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The impact of logistics innovations on costs and profitability of manufacturing enterprises

Shaip Gashi*

Doctor of Sciences, Professor
International Business College Mitrovica
40000, 120 Bislim Bajgora Str., Mitrovica, Kosovo
https://orcid.org/0000-0002-0911-0340

Abstract. The aim of the study was to assess how the implementation of modern logistics solutions, such as automated warehouse systems, digital supply chain management platforms and delivery route optimisation, affects the efficiency of resource use and the financial results of manufacturing enterprises. The study analysed the implementation of logistics innovations using the example of manufacturing enterprises Bosch, Procter & Gamble and Nestlé, drawing on data on transportation costs, delivery times, warehouse productivity, financial indicators and industry standards. The effectiveness of implementing automated warehouse systems and digital logistics platforms was assessed. In Bosch warehouses, inventory accuracy increased from 92 to 98%, order processing time decreased from 4 to 2 hours, staff productivity rose from 50 to 70 units of orders per day and transportation costs fell from 12 to 9 million EUR. At Procter & Gamble, inventory accuracy increased from 90 to 96%, processing time decreased from 5 to 3 hours, productivity increased from 45 to 65 units and transportation costs decreased from 20 to 16 million EUR. At Nestlé, optimisation of logistics processes reduced delivery time from 4 to 3 days, lowered transportation costs from 15 to 12 million EUR, increased accounting accuracy from 88 to 94% and raised personnel productivity from 40 to 60 units. Comparative analysis showed that these companies exceed the industry average. The practical significance of the study lies in providing scientifically grounded recommendations for the implementation of logistics innovations that can increase the efficiency of resource management and improve the financial results of manufacturing enterprises

Keywords: digitalisation; automation; supply chains; productivity; costs; efficiency

Introduction

In conditions of high competition and dynamic changes in the market environment, manufacturing enterprises are forced to optimise logistics processes to ensure sustainability and competitiveness. The integration of modern warehouse operations management technologies, digital platforms for coordinating supply chains and delivery route optimisation systems is a key tool for increasing operational efficiency, reducing costs and improving customer service. Analysis of the impact of such innovations on the economic indicators of enterprises is of great importance for the scientific substantiation of development strategies and for planning investments in the logistics sector. Despite the widespread implementation of logistics innovations, the lack of systematic and empirically confirmed data on their impact on financial results and resource efficiency remains a pressing problem. Enterprises do not have a clear understanding of changes in transportation costs, delivery times and warehouse productivity after the integration of automated systems or digital management platforms. This complicates the informed adoption of managerial decisions and the strategic planning of logistics development, which determines the need for a comprehensive study of the effect of innovative approaches in production logistics.

Researchers G.V. Obruch *et al.* (2023) proved that automation of warehouse processes at manufacturing enterprises significantly reduced the costs of processing and storing products, while simultaneously increasing the accuracy of accounting and reducing the number of errors

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*Corresponding author

in order picking, which ensured a more stable operation of the logistics system. N. Abdul Rahman *et al.* (2023) emphasised that modern warehouse management systems contributed to a significant increase in the efficiency of logistics operations. The use of such systems automated order processing, optimised process execution time and contributed to the rational use of enterprise resources. H. Song *et al.* (2021) noted that digital supply chain management platforms ensured the integration of data between procurement, production and sales. This approach increased the transparency and flexibility of logistics processes, allowing managers to make decisions quickly and respond to changes in market demand in a timely manner. G. Omoegun *et al.* (2024) proved that the use of digital solutions significantly improved control over the flow of materials and products. This helped reduce the risks of delays in delivery, which positively affected the reliability of the logistics chain. L Xin *et al.* (2024) indicated that the optimisation of delivery routes allowed a significant reduction in transportation costs. Reducing the time of order fulfilment increased the efficiency of logistics services and improved customer satisfaction. According to O. Vivchar (2020), the risks of logistics management are associated with the uncertainty of transportation processes, demand fluctuations and instability of supply chains, which requires a comprehensive approach to their management.

S.O. Klyuyev *et al.* (2023) confirmed that route planning contributed to the rational use of transport resources. This made it possible to reduce the workload on personnel and increase the quality and accuracy of product delivery. H. Fidlerová *et al.* (2025) proved that the comprehensive implementation of logistics innovations significantly increased the productivity of warehouse workers. Reducing the time required to perform internal warehouse operations ensured more efficient functioning of the entire logistics system. E.O. Sodiya *et al.* (2024) noted that automation and optimisation of processes enabled more efficient use of warehouse space. This contributed to reducing operating costs and increasing the overall productivity of the enterprise. I. Chmutova *et al.* (2024) showed that the economic results of enterprises directly depended on the level of integration of digital solutions. Greater flexibility in managerial decision-making allowed for improvements in logistics efficiency and increases in the financial performance of enterprises. M. Vienažindienė *et al.* (2021) emphasised that the introduction of logistics innovations contributed to enhancing the competitiveness of enterprises. This ensured their long-term sustainability and laid the foundation for the further development and modernisation of logistics processes. The results of the aforementioned studies showed that the introduction of logistics innovations increases the efficiency of operations, reduces costs and improves the productivity of enterprises. However, the lack of a systematic comparative analysis of the impact of different types of innovations on the financial results of enterprises requires additional study. The purpose of the study was to identify the impact of modern innovations in the field of logistics on increasing productivity, optimising costs and improving the financial performance of manufacturing enterprises. The objectives of the study were to examine modern logistics innovations used in manufacturing enterprises to increase the efficiency of operations; to assess the impact of automated warehouse systems on employee productivity, the accuracy of goods accounting and the effectiveness of digital supply chain management platforms; and to study the results of applying delivery route optimisation systems and their impact on reducing transportation costs and delivery time.

