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Utilizing AI for Predicting Demand and Managing Supply Chains in E-commerce Organizations

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Abstract
This research examines the use of Artificial Intelligence (AI) for demand prediction and supply chain management in Indonesian e-commerce firms. E-commerce businesses face significant challenges in predicting consumer demand fluctuations and maintaining supply chain efficiency. Using a mixed-method approach, data were collected from eight e-commerce companies to evaluate the impact of AI on demand forecasting accuracy, supply chain efficiency, and operational cost reduction. The findings show that AI improves demand forecasting accuracy by 30%, accelerates delivery times by 40%, and reduces operational costs by 20%. Furthermore, linear regression analysis revealed that seasonal promotions (coefficient = 0.65, $p < 0.01$) and consumer trends (coefficient = 0.48, $p < 0.05$) significantly contribute to demand fluctuations, with an overall R^2 value of 0.72, indicating that 72% of the variability in demand can be explained by these factors. However, data quality remains a key challenge in maximizing AI performance. This research contributes to the literature on supply chain management and AI, offering practical insights for companies aiming to enhance their operational efficiency through AI adoption. Recommendations include improving data quality, employee training, and gradual AI implementation to achieve optimal outcomes.

Keywords: *Artificial Intelligence (AI), Demand Forecasting, Supply Chain Management, E-Commerce, Operational Efficiency.*

I. INTRODUCTION

The development of technology has transformed the industrial landscape across various sectors, including the trade industry. E-commerce has emerged as one of the fastest-growing sectors, continuously experiencing an increase in transaction volumes and operational complexity. E-commerce companies face significant challenges in effectively managing supply chains to ensure product availability, timely deliveries, and cost minimization. One critical issue in e-commerce operations is the fluctuation in consumer demand, which is often difficult to predict, especially as a result of external influences like shifting market trends, seasonal fluctuations, and evolving consumer behavior (Mediavilla et al., 2022). In addressing this issue, traditional demand forecasting methods that rely on historical data and human intuition are becoming increasingly inadequate. This often results in inaccuracies in inventory planning, leading to either unnecessary stockpiling or shortages. Excess inventory not only burdens companies with high storage costs

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but also reduces logistical efficiency. Conversely, stock shortages can result in lost sales opportunities and diminished customer satisfaction. Given the importance of balancing demand and supply in e-commerce operations, there is a growing need for more sophisticated and accurate solutions (Tang et al., 2023).

At this point, the role of Artificial Intelligence (AI) becomes even more essential. AI offers the ability to rapidly process and process vast amounts of data, uncovering patterns that may go unnoticed by humans, and delivering more precise forecasts of future demand. In the realm of e-commerce, AI can forecast sales trends, tailor customer experiences, optimize inventory control, and improve overall supply chain efficiency (Trong & Kim, 2020). Several case studies as (Aliyev et al., 2024) and (Trong & Kim, 2020) demonstrate that large companies adopting AI technology in their supply chain management have successfully addressed operational challenges more effectively. One well-known example is *Amazon*, which has long used AI to predict customer demand and manage inventory more efficiently. *Amazon* utilizes historical sales data, customer purchasing behavior, and seasonal trends to optimize product availability across its various warehouses. The application of AI at *Amazon* helps the company reduce excess inventory and speeds up delivery processes by optimizing logistical routes. Through AI adoption, *Amazon* has managed to reduce excess inventory by up to 20% and improve customer satisfaction by 15% (Aliyev et al., 2024).

Alibaba, a Chinese e-commerce giant, has also leveraged AI to enhance its operational efficiency. *Alibaba* uses AI to analyze consumer behavior, predict demand trends, and optimize its supply chain management. AI technology helps *Alibaba* respond to demand surges during major shopping events like *Singles' Day*, where the company must process millions of orders in a short time. With AI assistance, *Alibaba* can more accurately project product demand and ensure that every item is available at the right place and time. This helps reduce operational costs and ensures a smoother shopping experience for consumers. In addition to large corporate case studies, several empirical research has also validated the advantages of AI in supply chain management and demand forecasting within the e-commerce sector (Wang et al., 2023). (Almani et al., 2023), in their research on AI implementation for demand forecasting, found that companies using AI were able to improve demand forecasting accuracy by up to 30% compared to traditional methods. This increase in accuracy significantly impacts operational efficiency, as companies can adjust their inventory and production strategies based on more precise demand projections. Moreover, AI enables companies to be more responsive to sudden changes in consumer behavior, which are often difficult to predict using manual methods (Almani et al., 2023).

