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Improved Business Operations due to Artificial Intelligence

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Abstract

Artificial intelligence (AI) is playing an increasingly important role in modernization and optimization of the whole economy. In the business micro scale, AI offers possibilities to boost the operations of companies, with particular emphasis on key areas: Control and accounting, production and logistics. Analysis of statistical data and case

studies allowed for the identification of key success factors and potential barriers to the AI implementation in various sectors. Additionally, this study also shows challenges related to the AI, such as high implementation costs, the need to adapt employees and issues related to data security.

Keywords: AI, Artificial Intelligence, Business Operation, Financial Risks

1. Introduction

Artificial intelligence (AI) is playing an increasingly important role in the modernization and optimization of various sectors of the economy. However, is it possible to precisely determine how it can contribute to improving the operations of companies in the areas of control, production and logistics? In an era of dynamic technological changes and growing competition on the market, the answer to this question is becoming crucial for companies striving to maintain or gain a competitive advantage.

The subject of this scientific work is a thorough analysis of the possibilities of improving the operations of companies through the use of artificial intelligence, with particular emphasis on three key areas: Control and accounting, production and logistics. In the context of business informatics and technology management, AI offers tools that can significantly increase operational efficiency, while minimizing the costs and risks associated with running a business.

The aim of this work is to examine in detail how companies can improve their operations with artificial intelligence technology. The work will analyze various aspects of the use of AI in three selected areas: Control and accounting, production and logistics. This analysis includes both theoretical considerations and practical examples of implementations that illustrate the real benefits of using AI in business.

To achieve the intended goal, several research methods were used. First of all, a thorough analysis of the literature on the subject was conducted, including the latest scientific publications, industry reports and case studies. Critical assessments of available data, comparative analyses of various implementations of AI technologies and reflection on the results of implementations in the context of the specific needs and challenges of individual companies were used. Analysis of statistical data and case studies allowed for the identification of key success factors and potential barriers to the implementation of AI in various sectors.

The state of research on the use of AI in business is already quite developed, but there are still areas that require further research and analysis. Previous studies indicate significant benefits of implementing AI, such as increased operational efficiency, process optimization and improved quality of products and services. At the same time, however, these studies also show challenges related to the implementation of AI, such as high implementation costs, the need to adapt employees and issues related to data security.

The structure of this work has been divided into several chapters, which comprehensively present the use of artificial intelligence in business. The first chapter is an introduction, outlining the research context. The second chapter is dedicated to control and accounting, discussing the automation of accounting processes, the use of AI in financial auditing, and financial risk management. The third chapter focuses on production, analyzing the optimization of production processes and quality

control using AI. The fourth chapter presents issues related to logistics, presenting the possibilities of supply chain optimization and warehouse management using AI. The whole ends with a summary chapter, which presents conclusions from the conducted research and recommendations for future analyses.

2. Control and accounting

This chapter will discuss key applications of artificial intelligence in the area of control and accounting, focusing on the automation of accounting processes, financial audit and financial risk management. It will present the benefits of implementing AI, which improve efficiency, accuracy and reduce operating costs, as well as increase the reliability of financial information. This context is necessary to understand how modern technologies can support the development of enterprises in the modern business environment.