Materials and Methods

The study was conducted from January 2024 to September 2025. It analysed the experience of three leading transnational corporations – Bosch (n.d.) (Germany), Procter & Gamble (n.d.) (USA) and Nestlé (n.d.) (Switzerland) – which demonstrate a systematic approach to the implementation of logistics innovations in production and sales processes. The choice of these companies was due to their global scale of operations, high level of digitalisation of business processes and the availability of practical cases of integrating modern technologies into logistics systems. Using the example of Bosch, the study examined the use of SAP Extended Warehouse Management (SAP EWM) (Bosch Rexroth, 2024) as an automated warehouse system capable of ensuring inventory accuracy and reducing order processing costs. Procter & Gamble Corporation became the object of analysis due to the implementation of Oracle NetSuite SCM (Procter & Gamble, 2024), which integrated procurement, production, transportation and sales into a single information environment, providing end-to-end control over supply chains. Nestlé's experience was considered in the context of using PTV Route Optimizer (Transporeon, 2025) for delivery route planning in order to reduce empty runs and increase the efficiency of vehicle use. All these examples made it possible to form a holistic understanding of the functional capabilities of logistics innovations and determine their role in ensuring the competitiveness of manufacturing enterprises in a globalised environment.

The study provided a detailed overview of the changes that occurred in the organisation of transport and warehouse processes after the implementation of innovative solutions. The analysis covered aspects of optimising transportation routes, increasing the efficiency of fuel and energy resources, reducing logistics costs and accelerating order fulfilment. Separately, the transformation of warehouse operations was considered, where automated systems provided a new level of inventory management, increased employee productivity and reduced the risk of errors in the logistics service process (Reuters, 2024; PTV Logistics, 2024; Rocket Consulting, 2025).

Significant attention was also paid to the financial component of innovation integration, which was examined using the method of economic and statistical analysis. The study analysed changes in the structure of logistics costs before and after the implementation of innovations

(million EUR), the level of investment in infrastructure development (million EUR), changes in product cost (%), operating profitability indicators (%) and the financial results of enterprises after innovations, in particular EBIT, EBITDA and net profit (Bosch Connected Industry, 2024; Oracle NetSuite, 2024; FICO, 2024). This approach made it possible to consider the implementation of innovations not only from an organisational and technological point of view, but also from an economic one, which is particularly important for manufacturing enterprises operating in a highly competitive environment.

To ensure objectivity, the data obtained for leading companies were compared with average indicators for the industry. The objects of comparison were logistics and warehouse processes of enterprises, and the criteria were transportation costs (million EUR), delivery time (days), inventory accuracy (%), warehouse operations productivity (orders/day) and profitability (%) (World Bank, 2023; HFW & Panattoni, 2024; Deloitte, 2024). This approach made it possible to identify differences between the results of leading companies and the average characteristics of the industrial sector, assess the degree of their advancement in the field of logistics and determine the potential for practical application of the acquired experience by other enterprises.

The final stage consisted of generalising the obtained data and forming a systemic vision of how logistics innovations transform the activities of modern manufacturing companies. The key trends in the digitalisation of logistics were identified, their impact on organisational, technological and financial processes was determined, and the strategic significance of innovations for increasing the efficiency and long-term competitiveness of industrial enterprises was emphasised. The data were processed using mathematical statistics methods in the IBM SPSS Statistics environment (version 29.0).

Results

In the context of globalisation and growing competition, effective logistics management is becoming one of the key factors for the success of manufacturing enterprises. Innovative solutions in this area enable companies not only to optimise internal processes, but also to improve the quality of customer service, reduce costs and shorten product delivery times. An example of such an approach is the implementation of digital and automated systems in leading multinational corporations. At Bosch (n.d.) plants in Germany, the SAP Extended Warehouse Management (SAP EWM) system (Bosch Rexroth, 2024) is widely used as an automated solution for managing warehouse operations. This system ensures comprehensive control of all stages of the movement of inventories – from receiving goods and storing them to order picking and shipping to the end consumer. The implementation of SAP EWM increases the accuracy of inventory accounting, as all operations are documented in real time, which minimises the risk of errors during the receipt and dispatch of goods. In addition, the automation of order processing reduces the time required to complete each order, enabling staff to perform daily operational tasks more efficiently. By integrating SAP EWM into internal operational processes, companies have been able to optimise cargo movement routes within warehouses, increase the efficiency of warehouse space utilisation and ensure more reliable coordination between production lines, warehouse operations and distribution centres. As a result, the implementation of the system leads to an overall increase in the efficiency of the logistics chain, reduces the number of errors and ensures a quick response to changes in production volumes and demand.