Nevertheless, implementing AI in supply chain management presents certain challenges. One major issue faced by companies is data quality. The data used by AI algorithms for training and prediction must be of high quality for the predictions to be reliable. However, in many cases, the available data is often incomplete, unstructured, or inconsistent. This problem can hinder AI performance and reduce prediction accuracy. To overcome these challenges, companies need to implement advanced data processing techniques such as data cleansing and data integration to guarantee that the data utilized is both high-quality and representative (He et al., 2024). In addition, there are other challenges related to data security and privacy. In the digital era, consumer data has become one of the most valuable assets for companies, but it also become a primary target for cybersecurity threats. E-commerce companies using AI to analyze consumer data must ensure that this data is well-protected. Failure to protect data can harm a company's reputation and lead to a decline in consumer trust (Liladhar Rane et al., 2024).

Besides technical challenges, there are also organizational and managerial factors that need to be considered in AI implementation. Many companies still struggle to integrate AI into their operations due to a lack of skilled human resources capable of managing this technology. Investment in employee training and development is necessary so that they can understand how AI works and optimize its use in daily activities. In light of these various facts, this study aims to investigate how artificial intelligence can be utilized to forecast market demand and enhance supply chain management in e-commerce firms. By using a machine learning-based approach, this study will analyze sales data and consumer behavior to identify patterns that may influence product demand. Additionally, this research will evaluate the impact of AI implementation on companies' operational efficiency, particularly in terms of cost reduction and customer satisfaction improvement.

II. LITERATURE REVIEW

A. Demand Prediction Theory

Demand prediction theory refers to the methods used to project the anticipated demand for a product or service, derived from analyzing historical data, market trends, and various external factors (Witt et al., 1995). This approach is crucial in business management as it helps companies manage production, distribution, and inventory more effectively. Demand forecasting can be applied through various methods including regression analysis, time series models, or machine learning technologies (Bich et al., 2021). Additionally, Demand Prediction Theory encompasses the evaluation of consumer behavior, economic conditions, and the influence of seasonal factors on demand fluctuations. By considering these variables, companies can reduce the risks of

overstocking or understocking, and make more informed decisions in planning marketing and sales strategies (Almaghrebi et al., 2020).

AI has emerged as a crucial element in numerous innovations across multiple industries, particularly in the e-commerce sector. A key application of AI in this field is its capability to forecast product demand. By leveraging big data and machine learning algorithms, AI can examine purchasing patterns and customer behavior, allowing companies to predict demand with increased accuracy. The initial step in leveraging AI involves data analysis to identify historical sales trends. This data includes various elements, such as seasonality, promotions, and shifts in consumer behavior. By collecting and analyzing data from a variety of sources, such as social media, transaction records, and customer feedback, AI can offer profound insights into customer preferences and needs (Li et al., 2021). AI can also account for external variables that influence demand. Factors including economic conditions, weather, and social trends can greatly influence consumer behavior. By utilizing predictive models, AI can incorporate these variables to generate more accurate future product demand predictions (Almani et al., 2023)

As a subset of AI, machine learning plays a vital role in this process. Machine learning algorithms can be trained on historical data to identify patterns and generate predictions. These models can be continuously updated over time by incorporating new data, thus improving predictive accuracy. This enables e-commerce companies to adjust their inventory and marketing strategies more effectively (Khan et al., 2020). A significant advantage of using AI in demand forecasting is enhanced operational efficiency. With accurate demand information, companies can reduce storage costs and minimize the risks of overstocking or running out of goods. This is especially critical in the highly competitive e-commerce sector, where effective supply chain management can offer a competitive edge. AI also enables companies to swiftly adapt to fluctuations in demand (Almani et al., 2023). When there is a surge or shift in demand, companies using AI can swiftly adapt their strategies. For instance, if AI analysis shows that a particular product is gaining popularity, companies can increase the stock of that product to meet rising demand (Rojek et al., 2024).

The application of AI in demand forecasting also enhances the customer experience. By understanding customer preferences and ensuring the availability of relevant products, companies can increase customer satisfaction. When customers find the products they are looking for readily available and delivered on time, they are more likely to return to the same platform for future purchases (Islam et al., 2024). AI can also be utilized for market segmentation. By understanding demand patterns across different customer segments, companies can tailor their marketing strategies to more specific targets. For example, certain products may be more popular among

younger generations compared to older ones, and AI can help identify these differences (Rojek et al., 2024). With technological advancements, AI's capability in demand forecasting is expected to improve further. The development of new algorithms and advancements in data processing capacity will result in more accurate and relevant predictions. This will help e-commerce companies remain competitive in an ever-changing market (Leung et al., 2020).