2.1 Automation of accounting processes

Automation of accounting processes using artificial intelligence brings many benefits to companies, introducing a new quality of financial management. AI systems enable automation of repetitive tasks such as data entry, balance reconciliation and invoice processing. This process not only increases operational efficiency, but also minimizes the likelihood of human errors. Examples of such implementations, as reported by Semrau (2021) ^[18], show that companies can achieve significant time savings, which allows employees to focus on more advanced tasks, such as financial data analysis. Another advantage of automation is increased precision by reducing the costs associated with the need to correct manual errors (EY, 2018) ^[3]. AI systems integrate with existing accounting tools, which allows smooth transaction processing and minimizes interruptions in the functioning of accounting systems. Artificial intelligence significantly increases accuracy and reduces errors in accounting. By using machine learning algorithms, it is possible to quickly detect irregularities in data, which increases the reliability of the company's financial information (Prędkiewicz & Biegun, 2024) ^[16]. These algorithms enable the analysis of large data sets in real time, which allows for the quick identification of errors that could be missed by employees. The implementation of AI in the data verification process minimizes the risk of making incorrect financial decisions resulting from incorrect data. Additionally, artificial intelligence ensures continuous data quality control, which allows for earlier identification of problems and avoidance of potential financial consequences (Semrau, 2021) ^[18]. Automation of accounting processes using AI technology also leads to a significant reduction in the time of completing tasks, such as financial settlements or preparation of reports. Thanks to this, the accounting staff can focus on more strategic activities, which translates into an increase in the business value of the entire department (EY, 2018) ^[3]. Automation of financial settlements reduces the time needed to process invoices, which leads to faster closing of settlement periods and provision of up-to-date data to the management. AI enables the generation of financial reports in real time, which facilitates making quick decisions and analyzing the current financial condition of the company (Semrau, 2021) ^[18]. Reduced task execution time allows for better use of human resources and increased department efficiency.

Implementation of AI in accounting also supports the

optimization of financial data management, allowing for effective processing and analysis of large volumes of data. Artificial intelligence enables real-time data analysis, which increases the precision of financial forecasts and budget planning, supporting the strategic management of the enterprise (Semrau, 2021) ^[18]. Thanks to AI, organizations can better monitor financial indicators, which facilitates the identification of trends and anomalies that affect future business decisions (Topolska & Pawlaczyk, 2020) ^[20]. AI systems integrate data from various sources, which allows for obtaining a holistic picture of the financial condition of the enterprise and making more informed decisions.

Reduction of operating costs becomes achievable thanks to the automation of accounting processes using artificial intelligence, which reduces the need to hire additional staff to perform repetitive tasks. Automation minimizes the need for manual data entry, which contributes to the reduction of operating costs (Topolska & Pawlaczyk, 2020) ^[20]. Implementing AI reduces the number of errors, which reduces the costs associated with their correction and eliminates the negative financial consequences. Automating accounting tasks increases operational efficiency, allowing companies to achieve a larger scale of operations without a proportional increase in costs. The costs associated with training new staff and maintaining existing human resources are reduced with the implementation of AI, which improves the profitability of companies. Thanks to AI, companies can scale accounting operations in a sustainable manner, which supports long-term financial development and organizational stability.

In summary, the automation of accounting processes using AI brings numerous benefits in terms of efficiency, accuracy, costs and data management, making it a key element of modern business strategies.

2.2 AI application in financial audit

The development of technologies related to the use of artificial intelligence (AI) in financial auditing introduces a new quality in the identification of anomalies and risks in the financial data of enterprises. Machine learning algorithms are able to process huge amounts of information in a much shorter time than traditional methods. This not only increases the efficiency of the entire audit process, but also enables more precise detection of potential errors and financial threats that traditional methods could miss (Haley, 2022) ^[5]. Automation of these processes supports auditors in data analysis, which affects the quality of the financial reports prepared (Prędkiewicz & Biegun, 2024) ^[16]. Thanks to artificial intelligence, both traditional and new methods of financial data analysis gain in efficiency and precision. AI systems integrate with various data sources, which allows auditors to obtain a more complete picture of the financial situation of the company (Prędkiewicz & Biegun, 2024) ^[16]. Real-time processing allows the identification of trends and deviations from the norm, which is crucial for making good financial decisions (Haley, 2022) ^[5]. This in turn allows for faster and more precise diagnosis of problems, which translates into greater efficiency of the audit process (Sasak, 2023) ^[17].

AI in financial audit also offers tools for better risk management, thanks to predictive analyses that detect patterns that may indicate potential financial fraud. These algorithms allow companies to manage their risk portfolio with greater efficiency, which minimizes potential losses

(Sasak, 2023) ^[17]. Predictive analyses allow for dynamic adjustment of audit strategies in response to changing market conditions, which is crucial for effective risk management (Haley, 2022) ^[5].