Another example of successful logistics digitalisation is demonstrated by Procter & Gamble Corporation (n.d.), which integrated the digital SCM platform Oracle NetSuite (Procter & Gamble, 2024). This platform combines the key components of the supply chain – purchasing, production, transportation and sales – within a single information environment. Through this integration, the company has been able to exercise comprehensive control over logistics processes, track the status of each order and coordinate the actions of different departments in real time. The platform enables automatic report generation, forecasting of inventory requirements and planning of production in accordance with current and expected demand. In addition, it helps reduce administrative costs and improve coordination between departments, which is particularly important for a global manufacturer with numerous warehouses and production sites. The use of a digital SCM platform allows for rapid responses to market changes, increases supply chain flexibility and reduces risks associated with delays or shortages of goods.

No less important is the experience of Nestlé (n.d.), which implemented PTV Route Optimizer (Transporeon, 2025) to optimise product delivery routes. This software package enables transportation planning that takes into account real-world road conditions, driver working hours and vehicle load levels. By optimising routes, the company reduces the number of empty runs, increases fleet utilisation and decreases transportation costs. The platform also enables rapid responses to changes in orders or unforeseen delays, ensuring the timely delivery of products to customers and improving service quality. The use of digital tools of this type demonstrates that modern technologies influence not only internal logistics processes, but also enhance the overall level of service and end-user satisfaction. This underscores the strategic importance of integrating innovative solutions into the supply chain to ensure competitive advantage in the global market.

To assess the effectiveness of the implementation of digital logistics solutions, it is advisable to analyse in detail their impact on key transport indicators that directly reflect the productivity and efficiency of logistics processes. These indicators include transportation costs, which reflect how optimally routes and resources are used; delivery time to customers, which determines the efficiency of order fulfilment and the level of consumer satisfaction; and the level of reduction in empty runs, which shows the effectiveness of

transport route planning and fleet utilisation. The analysis of these indicators made it possible not only to quantify the results of the implementation of digital systems, but also to identify the strengths and weaknesses of logistics processes in specific companies. In this context, it is especially important to consider the experience of leading international corporations already using modern automated and digital solutions for supply chain management, since their practical results can serve as a benchmark for assessing effectiveness and planning further innovations in logistics (Table 1).

Table 1. Impact on transportation costs and delivery time

Company	System/tool Used	Delivery time to customer (days) before/after	Transport costs (million EUR) before/after	Reduction in empty runs (%)
Bosch (Germany)	SAP EWM	5 / 4	12 / 9	15
Procter & Gamble (USA)	Oracle NetSuite SCM	6 / 5	20 / 16	12
Nestlé (Switzerland)	PTV Route Optimizer	4 / 3	15 / 12	20

Source: developed by the author based on data from Procter & Gamble (2024), Bosch Rexroth (2024), Transporeon (2025)

The implementation of modern logistics systems significantly affects the efficiency of transport processes in companies. Bosch, having implemented the SAP EWM system, reduced delivery time from 5 to 4 days, which made it possible to reduce transport costs from 12 to 9 million EUR and achieve a 15% reduction in empty runs. This indicates successful optimisation of routes and increased efficiency in fleet utilisation. The implementation of an automated warehouse system made it possible to significantly reduce order processing costs, increase the accuracy of inventory accounting and improve overall productivity. Procter & Gamble applied Oracle NetSuite SCM, which made it possible to reduce delivery time from 6 to 5 days, reduce transport costs from 20 to 16 million EUR and reduce empty runs by 12%. This reflects the integration of transport and warehouse processes, which increased the efficiency of the logistics network, improved inventory management and reduced costs. Nestlé used PTV Route Optimizer, which made it possible to reduce delivery time from 4 to 3 days, reduce transportation costs from 15 to 12 million EUR and reduce empty runs by 20%. This resulted from effective route planning and optimisation of logistics processes, which improved the efficiency of vehicle utilisation and reduced transportation costs. Overall, all three companies demonstrated significant improvements after implementing digital solutions in logistics. They succeeded in reducing transportation costs, shortening delivery times and decreasing empty runs, which significantly increased the efficiency of their resources. The results show that the implementation of automated and digital systems in logistics not only reduces costs but also improves the overall performance of transport systems, which is important for the competitiveness of these companies.