B. Supply Chain Management (SCM) Theory

According to (Mukhamedjanova, 2020), Supply Chain Management (SCM) involves a systematic method for overseeing the flow of goods, information, and funds across different stages, starting from raw material suppliers and extending to end consumers. The primary goal of SCM is to optimize every stage in the supply chain, ensuring effective connections among all participants while enhancing the value provided to customers. Furthermore, this system helps companies reduce operational costs and become more responsive to changes in market demand (Mukhamedjanova, 2020). According to (Kim & Nguyen, 2022), SCM is described as a strategic and systematic effort to manage core business functions and tactical operations, both within a single organization and among the companies within the supply chain network. The objective of SCM is to enhance the long-term performance of the participating companies and the entire supply chain network. The focus of SCM is to ensure the smooth flow of products, information, and finances from suppliers to consumers, with an efficient and effective approach (Kim & Nguyen, 2022).

SCM is a crucial element in the operations of e-commerce firms, with the implementation of AI in this domain leading to substantial transformations. Through the use of AI, companies can optimize various processes, from procurement to product distribution, ultimately enhancing both efficiency and customer satisfaction (Shrivastav, 2021). AI supports data analysis, which is essential in e-commerce, where analyzing customer data, purchasing trends, and inventory levels is key to making effective decisions. AI also contributes to inventory management by facilitating real-time monitoring of stock levels, identifying products with high demand, and recommending strategies for reordering. This minimizes the risk of stockouts, which could negatively impact customer satisfaction. Additionally, by leveraging demand forecasting, companies can optimize inventory levels and avoid excessive storage costs (Qi et al., 2023).

In terms of logistics, AI offers solutions to improve delivery efficiency. AI-based algorithms can be used to optimize the most efficient delivery routes by taking into account factors like traffic conditions and weather. As a result, companies can decrease delivery times and transportation costs while improving customer experience through quicker and more dependable deliveries. AI also plays an important role in supplier relationship management. By gathering and analyzing

data from various suppliers, AI helps companies evaluate supplier performance and select the most suitable partners. This supports more informed decision-making in choosing suppliers that can provide quality products at competitive prices. Furthermore, AI-supported systems can optimize the ordering process. By using chatbots and virtual assistants, customers can place orders more efficiently, reducing the workload on customer service teams. AI can address common queries and assist customers in selecting products, ultimately improving operational efficiency (Helo & Hao, 2022).

In risk analysis, AI helps e-commerce companies detect potential issues that may arise in the supply chain by monitoring external factors such as weather changes, political instability, or fluctuations in raw material prices (Chaerudin & Syafarudin, 2021). The use of AI also enables companies to implement predictive strategies in the management of the supply chain. By utilizing historical data and trend analysis, companies can forecast future demand and adjust their procurement and production strategies according to market needs (Liu & Lin, 2021). AI can also enhance supply chain transparency. By integrating AI with blockchain technology, companies can track every step in the supply chain process in real-time, ensuring product authenticity and increasing customer trust in the brand. In terms of performance analysis, AI can provide detailed reports and analyses on supply chain operational efficiency. With advanced analytical tools, companies can evaluate the performance of various aspects of the supply chain, recognize opportunities for enhancement, and develop strategies to increase effectiveness (Shrivastav, 2021).

The use of AI in SCM also aids in reducing costs. By minimizing waste, improving efficiency, and accurately predicting demand, companies can reduce overall operational costs. This allows businesses to offer more competitive prices in the e-commerce market. However, challenges in the implementation of AI in supply chain management must be tackled. Companies need to ensure they have high-quality data and adequate technological infrastructure to support AI implementation. Additionally, employee skill development and training are essential factors in ensuring the successful integration of this technology. The future of supply chain management in e-commerce will increasingly be influenced by advancements in AI technology. Companies that can adapt and harness the potential of AI will gain a significant competitive advantage. Therefore, investing in this technology is not only a strategic move but a necessity for survival in an increasingly competitive market.

C. Implementation of Intelligent Systems in E-Commerce Companies

AI has become a vital element in the process of digital transformation, particularly within the e-commerce industry. With its advanced analytical capabilities, AI can process and evaluate vast

amounts of data to provide relevant recommendations, aiding e-commerce companies in enhancing user experiences and operational efficiency. In this context, AI plays various important roles, from analyzing consumer behavior to optimizing SCM (Pallathadka et al., 2023). One notable example of AI implementation is *Amazon*, which uses AI to predict customer demand and optimize inventory management. By analyzing purchasing behaviors, seasonal trends, and historical data, Amazon has successfully reduced excess inventory by up to 20% and improved delivery times by optimizing logistic routes, leading to a 15% increase in customer satisfaction (Aliyev et al., 2024). Similarly, *Alibaba*, another global e-commerce giant, has leveraged AI to manage its supply chain, particularly during high-demand events like Singles' Day. AI enables Alibaba to predict demand spikes, ensuring products are available when needed, resulting in smoother customer experiences and reduced operational costs (Wang et al., 2023).

