

Distribution Process in A Manufacturing Company*

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Abstract

Distribution logistics plays a key role in manufacturing companies, especially in terms of timely and safe delivery of products to customers. The efficiency and effectiveness of transport processes in this area affects the quality of customer service and market competitiveness. The variability of the conditions for the implementation of transport processes is a constant research challenge. Studying the conditions for the implementation of transport processes is crucial in decision-making processes at the operational and strategic level in a company specializing in the production of cleaning machines and metal components. The assessment of the key conditions for the implementation of the process of distribution of finished products of the examined metal industry manufacturing company was made on the basis of the company's source data, an indicator analysis of the level of quality of deliveries, punctuality of deliveries and distribution costs. In terms of the quality of deliveries, the company maintained a very good level, with a clear downward trend in the complaint rate. The punctuality of deliveries has shown significant progress, which is evidenced by good transport organization, effective order planning and improved vehicle availability. The demonstrated increase in transport costs related to the costs of fuel, services, drivers' salaries, insurance and administrative costs is an important contribution to their optimization, e.g. through the use of outsourcing of transport services.

Keywords: distribution process, distribution quality, on-time delivery, distribution costs

Introduction

Distribution logistics in a manufacturing company includes distribution planning, warehousing, transport process and customer service (from order acceptance to returns and complaints handling).¹² The use of good practices in the area of distribution logistics of the company allows for minimizing costs by, for example, optimizing transport routes, using the full load capacity of transport vehicles, reducing storage costs, shortening delivery time by, for example, fast order fulfillment, minimizing customer waiting time for a product, increasing availability and minimizing product damage, increasing customer satisfaction by, for example, ensuring timely deliveries and their compliance with the product order, as well as professional customer service³.

¹ Ballou, R. H. (2004). *Business Logistics/Supply Chain Management: Planning, Organizing, and Controlling the Supply Chain* (5th ed.). Pearson Education, Inc., Upper Saddle River, New Jersey, 2004, pp. 47,48.

² Juściński S., *Analysis of the logistics of distribution of new agricultural machinery in the aspect of changes in the structure of demand*, Wydawnictwo Zakład Logistyki i Upravljanje Przedsiębiorstwem, University of Life Sciences in Lublin, Lublin 2012, p. 85, Journal of Research and Applications in Agricultural Engineering, Vol. 57, No. 2, ISSN 1642-686X

³ Jurczak. M., Konecka S., Łupicka-Fietz A., Pawlicka K., *Fundamentals of logistics*, Poznań University of Economics, Poznań 2024, p. 65, ISBN: 978-83-8211-206-1, e-ISBN: 978-83-8211-207-8, DOI: 10.18559/978-83-8211-207-8

Methodology

Distribution logistics plays a key role in a manufacturing company, especially in terms of delivering products to customers on time, safely and cost-effectively⁴. Transport processes, which are an essential element of distribution logistics, affect the quality of customer service, market competitiveness and productivity of the company. Growing customer requirements and market changes in a manufacturing company's environment necessitate constant analysis and evaluation of transport processes in distribution logistics. The transport process usually consists of organizational activities (they focus on optimizing the transport of cargo from the point of delivery to the point of collection), commercial activities (from negotiating the terms of transport, its costs to signing a commercial agreement) and executive activities (from preparing the cargo, arriving for loading, securing the cargo to transport, unloading and quantitative-quality control, as well as the return of the vehicle)⁵. The research area of the article includes the logistics of a manufacturing company's distribution, and in particular, its transport process. The subject of the research is a manufacturing company specializing in the production of cleaning machines and metal components. The company has been operating in the market since 1997 and has its own logistics department and a fleet of vehicles, enabling independent distribution of products to domestic and international markets. The subject of the research was the transport process of distribution logistics of the studied company. The main objective of the research process is to assess the implementation of the transport process in the distribution process of the audited company. The main problem of the paper is formulated in the form of a question: what were the key conditions for the implementation of the transport process in the process of product distribution in the studied company. Research methods used in the research process: literature analysis, secondary data analysis, indicator analysis and inference.