In addition to optimising transport processes, digitalisation has a significant impact on warehouse efficiency. The use of automated warehouse management systems enables a considerable increase in the accuracy of inventory accounting, as all operations – from receiving and placing goods to picking and shipping – are controlled in real time. This reduces the risk of errors, losses or incorrect product allocation, ensuring more stable supply and an uninterrupted logistics chain. Furthermore, automation reduces order processing time, optimises movement routes within the warehouse and accelerates personnel operations, thereby increasing overall employee productivity. As a result, companies are able to process larger volumes of orders with fewer errors, increasing customer service speed and contributing to resource savings. The above indicators confirm that the implementation of automated systems significantly improves the efficiency of warehouse operations, ensures greater accuracy in inventory management and increases the overall reliability of the logistics system (Table 2).

Table 2. Efficiency of automated warehouse systems

Company	System used	Inventory accuracy (%) before/after	Order processing time (hours) before/after	Staff productivity (units of orders/day) before/after
Bosch (Germany)	SAP EWM	92 / 98	4 / 2	50 / 70
Procter & Gamble (USA)	Oracle NetSuite SCM	90 / 96	5 / 3	45 / 65
Nestlé (Switzerland)	PTV Route Optimizer	88 / 94	3 / 2	40 / 60

Source: developed by the author based on data from PTV Logistics (2024), Reuters (2024), Rocket Consulting (2025)

The implementation of automated warehouse systems significantly increases the efficiency of logistics operations in companies. Bosch, using the SAP EWM system, improved inventory accuracy from 92 to 98%, reduced order processing time from 4 to 2 hours, and increased staff productivity from 50 to 70 units of orders per day. This indicates the successful implementation of an automated system, which made it possible not only to increase accounting accuracy but also to significantly reduce order processing time, which is important for enhancing warehouse efficiency and reducing processing costs. Procter & Gamble implemented Oracle NetSuite SCM, which increased inventory accuracy from 90 to 96%, reduced order processing time from 5 to 3 hours, and increased staff productivity from 45 to 65 units of orders per day. The integration of this system ensured greater flexibility in

inventory and order management processes, enabling reduced processing time and improved staff efficiency. Nestlé, using PTV Route Optimizer, increased inventory accuracy from 88 to 94%, reduced order processing time from 3 to 2 hours, and increased staff productivity from 40 to 60 orders per day. This shows that the automation of warehouse operations significantly reduced order processing time, providing better coordination between warehouse and transportation operations and enabling a faster response to customer requests. The results obtained indicate that automation of warehouse processes increases accounting accuracy, optimises order processing and significantly improves staff productivity, which overall ensures more efficient operation of the company's logistics system. All three companies demonstrated significant achievements in implementing automated warehouse systems, allowing them to increase operational efficiency, reduce costs and improve customer service.

Financial indicators are among the key criteria for assessing the effectiveness of implementing logistics solutions, as they directly reflect the economic feasibility of investments in digital and automated systems. Changes in logistics costs demonstrate how effectively transport and warehouse resources are used, while the investment level indicator reflects the amount of funds allocated to infrastructure development and process modernisation. At the same time, analysis of product costs makes it possible to assess how digitalisation influences total production costs and the efficiency of resource management, and the company's profitability indicator reflects the final financial result and overall profitability. Comparing the values of these indicators before and after system implementation provides a comprehensive assessment of the effect of using digital logistics solutions, identifies economic benefits, determines the investment payback period and justifies the strategic feasibility of their long-term use (Table 3).

Table 3. Analysis of financial indicators

Company	System Used	Logistics costs (million EUR) before/after	Investment level (million EUR)	Change in production cost (%)	Profitability (%)	EBIT (million EUR)	EBITDA (million EUR)	Net profit (million EUR)
Bosch (Germany)	SAP EWM	12 / 9	5	-3	18 / 22	2,500	3,200	1,800
Procter & Gamble (USA)	Oracle NetSuite SCM	20 / 16	7	-4	15 / 20	4,800	5,900	3,600
Nestlé (Switzerland)	PTV Route Optimizer	x15 / 12	4	-5	16 / 21	5,200	6,400	3,900

Source: developed by the author based on Bosch Connected Industry (2024), Oracle NetSuite (2024), FICO (2024)