Implementation of AI in audit processes significantly improves the accuracy and reliability of financial reports, while reducing operating costs (Prędkiewicz & Biegun, 2024) ^[16]. Automation of analyses eliminates the risk of human errors, which translates into greater accuracy of reports (Haley, 2022) ^[5]. AI systems support companies in maintaining compliance standards with regulations, which increases stakeholder trust in their activities (Sasak, 2023) ^[17]. Thanks to AI's ability to continuously identify areas requiring improvement, audit processes can be continuously improved, which increases their efficiency (Prędkiewicz & Biegun, 2024) ^[16]. Artificial intelligence plays a key role in identifying financial fraud by analyzing transaction patterns and detecting unusual operations. This allows for a faster response to potential threats before they become a serious problem (Konečka, 2015) ^[9]. AI allows for ongoing monitoring of finances, which increases the efficiency of fraud detection and protects the financial stability of the company (Sasak, 2023) ^[17]. Integrating AI with traditional audit methods improves the identification of fraud, which is crucial for increasing stakeholder confidence in the company's operations (Konečka, 2015) ^[9].

In summary, the use of AI in financial audit opens up new possibilities in terms of detecting irregularities, managing risk and improving the efficiency of audit processes.

2.3 Financial Risk Management with AI

The use of artificial intelligence (AI) in financial risk management significantly changes the approach of companies to the analysis and forecasting of threats. Thanks to AI, companies can more accurately predict financial risks by analyzing large data sets and identifying patterns that may indicate potential threats. The implementation of AI enables risk modeling based on historical data, which supports making more informed financial decisions. According to the McKinsey & Company report (2017) ^[12], AI enriches the forecasting of market changes, which allows for faster and more effective adjustment of risk management strategies. AI algorithms play a key role in identifying potential financial frauds by analyzing unusual transaction patterns. AI systems are able to quickly detect irregularities, which allows companies to immediately respond to threats and minimize financial losses. Konečka (2015) ^[9] indicates that machine learning algorithms can identify patterns of transaction anomalies that could escape traditional supervision methods, which increases the efficiency of audit processes. In addition, McKinsey & Company (2017) ^[12] emphasizes that AI technologies can automatically monitor transactions in real time, which on the one hand improves the response to threats and on the other hand allows for the rapid implementation of corrective actions.

The use of AI in risk portfolio management allows for the dynamic assessment of market variables and rapid adjustment of investment strategies. AI supports companies in optimizing asset management, increasing profitability and reducing risk exposure. Brandt (2023) ^[1] points out that AI allows companies to quickly assess changing market conditions, which translates into higher profits and lower risk. Thanks to AI, companies can more effectively forecast market fluctuations, as noted by Kopinski (2010) ^[10], which

increases the accuracy of predictions and minimizes risk.

AI-based technologies provide companies with tools for ongoing analysis of financial data and faster adaptation to changing market conditions. Artificial intelligence supports decision-making processes, increasing the efficiency of risk management and minimizing operational risk. As Kopinski (2010) ^[10] emphasizes, AI enables the analysis of large volumes of financial data in real time, which increases the accuracy of decisions made. Brandt (2023) ^[1] adds that AI can automatically adjust risk management strategies, which increases the flexibility of companies and minimizes operational risk.

Implementing AI in financial risk management not only automates risk assessment processes, but also reduces operational costs and increases the accuracy of analyses. McKinsey & Company (2017) ^[12] indicates that automation minimizes the time needed for comprehensive analysis, which leads to faster decision-making. AI technology supports companies in creating personalized risk management strategies that take into account the individual needs of the company, contributing to long-term financial stability, as Brandt (2023) ^[1] notes. Reducing operational costs allows companies to allocate resources to more strategic areas, which affects their development and competitiveness (McKinsey & Company, 2017) ^[12].

To sum up, the use of artificial intelligence in financial risk management offers companies new perspectives in predicting and minimizing threats. AI enables a dynamic and precise approach to risk, which contributes to increased financial stability and competitiveness of enterprises.

3. Production

This chapter will present key aspects of the use of artificial intelligence in production processes, which aim to optimize efficiency and increase the flexibility of companies. It will focus on three main areas: Optimization of production processes, quality control and the use of AI in the analysis of production data. In the context of digitalization and changing market requirements, understanding the role of AI technology becomes essential for companies striving to gain a competitive advantage.