Research Results

Efficient and productive distribution logistics and its transport process are key elements influencing the competitive advantage of a manufacturing company. The quality of distribution processes, delivery time and the level of distribution costs incurred have a direct impact on the level of customer satisfaction and on the company's financial results. In the era of growing market expectations and dynamic changes in the economic environment, the continuous improvement of these areas of the company's activity becomes significant. Quality, as a key feature in the operations of the surveyed manufacturing company, plays the most critical role in distribution logistics, where error-free delivery directly impacts the level of customer satisfaction and the company's operational productivity. The company systematically examines it by comparing the number of parts advertised with the total number of parts shipped to the customer to identify potential problems and understand how to solve them. Quantitative data on the parts advertised versus parts shipped for the years 2021-2023 are illustrated in Figure 1.

⁴ Dyczkowska J., *Logistics of supply and production – impact on distribution logistics*, Scientific Works of the Warsaw University of Technology. Transport, Warsaw 2012, p. 23, ISSN 1230-9265, e-ISSN 2956-9257

⁵ Hajduk M., Stajniak M., Foltyński M., Koliński A., Andrzejczyk P., *Organization and monitoring of transport processes*, Institute of Logistics and Warehousing in Poznań, Poznań 2015, p. 13, ISBN: 9788363186012

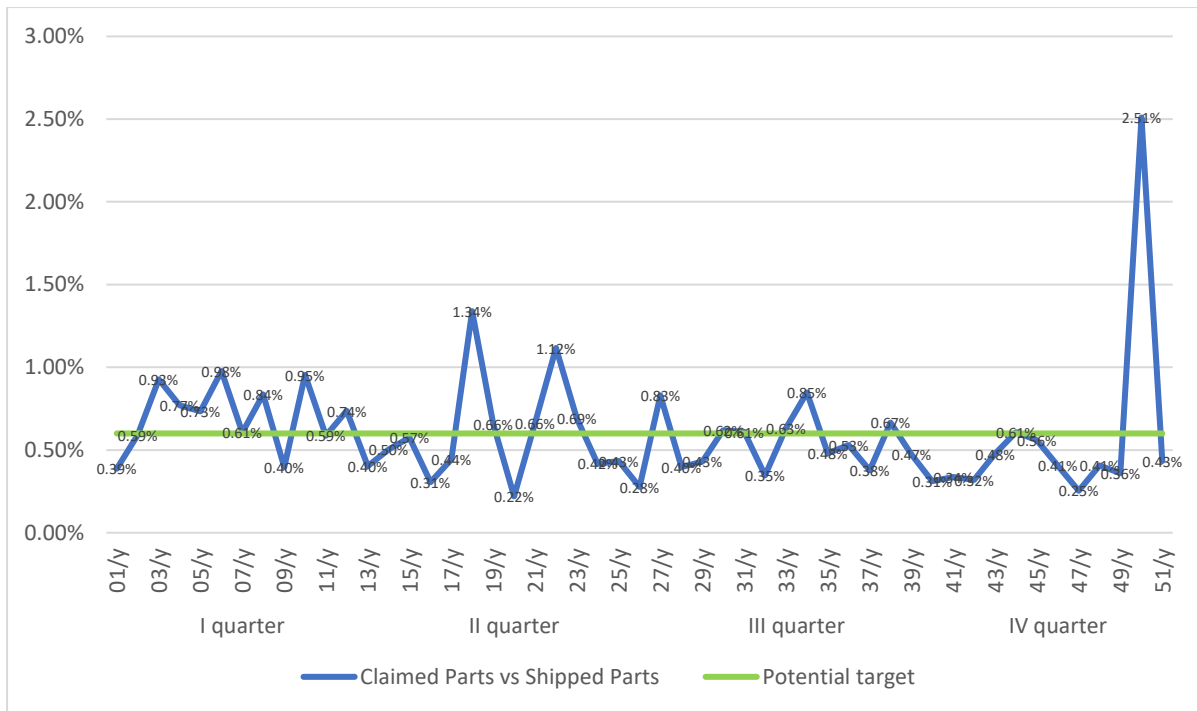


Fig. 1. Parts Advertised vs Parts Shipped for 2021-2023

The analysis of the data illustrated in Figure 1 allows us to conclude that, in the years 2021-2023, the average level of complaints about shipped parts relative to all shipped parts was 0.60%, which corresponds to the company's set potential target. In addition, despite an overall satisfactory average level, weekly data are characterised by significant volatility, especially in the first half of the period. In the first quarter of the period under review, there were frequent exceedances of 0.60%, with local peaks recorded, which may indicate instability in production and/or logistics processes during this period. However, the highest complaint rates occurred in the second and fourth quarters, with 1.31% in week 17 and 