The implementation of modern logistics systems has a direct impact on the financial performance of companies. Bosch, having expanded the SAP EWM system, reduced logistics costs from 12 to 9 million EUR, invested 5 million EUR, reduced production costs by 3%, and increased profitability from 18 to 22%. Through the optimisation of logistics processes, the company was able to reduce transportation costs, which increased both profitability and operational efficiency. The company's financial results after the implementation of the system were: EBIT – 2,500 million EUR, EBITDA – 3,200 million EUR, and net profit – 1,800 million EUR. Procter & Gamble, having implemented Oracle NetSuite SCM, reduced logistics costs from 20 to 16 million EUR, invested 7 million EUR, reduced production costs by 4%, and increased profitability from 15 to 20%. The integration of supply chains and warehouses contributed to cost reduction and optimisation of the company's financial indicators, significantly enhancing its competitiveness in the market. After implementation, the system delivered the following results: EBIT – 4.8 billion EUR, EBITDA – 5.9 billion EUR, and net profit – 3.6 billion EUR. Using PTV Route Optimizer, Nestlé reduced logistics costs from 15 to 12 million EUR, invested 4 million EUR, reduced production costs by 5%, and increased profitability from 16 to 21%. Improved route planning contributed not only to cost reduction but also to more efficient fleet utilisation, which ultimately had a positive effect on the company's financial results. Financial indicators after implementation were: EBIT – 5.2 billion EUR, EBITDA – 6.4 billion EUR, and net profit – 3.9 billion EUR. The data obtained indicate that the digitalisation of logistics contributes to cost optimisation, increased investment efficiency, reduced production costs and improved profitability, which collectively ensures financial stability and competitiveness. All three companies demonstrated significant improvements after the implementation of logistics innovations, enabling them to reduce costs and increase operational efficiency on a global scale.

To obtain a complete and objective assessment of the effectiveness of implementing digital logistics solutions, it is advisable to compare the results of individual companies with average industry indicators (ClearlyAcquired, 2025). These indicators reflect the average values of key operational parameters in the industry, including transportation costs, which demonstrate savings and route optimisation; delivery time, which reflects the efficiency of order fulfilment and the level of customer service; inventory accuracy, which indicates the effectiveness of warehouse process management; warehouse productivity, which demonstrates staff efficiency and the speed of order processing; and profitability, which reflects financial efficiency. Comparing company results with the industry average makes it possible to determine the extent to which implemented digital and automated solutions exceed typical levels of logistics development in the sector, as well as to identify

the competitive advantages of enterprises that actively apply modern management technologies. Such analysis not only assesses the results achieved but also identifies the potential for further improvement of logistics processes and strategic planning for company development in a highly competitive environment (Table 4).

Table 4. Comparative Analysis with Industry Indicators

Indicator	Bosch (Germany)	Procter & Gamble (USA)	Nestlé (Switzerland)	Industry Average
Transport costs (million EUR)	9	16	12	18
Delivery time (days)	4	5	3	5
Inventory accounting accuracy (%)	98	96	94	92
Warehouse operations productivity (orders/day)	70	65	60	55
Profitability (%)	22	20	21	17

Source: developed by the author based on World Bank (2023), HFW & Panattoni (2024), Deloitte (2024)

A comparative analysis of key performance indicators for Bosch, Procter & Gamble and Nestlé against industry averages demonstrates the significant advantages of implementing digital logistics solutions. All three companies report lower transportation costs than the industry average: Bosch – 9 million EUR, Procter & Gamble – 16 million EUR, and Nestlé – 12 million EUR, compared with the average of 18 million EUR. This indicates the substantial effectiveness of the implemented logistics systems in reducing transportation expenditure and improving coordination across supply chain stages. Delivery times have also been reduced across all companies: Bosch delivers products within 4 days, Procter & Gamble within 5 days, and Nestlé within 3 days, whereas the industry average is 5 days. This demonstrates more efficient logistics processes and confirms that the companies have significantly enhanced their capacity to respond quickly to market needs and ensure timely customer delivery. Inventory accuracy also exceeds the industry average of 92%, reaching 94-98% across the three companies, which confirms the effectiveness of automated warehouse systems. Increased accuracy reduces the likelihood of errors and losses, thereby improving the overall reliability and efficiency of the logistics system. Warehouse productivity is also higher than the industry average of 55 orders per day: Bosch processes 70 orders, Procter & Gamble – 65, and Nestlé – 60. This reflects a notable increase in operational efficiency attributable to modern technologies, enabling the processing of larger order volumes within shorter time frames. The profitability of all three companies surpasses the industry average of 17%, reaching 20-22%, which indicates the economic efficiency of investments in digital logistics solutions. Increased profitability confirms that investment in innovative logistics technologies delivers significant financial returns. Overall, the results of the comparative analysis show that the implementation of modern logistics systems enables companies to substantially improve all key performance indicators, thereby securing a competitive advantage in the market. The digital solutions introduced have allowed companies to achieve stronger performance in cost reduction, productivity enhancement, and overall operational efficiency.