3.1 Optimization of production processes

Optimization of production processes using artificial intelligence (AI) is an innovative approach that significantly improves the efficiency and flexibility of companies in response to dynamic market changes. Artificial intelligence can significantly improve production planning by analyzing and predicting market variables and resources. AI algorithms enable dynamic adjustment of production schedules, minimizing interruptions and increasing the utilization of company resources (Maternowska, 2019) ^[11]. The use of artificial intelligence algorithms allows for ongoing analysis of market data, which allows for flexible response to changing market needs and optimization of production schedules (Haley, 2022) ^[5]. Predictive modeling using AI supports the prediction of demand for raw materials, which allows for appropriate order planning and prevents production downtime (Skuzza & Lizak, 2023) ^[19]. The use of AI in forecasting market variables allows companies to better adapt production to customer expectations, which increases the company's competitiveness (Maternowska, 2019) ^[11]. Automation of planning processes using AI shortens the time of developing schedules, which allows for faster response to changes in

demand and increases operational efficiency (Haley, 2022)^[5]. Integration of AI in production planning allows for more precise allocation of resources, which reduces production costs and minimizes waste (Czarniawska, 2024)^[2]. Implementation of AI in resource management supports optimization of labor and material allocation, which translates into cost reduction and minimized waste. By analyzing historical data and trends, AI supports forecasting of raw material consumption, which allows for more effective planning of material requirements (Skuzza & Lizak, 2023)^[19]. Implementation of AI systems in resource management allows for dynamic work allocation, which optimizes the use of human and machine resources (Haley, 2022)^[5]. Application of AI in the analysis of raw material demand minimizes the risk of material shortages and production delays, affecting the continuity of production processes (Maternowska, 2019)^[11]. AI enables the identification of waste areas in production processes, which leads to the implementation of strategies to minimize the use of raw materials and reduce operating costs (Czarniawska, 2024)^[2]. Resource management using AI supports data-driven decision-making, increasing planning accuracy and eliminating subjectivity (Haley, 2022)^[5]. The use of machine learning algorithms to analyze production processes allows for the identification of areas generating unnecessary waste, which supports sustainable development and reducing operating costs (Czarniawska, 2024)^[2]. AI algorithms identify patterns of waste generation in production processes, which allows for the introduction of actions aimed at eliminating or minimizing them (Maternowska, 2019)^[11]. The use of AI in the recycling of materials allows for better waste management and reuse, which reduces disposal costs (Brandt, 2023)^[1]. The analysis of production processes using AI supports decision-making regarding the optimization of raw material consumption, which minimizes the impact of production on the environment (Czarniawska, 2024)^[2]. AI enables ongoing monitoring and assessment of waste levels, allowing for immediate response to irregularities and their correction in real time (Maternowska, 2019)^[11]. The use of artificial intelligence improves the efficiency of production processes by reducing material losses and increasing the use of available resources (Maternowska, 2019)^[11]. Systems based on artificial intelligence enable the collection and analysis of large sets of data related to production, which allows for ongoing monitoring of processes and quick identification of areas requiring improvement. Thanks to this, companies can increase operational efficiency and better adapt to changing market conditions (Maternowska, 2019)^[11]. AI systems collect and analyze data in real time, which allows for quick identification of problems and immediate interventions in production processes (Czarniawska, 2024)^[2]. Data analysis using AI supports process optimization by identifying bottlenecks and eliminating them, which increases the fluidity and efficiency of production (Skuzza & Lizak, 2023)^[19]. By collecting data on a large scale, it is possible to implement improvements based on solid evidence, which translates into increased operational efficiency (Maternowska, 2019)^[11]. AI enables the integration and analysis of various data sources, which allows for better understanding and control of complex production processes (Brandt, 2023)^[1]. The use of AI in the analysis of production data allows companies to adapt faster to changing market conditions and customer needs, which

