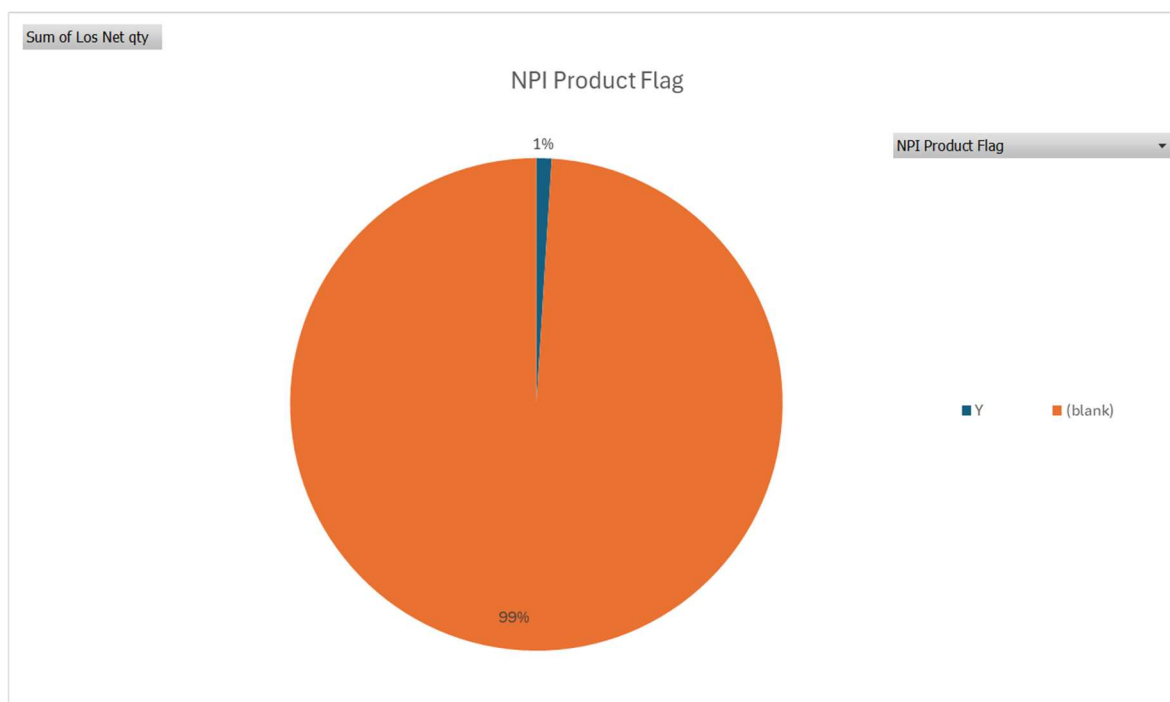

Figure 3 Number of serviced requests for after-sales service of customers who purchased new computing products

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This percentage is to be expected as products sold to customers under warranty in the early stages of the life cycle are relatively rarely damaged and warranty claims increase with the degree of moral obsolescence of the equipment and, accordingly, with its operation. It is common practice for computer companies to technically test the performance of a product at the manufacturing facility before the product is installed at the customer's premises. It is expected that all possible tests and replacement of a spare part will have taken place before the product is installed in the customer's data center. It is assumed that no failures that would require the replacement

of a spare part are to be expected in the first 6 months after installation.