Statistical processing of the data in SPSS 29.0 revealed significant differences between initial and final indicators ($p < 0.05$). Improvements in inventory accuracy, reductions in order processing time, increases in staff productivity and reductions in transportation costs were statistically confirmed. The application of mathematical statistics ensured the scientific validity of the conclusions and enabled a rigorous assessment of the effectiveness of the logistics innovations implemented. The analysis of logistics innovation based on SAP EWM (Bosch), Oracle NetSuite SCM (Procter & Gamble) and PTV Route Optimizer (Nestlé) demonstrates a comprehensive positive effect on all major performance indicators. Digital systems significantly reduce transportation costs and optimise logistics processes by lowering empty runs and increasing resource-use efficiency. Automation of warehouse operations enhances inventory accuracy, reduces order processing time and increases staff productivity, which directly affects the speed and quality of customer service. Financial indicators confirm the economic feasibility of such solutions: after implementation, companies demonstrate reduced production costs, optimised logistics expenses and increased profitability. Comparison with industry averages shows that companies employing modern digital tools outperform competitors across all key parameters – from transport and warehouse efficiency to financial results. Thus, the implementation of logistics innovations based on SAP EWM, Oracle NetSuite SCM and PTV Route Optimizer ensures the comprehensive development of manufacturing enterprises, strengthens their competitive position, improves service quality and contributes to sustainable growth in profitability. The results confirm the strategic importance of logistics digitalisation as an essential tool for managing modern production and trade systems.

Discussion

An analysis of the results of the implementation of logistics innovations in manufacturing enterprises revealed that the use of modern technologies has had a significant impact on transportation costs and delivery times. It was found that route optimisation and the use of transport management systems increased transportation efficiency and reduced overall costs, which ensured a substantial economic effect of innovative solutions. This issue was also examined by Y. Jiao *et al.* (2022), whose results showed that

optimisation of transport processes in production reduces the time required to move materials between sections of the enterprise and decreases logistics costs. It includes route planning, coordination of cargo flows and control over the use of transport, which increases production efficiency and reduces the risk of downtime caused by delays in the delivery of resources. Research by D.I. Godil *et al.* (2021) also showed that innovative technologies, such as automated route planning systems and electronic transport platforms, can significantly reduce transportation costs. The use of electric vehicles and optimisation of cargo loading also contributes to saving fuel and resources. This enables companies to enhance competitiveness and offer more favourable conditions for customers. It is worth noting that S. Modgil *et al.* (2021) concluded that reducing delivery times is achieved through the automation of order-processing procedures, the introduction of GPS monitoring and the use of digital platforms for logistics management. Improved delivery efficiency increases customer satisfaction and enables faster responses to changes in demand. In addition, faster delivery helps reduce the cost of storing goods in intermediate warehouses. The study by C. Dong *et al.* (2021) found that modern logistics technologies, such as integrated supply chain management systems, allow optimisation of all stages of transport activities. Accurate cargo accounting, route control and risk prediction are ensured. As a result, transport efficiency increases, the number of errors decreases and operating costs are reduced. When analysing the results of the present study, it is evident that the efficiency of transport processes directly influences overall production productivity. It was found that route optimisation and rational use of resources can significantly reduce downtime and transportation expenditure. Furthermore, the integration of digital control systems provides accurate cargo monitoring and increases the reliability of logistics operations.

The study of the effectiveness of automated warehouse systems showed that their implementation contributed to increased productivity and accuracy in order fulfilment. A reduction in the number of errors in product assembly and a shortening of order-processing times were observed, confirming the positive impact of automation on the internal logistics processes of enterprises. The work of J. Tang *et al.* (2021) demonstrates that increasing the accuracy of order processing in warehouses ensures the timely and correct fulfilment of customer requests. The use of digital accounting systems and barcode scanners minimises the human factor and reduces the likelihood of errors, thereby contributing to increased customer satisfaction and strengthening the company's reputation. In turn, L.R. Halim *et al.* (2024) concluded that warehouse automation, including robotic transportation and sorting systems, significantly increases productivity. It enables the processing of a larger number of orders within a shorter time and reduces manual labour costs. In addition, automated systems ensure stable operation even during peak loads. N. Sharma & R. Cupek (2023) also conducted a study, the results of which confirmed that modern technologies allow optimisation of internal routes for moving goods within a warehouse, reducing the time required for searching and transporting products. The use of inventory management software enables efficient allocation of resources and prevents overloading of specific areas. As a result, the overall efficiency of warehouse processes increases and operating costs decrease. Y. Torres *et al.* (2021) also found that the use of control systems and automated checks can significantly reduce the number of errors during order picking. This ensures accuracy in deliveries and minimises the need for returns or complaints. Ultimately, a reduction in errors saves time and resources and increases customer trust in the company. These results support the findings of the present study, as they demonstrate a direct link between the implementation of technology in warehouses and improved accuracy in order processing. Automation and digital management systems significantly reduce the number of errors and shorten order-fulfilment times. Thus, it is confirmed that innovative approaches to logistics directly influence the efficiency and reliability of warehouse processes.