increases their competitiveness (Maternowska, 2019)^[11]. By using artificial intelligence, companies can make more informed decisions related to production management, which are based on the analysis of many factors simultaneously. Automation of the analysis of production variables allows for faster response to changes and optimization of the operating strategy (Skuzza & Lizak, 2023)^[19]. AI analyzes various factors simultaneously, which supports decision-making based on a more complete picture of the situation and reduces the risk of incorrect assessments (Haley, 2022)^[5]. Integration of AI into decision-making processes reduces the time needed for data analysis and increases the speed of response to market changes (Maternowska, 2019)^[11]. The use of AI in the analysis of production variables allows for the optimization of the operating strategy and better adaptation to market needs (Skuzza & Lizak, 2023)^[19]. AI supports the creation of "what if" scenarios, which allows testing various strategic options and choosing the most optimal one (Czarniawska, 2024)^[2]. The introduction of AI into the decision-making process increases the effectiveness of risk management, enabling prediction and adaptation to potential threats (Haley, 2022)^[5].

Artificial intelligence contributes to complex analysis and optimization of production systems, enabling identification of bottlenecks and analysis of the performance of individual components. This allows for the introduction of process improvements, which translates into increased overall productivity and cost reduction (Maternowska, 2019)^[11]. AI enables the identification and analysis of bottlenecks in production processes, which allows for the implementation of corrective actions and increased system throughput (Brandt, 2023)^[1]. Analysis of the performance of individual components using AI supports the elimination of inefficiencies and optimization of resource use (Maternowska, 2019)^[11]. Complex AI algorithms enable the simulation of various production scenarios, which allows for testing and selection of the most effective solutions (Skuzza & Lizak, 2023)^[19]. The use of AI in the analysis of complex production systems increases the ability to quickly respond to changes and adapt processes to new conditions (Czarniawska, 2024)^[2]. The use of AI in production processes leads to continuous improvement of systems, which increases their flexibility and ability to adapt to changing market requirements (Maternowska, 2019)^[11]. In summary, artificial intelligence offers a wide range of possibilities for optimizing production processes, providing enterprises with increased efficiency and competitive advantage.

3.2 Quality control with AI

In the context of quality control in production processes, artificial intelligence (AI) offers key tools that can significantly improve the accuracy and efficiency of quality systems. AI enables automatic visual analysis of products, which allows for precise detection of production defects and increases the efficiency of quality control. Machine learning algorithms, such as image analysis, are used to identify even subtle defects, which supports the elimination of substandard products (Maternowska, 2019)^[11]. In the context of demanding industries, AI equipped with image analysis algorithms contributes to the rapid detection of surface defects, which is essential in industries such as automotive, electronics and food industry, where quality

standards are extremely high. An important aspect of AI applications is reducing the subjectivity of human assessment, which reduces the number of errors resulting from interpersonal differences in defect identification and allows for the consistency of quality control results (Wróbel & Wojda, 2018) ^[21]. Integration of AI systems with production lines enables ongoing monitoring and automation of the quality control process, which leads to reduction of operating costs by minimizing the need to employ a large number of quality inspectors (Hoser & Ochnio, 2022) ^[6]. Thanks to the ability to quickly identify defects, artificial intelligence not only supports the efficiency of production processes, but also contributes to reducing production rejects, which supports sustainable development and effective resource management (Nowakowska-Grunt, 2010) ^[13]. Predictive maintenance is another area where AI is used, enabling prediction of machine failures before they occur. By analyzing data from sensors and historical information, AI enables identification of trends indicating potential technical problems, which minimizes downtime and repair costs (Płaczek, 2018) ^[15]. Predictive maintenance mechanisms allow for early detection of problems before they negatively affect production continuity. Machine learning algorithms enable analysis of the history of failures and machine condition, which results in precise forecasts (Płaczek, 2018) ^[15]. Optimizing service schedules using AI extends the life of equipment and reduces unplanned downtime, which can significantly affect plant productivity (Hoser & Ochnio, 2022) ^[6]. Automatic detection of quality deviations is another area where AI shows its potential. AI technologies allow for automatic monitoring and evaluation of production data in real time, which makes it easier to identify deviations from the norm and quickly take corrective actions. AI systems can analyze large sets of production data, which allows for immediate detection of deviations from quality standards, minimizing the number of defective products leaving the production line (Wróbel & Wojda, 2018) ^[21]. Automatic detection of deviations provides the ability to immediately respond to irregularities, which helps avoid costly product recalls and repair their image. The use of big data analytics combined with AI enables detailed analysis of production processes, which allows for the identification of the root causes of quality deviations and the implementation of effective preventive and corrective actions (Nowakowska-Grunt, 2010) ^[13]. The integration of AI in production processes enables ongoing analysis and optimization of factors affecting quality. Thanks to this, companies can reduce the number of rejects and increase operational efficiency through better management of production resources (Hoser & Ochnio, 2022) ^[6]. Artificial intelligence allows for process optimization, shortening production time and increasing line throughput, which is crucial in highly competitive industries such as electronics and automotive (Hoser & Ochnio, 2022) ^[6]. The use of AI supports the reduction of raw material and energy waste by identifying areas for optimization, which contributes to operational cost savings and supports sustainable development (Płaczek). In the context of sustainable development and waste reduction, AI plays a key role by identifying and reducing production waste. AI technology helps identify processes generating excess waste, which allows for the implementation of changes that minimize the negative