Figure 4 shows the number of service requests received for new products that were responded to promptly and for which a replacement part was provided to fulfill the warranty. Figure 4 shows that in 94% of cases a replacement part was available and warranty services were provided on time, but in 6% of cases this was not the case. Considering the company's goal to provide a 100% spare parts service for new products, it is necessary to identify the reasons why the requested spare parts were not available at the time of the request.
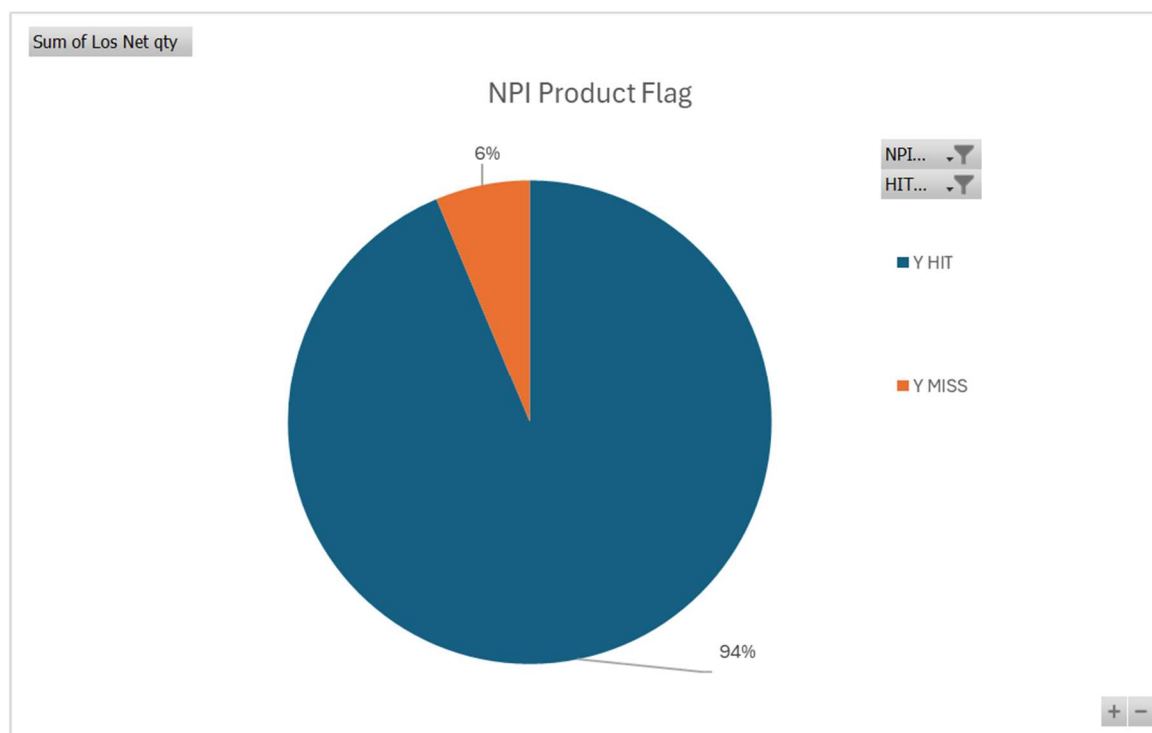

Figure 4 Level of after-sales service achieved with spare parts for new computing products (missed (MISS) / fulfilled on time (HIT) warranty claims)

Figure 5 shows the reasons for missed deadlines for the timely execution of a service order with a spare part for products launched less than 6 months ago. Figure 5. shows that the reason is the same for all requested spare part categories, namely a delivery delay ("Delivered too late"). This means that a spare part was available (usually in a central warehouse) but not close to the customer (it was not available in a regional company warehouse). It is a common practice for computer companies to keep a stock of spare parts needed for after-sales service in central warehouses at the beginning of the product life cycle. This

practice serves to optimize inventory levels, optimize costs and later make the right decisions - in which regional warehouses, what types of parts and in what quantities to position them so that customers in the region can be served in a timely manner. Regarding the types of spare parts requested for the maintenance of products launched less than six months ago, Figure 5 shows that it is hard disks in 61% of cases, followed by network spare parts (switches and routers) in 31% of cases and in third place cables, adapters and chargers in 8% of cases.