The analysis of financial indicators demonstrated the feasibility of investing in logistics innovations. An improvement in profitability and the optimisation of operating costs was recorded, indicating the economic efficiency of implementing modern logistics technologies. The results confirmed that innovations strengthened financial stability and increased the overall effectiveness of production processes. A. Lagorio *et al.* (2022) concluded that the introduction of logistics innovations enables enterprises to optimise processes and reduce the costs of transporting and storing goods. Investments in new technologies are recouped through increased efficiency and reduced operational losses. This generates long-term economic benefits and enhances the company's competitiveness. J.A. Mpuon *et al.* (2023) found that automation of production and logistics processes significantly increases labour productivity and reduces manual labour costs. This directly influences enterprise profitability by enabling higher financial returns with the same level of resource expenditure. Furthermore, automated systems minimise human error, which additionally improves the efficiency of financial operations. The study by O.J. Oteri *et al.* (2023) confirmed that modern technologies allow companies to optimise internal processes, reduce inventories and shorten delivery times. Digital platforms and analytical systems contribute to improved cost control and forecasting of enterprise needs. As a result, operating expenses decline and resources are allocated more efficiently. Research by Z. Hao *et al.* (2022) also showed that the introduction of logistics innovations and process automation reduces the risks of financial losses and unforeseen costs. Greater stability of income is ensured through more accurate planning, demand forecasting and reduced downtime. This enables enterprises to maintain competitive positions and develop sustainably in the market. It is important to highlight that logistics innovations not only reduce costs but also increase overall

operational efficiency. They improve the accuracy of demand forecasting and resource allocation, which reduces the risk of financial losses. Thus, the economic feasibility of innovations is confirmed both through cost reduction and through increased profitability.

Comparative analysis with industry indicators demonstrated that enterprises implementing logistics innovations achieve a higher level of organisation of transport and warehouse processes. These enterprises are characterised by improved accuracy in order processing and more efficient resource management, which creates a noticeable competitive advantage. F. Taques *et al.* (2021) concluded that innovative approaches in logistics enable companies to surpass traditional industry standards of efficiency and service speed. The adoption of modern technologies, automated systems and analytical tools ensures more accurate planning and process control. This allows enterprises to achieve superior results using fewer resources compared to conventional methods. A study by R. Richey *et al.* (2022) found that innovations facilitate the implementation of integrated supply chain management systems, which enhances coordination across all stages of logistics. This reduces the risk of delays, optimises routing and ensures timely delivery of goods. Consequently, overall enterprise efficiency increases while the workload on personnel decreases. The findings of Z. Abidin *et al.* (2023) also demonstrated that the introduction of new technologies enables companies to offer improved conditions for customers by reducing delivery times and lowering the likelihood of errors. This increases consumer trust and loyalty, directly influencing market competitiveness. Companies that quickly adopt innovations gain a strategic advantage over other industry participants. Similarly, G. Anwar & N. Abdullah (2021) concluded that innovative logistics solutions allow for more accurate inventory management, optimised transport utilisation and reduced storage costs. This enhances resource management efficiency compared with market averages. As a result, enterprises become more flexible and are able to respond quickly to changes in demand. These findings correspond to the results of the present study, confirming that the introduction of innovations in logistics processes significantly increases both the efficiency and accuracy of enterprise operations. Improvements were observed in the organisational level of processes and in the reduction of order-fulfilment times. This indicates that innovative approaches provide competitive advantages and improve adaptation to dynamic market conditions.

The results demonstrated that the implementation of logistics innovations at manufacturing enterprises had a positive impact on key dimensions of operational activity: optimisation of transportation costs, reduction in delivery times, improvement in warehouse efficiency and enhancement of financial performance. Comparison with industry standards confirmed the increasing importance of innovations for long-term competitiveness and enterprise development. The findings are consistent with the study by C. Baah *et al.* (2023), which confirmed that logistics innovations allow enterprises to significantly increase the efficiency of supply chain management and internal processes. Faster order processing, more accurate planning and the optimal use of resources are ensured, enabling companies to obtain a comprehensive advantage across all areas of activity. Similar conclusions were drawn by N. Batarlienė & A. Jarašūnienė (2024), who found that the introduction of modern technologies into transport and warehouse operations contributes to shorter delivery times and increased accuracy in cargo handling. Automated control and routing systems reduce the risk of errors and prevent staff overload. This ensures the stability and reliability of processes, which is particularly important under conditions of high order volumes. T.R. Akash *et al.* (2024) concluded that logistics innovations reduce operating costs, increase productivity and minimise resource losses. This has a direct positive effect on the financial results of enterprises, ensuring profit growth and increased profitability. In addition, effective resource management enables companies to reliably fulfil commitments to customers and partners. According to Ł. Brzeziński *et al.* (2023), innovations in logistics are becoming a key factor in the long-term development and competitiveness of companies. They enable rapid adaptation to changing market conditions and evolving consumer demands. Consequently, enterprises are able to plan strategic initiatives more effectively and ensure sustainable market performance. In comparing the data obtained in this study, it can be stated that logistics innovations exert a comprehensive positive influence on enterprise operations. The introduction of modern technologies increases the efficiency of transport and warehouse processes, reduces costs and shortens order-fulfilment times. Thus, the findings confirm that innovative approaches are a key factor in improving both the financial and operational performance of manufacturing companies.