2.51% in week 51, significantly exceeding the permissible level. Such anomalies may indicate incidental quality issues or serial errors. In the second half of the year and in the third and fourth quarters, greater stability was observed, with most of the results remaining below the target line. It should also be noted that in the period under review, many weeks recorded results close to 0.30%–0.50%, which should be assessed positively. The series of weeks between the 35th and 47th stands out in particular, where the level of complaints was not only in line with the assumptions, but also significantly lower, which may indicate the effective operation of quality control systems and appropriate corrective and preventive actions.

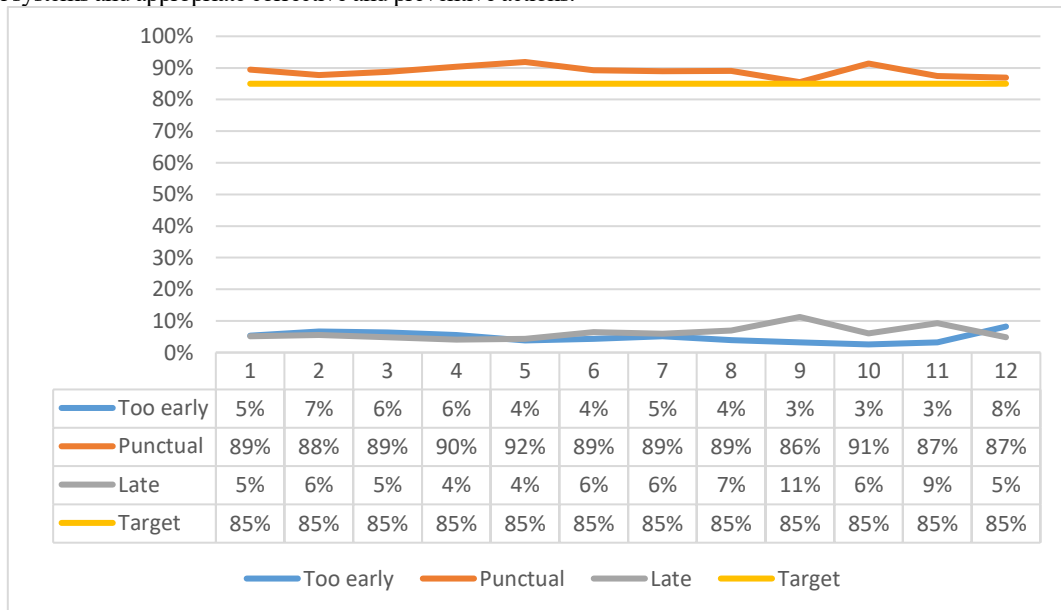


Fig. 2. On-time deliveries in 2021-2023

The analysis of the data illustrated in Figure 2 allows us to conclude that the timeliness of deliveries in the audited years records a clear and systematic progress in the implementation of deliveries in accordance with the assumptions. The average on-time delivery rate for the entire period was 89%, which means the company not only achieved the minimum target of 85% for two consecutive years but also exceeded it. In 2021, delivery punctuality was the lowest, at 82% on average, indicating the target was not met. However, already in 2022, a significant improvement was recorded – punctuality increased to 91.7%, and in 2023, an even better result was achieved at 93%. These figures, summarizing the entire three-year period, confirm a high and stable level of punctual deliveries, with monthly values ranging from 86% to 92%, except in September, when a temporary decline to 86% occurred, and at the end of the year, where 87% was recorded. It is also worth noting that both late and premature deliveries remained relatively low for most of the period, and jumps above this range were sporadic and did not significantly affect the overall trend. Based on the data above, the 85% punctuality target is no longer a challenge and does not reflect the company's current productivity. Therefore, it would be justified to consider raising the target ratio. Distribution costs relate to the delivery of finished products to customers or to the audited company's points of sale. Financial data on outsourcing distribution costs in 2021-2023 are presented in Table 1.