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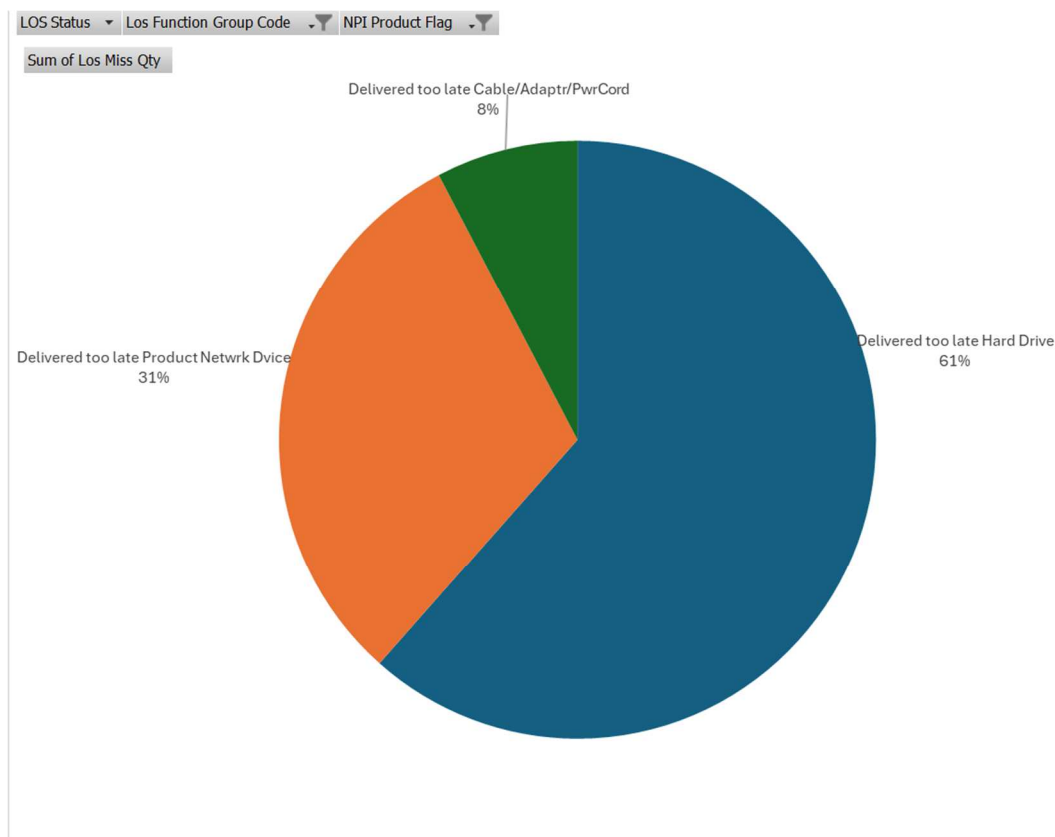Maria Vodenicharova, Yulia Genova

Figure 5 Reasons for missed deadlines for the implementation of after-sales service but new products due to the lack of a spare part

Due to uncertain demand and warranty failures, computer equipment manufacturers often take the risk of not stocking spare parts in regional warehouses for the first six months after product launch. Instead, they wait until demand has stabilized so that they can make better decisions about stocking in regional warehouses.

5   Conclusions

The analysis of the research data shows that computer companies work with several suppliers and manufacturers of spare parts. A large proportion of the spare parts used for the production and after-sales service of finished products are supplied by non-company manufacturers (third-party suppliers such as Intel or AMD (processors), Nvidia (graphics cards), Amphenol (special cables), Samsung, Kioxia, Seagate and others (hard disks), etc.). The problem that arises from this is the large number of suppliers and third-party providers that computer companies work with. This presents a challenge as there are not always uniform/centralized rules for managing relationships with each vendor, but a different approach is required due to the specific agreements with each vendor. This sets the stage for errors due to communication gaps or failure to recognize delivery delays in a timely manner, as well as opportunities for unfulfilled contracts, inaccuracies and difficult traceability and control of relationships with the various suppliers. The lack of centralized operating rules alone can lead to instability in the spare parts supply

chain and present management with the challenge of managing all relationships with different suppliers in different ways (depending on the established requirements and the agreements made with each of them).

Some of the spare parts are produced by the computer manufacturer itself - these are spare parts that require special processing of the software part, which is combined with the hardware part to match the finished product (firmware, etc.). The problem that may arise with in-house production of spare parts is the maintenance of equipment and highly qualified personnel (engineers), which means additional costs for the computer company. One of the ways to improve the after-sales service supply chain for spare parts could be sought in cost rationalization in the area of spare parts production.

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