impact of production on the environment, while achieving cost savings (Nowakowska-Grunt, 2010) ^[13]. Machine learning enables better forecasting of raw material demand, which leads to more efficient use of resources and reduced waste generation (Wróbel). AI supports companies in designing production processes based on the ideas of the circular economy, which enables more efficient use of materials through their renewal and reuse (Nowakowska-Grunt, 2010) ^[13].

In summary, the application of artificial intelligence in production quality control leads to significant improvements in efficiency, accuracy and sustainability, giving companies the tools to better manage quality and resources.

4. Logistics

This chapter will discuss key applications of artificial intelligence in logistics, focusing on supply chain optimization and warehouse management. The use of AI in these areas allows for increased operational efficiency, cost reduction, and better adaptation of management processes to changing market conditions. Analyzing the impact of artificial intelligence on logistics is important for companies striving to gain a competitive advantage and sustainable development.

4.1 Supply chain optimization

Supply chain optimization using artificial intelligence (AI) is a key mechanism that contributes to increasing the operational efficiency of enterprises. AI systems, analyzing historical and current data, play an important role in demand forecasting. Thanks to this, companies are able to better adapt their production processes and inventory management to changing market expectations. Precise forecasting minimizes the risk of both overproduction and shortages of goods, which is especially important in a dynamically changing business environment (Brandt, 2023) ^[1]. Using advanced machine learning models allows the integration of various data sources, such as social media or demographic data, which increases the accuracy of predictions and allows companies to dynamically adapt to changing market trends and consumer preferences (Brandt, 2023) ^[1]. Better demand forecasting supports companies in optimizing inventory management, contributing to waste reduction and increased production efficiency (Brandt, 2023) ^[1]. However, it is worth critically considering the potential of AI in adapting demand forecasts to external variables, such as changes in trade policy or crisis situations. Despite the ability to provide operational stability, AI has yet to overcome the challenges of adapting to unpredictable events (Brandt, 2023) ^[1]. Automation of inventory management with AI is another important aspect in supply chain optimization. AI supports the current analysis of inventory levels, which allows for quick identification of inventory replenishment needs, minimizing the risk of production downtime (Ocicka & Raźniewska, 2015) ^[14]. Automatic generation of orders from suppliers based on the analysis of sales data optimizes delivery times and reduces logistics costs, which is important in the face of increasing competition on the market (Ocicka & Raźniewska, 2015) ^[14]. In the context of forecasting seasonal fluctuations in demand, AI allows companies to better prepare for increased demand in specific periods, thus increasing their adaptive capacity (Ocicka & Raźniewska, 2015) ^[14]. Artificial intelligence also supports the identification of low-traffic goods, which allows for better assortment management and minimizing excess

inventory (Ocicka & Raźniewska, 2015) ^[14]. Although automation of inventory management using AI brings numerous benefits, it is necessary to consider the possible challenges associated with integrating these systems with existing ERP structures and ensuring data consistency (Ocicka & Raźniewska, 2015) ^[14].