Table 1. Distribution costs of the enterprise in 2021-2023 (PLN)

| Destination | Route length (rounded up to 100 km) | Average number of deliveries | Cost 2021 | Annual cost | Total costs |
|-------------|-------------------------------------|------------------------------|-----------|-----------------|-----------------|
| 1 | 600 | 352 | 3 450,00 | PLN1,214,400.00 | PLN5,156,800.00 |
| 2 | 1200 | 352 | 5 000,00 | PLN1,760,000.00 | |
| 3 | 1400 | 352 | 6 200,00 | PLN2,182,400.00 | |
| | | | Cost 2022 | | |
| 1 | 600 | 440 | 4 560,00 | PLN2,006,400.00 | PLN8,553,600.00 |
| 2 | 1200 | 440 | 6 720,00 | PLN2,956,800.00 | |
| 3 | 1400 | 440 | 8 160,00 | PLN3,590,400.00 | |
| | | | Cost 2023 | | |
| 1 | 600 | 264 | 5 426,00 | PLN1,432,464.00 | PLN6,115,824.00 |
| 2 | 1200 | 264 | 8 040,00 | PLN2,122,560.00 | |
| 3 | 1400 | 264 | 9 700,00 | PLN2,560,800.00 | |

Table 1 shows the costs incurred between 2021 and 2023 for distributing goods on three fixed international routes from Poland to sister companies in Germany. For each route, the length of the entire route, the average annual number of deliveries, the cost of a single transport and the total costs incurred for distribution are taken into account. In 2021, the total distribution costs amounted to PLN 5,156,800.00. The largest annual expenditure concerned route 3 (PLN 2,182,400.00), which resulted from the highest unit transport cost (PLN 6,200.00) and the same average number of deliveries per year (352). In 2022, there was a significant increase in costs – the total sum amounted to PLN 8,553,600.00. Both the number of deliveries (to 440 per year) and unit costs increased. The highest costs again concerned route 3 (PLN 3,590,400.00), but the most significant increase in unit costs was recorded on route 1 (from PLN 3,450.00 to PLN 4,560.00). In 2023, distribution costs fell to PLN 6,115,824.00. Despite the decrease in annual costs, an increase of about 19% in unit prices can be recorded; the lower cost is also due to fewer deliveries during the year. Route 1 remained the most expensive, but the differences between the routes were not as apparent as in previous years.

Conclusion

An analysis of the transport process at the surveyed company for the years 2021–2023 shows that the quality and timeliness of deliveries play a key role in shipping orders. Costs, on the other hand, are not a priority, as indicated by the savings that can be achieved. In the period under review, there was a systematic improvement in the studied determinants, which increased the productivity of logistics activities and the level of customer satisfaction. In terms of delivery quality, the company maintained an outstanding level, with a clear downward trend in the complaint rate. In 2021, the average level of advertised parts relative to total shipments was 0.59%; in 2022, it was 0.70%; and in 2023, it fell to 0.53%. The average value for the entire period was 0.60%, indicating that the new quality target would be met. The most significant improvement was observed in 2023 –

especially in the fourth quarter, when the level of complaints remained even below 0.2%. This means the effective implementation of preventive and control measures that have improved the quality of logistics and production services. On-time deliveries also showed significant progress. In 2021, only 82% of deliveries were made on time, which did not meet the adopted minimum target (85%). In the following years, there was a clear improvement: in 2022, the on-time delivery rate increased to 91.7%, and in 2023 it rose to 91.9%. This increase is evidence of better transport organisation, more efficient order planning and improved vehicle availability, which had a significant impact on the stability of the supply chain. An analysis of transport costs indicates that the company incurs significant expenses related to the maintenance of its own fleet of vehicles, which is related to, among other things, the costs of fuel, services, drivers' salaries, insurance, and administrative expenses. Due to rapidly changing transport rates on the European market, the company should focus on cost optimization. The company makes about a thousand deliveries a year, and therefore even the smallest unit savings translate into significant sums at the end of the financial year. If a company used more, e.g., outsourcing of transport services, it could significantly reduce fixed operating costs, eliminating the need to keep the fleet on standby throughout the year. Outsourcing would allow for flexible adjustment of the number of transports to current needs and the transfer of responsibility for transport logistics to a specialized partner. This would enable the company to focus on its core business of producing high-quality metal components, resulting in even better quality and innovation.

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