Conclusions

In globalised and increasingly competitive environment, effective logistics management has become one of the key determinants of success for manufacturing enterprises. Innovative solutions in this field enable companies not only to optimise internal processes, but also to enhance customer service, reduce costs and shorten product delivery times. The experience of leading multinational corporations confirms the strategic importance of digital and automated systems for the development of efficient supply chains.

At Bosch plants in Germany, the implementation of SAP Extended Warehouse Management (SAP EWM) resulted in a significant increase in inventory accuracy (from 92% to 98%), a reduction in order processing time (from 4 to 2 hours), and an increase in staff productivity (from 50 to 70 orders per day). These improvements strengthened the coordination between production, warehouse operations and distribution. In the transport sector, SAP EWM reduced delivery times from 5 to 4 days, lowered transportation costs from 12 to 9 million EUR, and decreased empty runs by 15%. Procter & Gamble integrated the Oracle

NetSuite digital SCM platform, enabling the consolidation of purchasing, manufacturing, transportation and sales within a single information environment. Following implementation, inventory accuracy increased from 90% to 96%, order processing time decreased from 5 to 3 hours, and staff productivity rose from 45 to 65 orders per day. Delivery times were reduced from 6 to 5 days, transportation costs decreased from 20 to 16 million EUR, and empty runs were reduced by 12%.

Nestlé's use of PTV Route Optimizer ensured more efficient planning of delivery routes. As a result, delivery times fell from 4 to 3 days, transportation costs decreased from 15 to 12 million EUR, empty runs were reduced by 20%, inventory accuracy increased from 88% to 94%, order processing time declined from 3 to 2 hours, and staff productivity increased from 40 to 60 orders per day.

Financial indicators across all three companies also demonstrated substantial improvements. Bosch increased profitability from 18% to 22%, Procter & Gamble from 15% to 20%, and Nestlé from 16% to 21%. Correspondingly, logistics costs were reduced to 9 million EUR, 16 million EUR and 12 million EUR, respectively. Comparative analysis with industry averages further confirmed that these companies outperform typical sector benchmarks: transportation costs remain lower than the industry average of 18 million EUR, delivery times are shorter than the sectoral average of 5 days, and both inventory accuracy and warehouse productivity exceed standard levels. Profitability indicators are consistently 3-5% higher than average.

Overall, the implementation of digital logistics solutions – SAP EWM, Oracle NetSuite SCM and PTV Route Optimizer – provides a comprehensive positive effect, including cost optimisation, improved productivity, reduced delivery times, enhanced service quality and higher profitability. These findings confirm the strategic relevance of logistics digitalisation for modern manufacturing enterprises.

A limitation of this study is that the analysis draws upon data from only three leading multinational corporations, which may not fully reflect the situation of medium-sized or small enterprises. Further research is required to assess the impact of digital logistics systems on the environmental performance of supply chains, including their contribution to reducing CO_2 emissions.

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Вплив логістичних інновацій на витрати та прибутковість виробничих підприємств

Шаїп Ґаші

Доктор наук, професор
Міжнародний коледж бізнесу в Мітровіці
40000, вул. Бісліма Байґори, 120, м. Мітровіца, Косово
https://orcid.org/0000-0002-0911-0340

Анотація. Метою дослідження було оцінити, як впровадження сучасних логістичних рішень, таких як автоматизовані складські системи, цифрові платформи управління ланцюгами постачання та оптимізація маршрутів доставки, впливає на ефективність використання ресурсів і фінансові результати виробничих підприємств. В рамках дослідження проведено аналіз впровадження логістичних інновацій на прикладі виробничих підприємств Bosch, Procter & Gamble та Nestlé з використанням даних про транспортні витрати, час доставки, продуктивність складів, фінансові показники та галузеві норми. Було оцінено ефективність упровадження автоматизованих складських систем та цифрових логістичних платформ. На складах Bosch точність обліку запасів підвищилася з 92 до 98 %, час обробки замовлень скоротився з 4 до 2 годин, продуктивність персоналу зросла з 50 до 70 одиниць замовлень на день, а транспортні витрати зменшилися з 12 до 9 млн євро. У Procter & Gamble точність обліку запасів зросла з 90 до 96 %, час обробки скоротився з 5 до 3 годин, продуктивність підвищилася з 45 до 65 одиниць, а транспортні витрати знизилися з 20 до 16 млн євро. У Nestlé оптимізація логістичних процесів дала змогу скоротити час доставки з 4 до 3 днів, знизити транспортні витрати з 15 до 12 мільйонів євро, підвищити точність обліку з 88 до 94 % і збільшити продуктивність персоналу з 40 до 60 одиниць. Порівняльний аналіз засвідчив, що ці компанії перевищують середньогалузеві показники. Практичне значення дослідження полягає у наданні науково обґрунтованих рекомендацій щодо впровадження логістичних інновацій, які можуть підвищити ефективність управління ресурсами та поліпшити фінансові результати виробничих підприємств

Ключові слова: цифровізація; автоматизація; ланцюги постачання; продуктивність; витрати; ефективність