AI technology in optimizing transport routes brings significant benefits, increasing logistics efficiency and reducing transport costs. AI algorithms enable analysis of traffic and weather data in real time, which allows for dynamic adjustment of transport routes (ID Logistics Polska, 2024) ^[7]. Taking into account various geographical and infrastructure factors allows for optimization of delivery times and reduction of operating costs, which is crucial for sustainable development (ID Logistics Polska, 2024) ^[7]. Real-time monitoring of routes allows for identification of potential delays and ensures more flexible logistics, however, it is important to consider technological limitations that may affect the effectiveness of these systems in real operating conditions (ID Logistics Polska, 2024) ^[7]. Route optimization using AI also supports companies' environmental strategies by reducing exhaust emissions and more efficient use of transport resources (ID Logistics Polska, 2024) ^[7]. Although AI technology offers many opportunities for integrating various elements of the supply chain, such as warehouses and distribution centers, it is necessary to critically approach the challenges related to the coordination and synchronization of logistics activities (ID Logistics Polska, 2024) ^[7].

The use of AI in identifying and managing risks in the supply chain is important for the operational stability of companies. Artificial intelligence analyzes data from different stages of the supply chain, identifying potential threats and risks, which allows for quick adaptation to changing market conditions (Maternowska, 2019) ^[11]. AI supports the identification of critical points that may be exposed to supply disruptions or changes in demand (Maternowska, 2019) ^[11]. Thanks to the analysis of real-time data, AI allows for the forecasting of potential logistics risks, such as delays in transport, which allows companies to plan emergency scenarios (Maternowska, 2019) ^[11]. However, the use of AI in risk management requires further analysis to understand how these systems can respond to unpredictable events that require rapid adjustment of crisis management strategies (Maternowska, 2019) ^[11]. While AI automates data analysis processes, which increases operational efficiency and minimizes the risk of human errors, it is necessary to consider possible limitations in the integration of data from different sources (Maternowska, 2019) ^[11].

AI integration in partner relationship management, especially with key suppliers, is essential for increasing the flexibility and operational efficiency of companies. Automating communication with suppliers using AI improves order management and delivery synchronization, which is crucial in a dynamically changing business environment (Ocicka & Raźniewska, 2015) ^[14]. AI systems support the analysis of supplier performance, which allows companies to better understand their efficiency and identify areas for improvement (Ocicka & Raźniewska, 2015) ^[14]. AI integration in partner relationship management also supports the identification of trends and changes in the supplier market, which translates into better strategic decisions, but this requires careful market monitoring and adaptation to

new challenges (Ocicka & Raźniewska, 2015) ^[14]. AI supports the maintenance of long-term partnerships by enabling personalization and better adaptation to the needs of key suppliers (Ocicka & Raźniewska, 2015) ^[14], which can be a significant competitive advantage for companies in the face of increasing competition. AI also offers the potential to integrate ERP systems with partners in the supply chain, which improves data consistency and coordination of logistics activities, but it is important not to overlook potential challenges related to data security and confidentiality (Ocicka & Raźniewska, 2015) ^[14].

In summary, the use of AI in supply chain optimization opens up wide opportunities for companies to increase operational efficiency and reduce costs, but this requires continuous monitoring and adaptation to changing market conditions.

4.2 Warehouse management using AI

In recent years, the development of artificial intelligence (AI) technology has significantly influenced the optimization of warehouse management, which allows for increased operational efficiency and cost reduction. Automation of inventory processes using AI is a key factor in reducing human errors and increasing the accuracy of warehouse data. The use of intelligent systems enables ongoing updating of warehouse stock levels, identification of shortages and surpluses of assortment (Grupa GT Ochrona Sp. z o.o., 2024) ^[4]. Systems based on AI eliminate traditional, manual procedures, which leads to a significant increase in data accuracy. Automation allows for daily updating of warehouse stock levels, allowing companies to quickly respond to changing demand (Grupa GT Ochrona, 2024) ^[4]. Despite its numerous advantages, a critical approach to the integration of AI with traditional warehouse systems is necessary to avoid potential data inconsistencies and ensure their consistency.

Using AI to manage warehouse space is an innovative approach to optimizing the arrangement of goods. AI algorithms analyze product rotation data, which facilitates decision-making on the best arrangement of goods, translating into a reduction in working time and operating costs (Skuza & Lizak, 2023) ^[19]. By analyzing data on the flow of goods, it is possible to optimize the spatial layout, which minimizes the time needed to complete orders and reduces the need for employees to move. Optimizing the arrangement of goods reduces labor costs and increases the operational efficiency of warehouses. However, it is crucial to ensure that AI systems are properly configured to avoid erroneous decisions resulting from improper data analysis.

AI technology also supports the optimization of warehouse operations through real-time data analysis and demand forecasting. This allows for dynamic adjustment of inventory levels and supply planning, which minimizes the risk of overproduction or shortages of goods, and also reduces storage costs (ID Logistics, 2024) ^[7]. AI allows for quick response to changing market conditions and adjustment of inventories to current needs. Despite the numerous benefits, in practice there may be challenges related to the accuracy of AI forecasts, especially in the context of dynamic and unpredictable market changes.

The use of AI in warehouse management enables automatic monitoring and analysis of performance indicators, which supports the identification of areas for improvement. This technology also supports sustainable development by

identifying opportunities for process optimization and resource consumption reduction, which contributes to the implementation of the company's ecological strategies (Hoser & Ochnio, 2022) ^[6]. AI monitors key warehouse performance indicators, which allows for the rapid identification of inefficiencies and the implementation of improvement strategies. An interesting aspect is how AI integration can affect sustainable development while increasing the competitiveness of enterprises. AI integration helps companies respond quickly to changes in demand and supply, which improves supply chain management (Skuza & Lizak, 2023) ^[19]. Automation of decision-making processes using AI allows for better order and delivery planning, which minimizes the risk of disruptions. However, it is crucial for companies to be ready for potential challenges related to data security and confidentiality.

In summary, integrating AI into warehouse management offers significant benefits in terms of operational efficiency, cost reduction, and support for sustainability strategies. However, to fully leverage the potential of AI, a critical approach to system integration and ensuring data integrity and security are necessary.

5. Conclusion

The conducted research addressed the key issue of the possibility of improving the operations of companies through the use of artificial intelligence in the areas of control, production and logistics. The main goal was to analyze the potential of AI in supporting business processes and identify specific optimization mechanisms in modern enterprises.

The conducted analyses showed that artificial intelligence is an extremely powerful tool for the transformation of business processes, offering comprehensive solutions in all key areas of company operation. In the area of control and accounting, AI enables process automation, increased accuracy of financial analyses and effective risk management. Systems based on machine learning algorithms allow for the elimination of human errors, reduction of operating costs and faster strategic decision-making.

In the area of production, AI technologies open up completely new possibilities for the optimization of manufacturing processes. Advanced algorithms support precise quality control, enable predictive maintenance and allow for dynamic adjustment of production schedules to changing market conditions. A key advantage is the ability to analyze huge volumes of data in real time, which translates into increased efficiency and flexibility of companies.

The logistics sector also benefits significantly from the implementation of solutions based on artificial intelligence. AI supports supply chain optimization through precise demand forecasting, inventory management automation, and dynamic route planning. AI systems enable companies to manage warehouses more efficiently, minimize operating costs, and respond quickly to market changes.

The conducted research confirmed that artificial intelligence is a key factor in competitive advantage in modern business. AI technologies not only streamline existing processes, but also open up completely new possibilities for strategic enterprise management. The possibility of automation, cost reduction, and increased accuracy of analyses makes AI an indispensable tool for digital transformation.

However, the research also indicates a number of challenges related to the implementation of AI solutions. Key limitations include the dynamically changing technology market, diverse implementation possibilities depending on the specifics of companies, and potential adaptation barriers on the part of employees. An important aspect is also the need to constantly monitor and adapt technological solutions.

Recommendations for future research focus on several key areas. Further analyses of the long-term effects of AI implementation, assessment of the impact of technology on the labor market, and in-depth examination of the ethical aspects of using advanced technological solutions are necessary. It will also be particularly important to recognize the possibilities of AI integration in smaller enterprises.

To sum up, artificial intelligence is a revolutionary tool for the transformation of modern business. However, its strategic implementation requires a conscious and comprehensive approach, taking into account the specifics of the organization, available resources and long-term strategic goals. The key to success is not only the technology itself, but above all the ability to use it consciously and effectively.

6. References

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