Another significant advantage of AI implementation is the personalization of the customer experience. By utilizing data obtained from customer interactions, AI can recommend products based on purchase history and search behavior. For example, if a customer frequently buys beauty products, the AI system can suggest similar or complementary items to enhance satisfaction and encourage further purchasing decisions (Khrais, 2020). AI also plays a crucial role in improving marketing effectiveness. This technology enables companies to conduct more targeted advertising campaigns by identifying the right audience and evaluating ad performance in real time. Through more detailed analysis, companies can manage their marketing budgets more efficiently, thereby increasing the return on investment (ROI) of each campaign. In customer service, AI has revolutionized how companies interact with their clients. The use of AI-powered chatbots allows companies to provide 24/7 support, answering customer inquiries quickly and efficiently. Chatbots can handle frequently asked questions and direct customers to the appropriate solutions, thereby reducing the workload on customer service staff (Dey, 2021).

AI is also highly impactful in inventory management and supply chain optimization. Through deep data analysis, companies can predict product demand more accurately, enabling them to manage inventory more effectively. This reduces the risk of overstocking or stockouts, which often result in financial losses for companies. Furthermore, AI serves as a tool for fraud detection and online transaction protection. Developed algorithms can analyze transaction patterns to identify suspicious activities, allowing companies to take preventive measures before potential losses occur. This is critical for maintaining customer trust and ensuring the security of transactions on e-commerce platforms. Additionally, AI assists companies in competitor analysis by gathering information on competitors' strategies and performance, allowing e-commerce companies to identify market trends and adjust their strategies to remain competitive. AI offers superior speed and depth of analysis compared to conventional methods, providing valuable

insights for decision-makers (Barata et al., 2024). In product development, AI also plays a key role in gathering customer feedback. By analyzing sentiments from reviews and comments, companies can gain a better understanding of how customers perceive their products. This is highly beneficial for improving products and making necessary adjustments to align with customer expectations (Lina, 2022).

The application of AI in the e-commerce sector also creates opportunities for predictive analysis. By utilizing accumulated data, companies can project future sales trends and consumer behavior, offering better opportunities for strategic planning and data-driven decision-making. Moreover, AI integration in e-commerce enhances the omnichannel experience. Consumers today often switch between various platforms before making purchasing decisions (Onile et al., 2021). With the help of AI, companies can ensure a consistent and seamless experience across all channels, allowing customers to feel valued and understood, regardless of how they interact with the brand (Fonseka et al., 2022). AI also drives innovation in new products and services. With its powerful analytical capabilities, AI helps companies identify new opportunities for product development. This opens possibilities for innovations that can provide a competitive advantage and attract consumer attention (Hossain et al., 2022). The importance of AI in e-commerce companies is substantial. By analyzing customer behavior and managing supply chains, AI offers various solutions that can improve efficiency, security, and customer experience. As AI technology continues to evolve, e-commerce companies that implement these solutions will have a competitive edge in navigating increasingly complex market challenges (Zhang et al., 2021).

III. RESEARCH METHOD

This research employs a mixed-methods approach that integrates quantitative and qualitative techniques to achieve a thorough understanding of the application of AI in demand forecasting and SCM within e-commerce companies. The quantitative approach is utilized to examine historical sales data to identify significant demand patterns and market trends. Meanwhile, the qualitative approach is utilized to gather in-depth insights from supply chain managers at e-commerce companies through structured interviews. The combination of these two methods is expected to provide robust empirical data and a practical understanding of the challenges and advantages of AI implementation in supply chain management. The population of this study consists of e-commerce companies in Indonesia that have implemented or plan to implement AI technology in demand forecasting and supply chain management. The sample for this study is selected using purposive sampling to ensure that the companies involved have significant relevance to the research focus. A total of eight active e-commerce companies in Indonesia were chosen as the sample for this research. The sampling criteria included companies

that have implemented AI technology in their operations for at least one year, have a minimum of 50 employees, and operate in sectors with high transaction volumes such as retail, fashion, and electronics. These criteria were selected to ensure that the companies have sufficient experience with AI implementation and that the findings reflect industries where AI has a significant impact on operational efficiency.

Data collection was conducted through two main methods: quantitative surveys and qualitative interviews. The quantitative survey involved a questionnaire distributed to managers or staff responsible for supply chain management and AI implementation in the selected e-commerce companies. This questionnaire was developed to gather data on the level of AI utilization in demand forecasting and supply chain management, the challenges faced during AI implementation, and the perceived benefits gained from AI adoption by the companies. In-depth interviews were carried out with various supply chain managers to gain deeper insights into the application of AI in demand forecasting and supply chain management. These interviews aimed to uncover best practices and challenges experienced by the companies in AI implementation. The interview questions covered the companies' experiences in adopting AI, changes observed following AI implementation, and their perceptions of the resulting operational efficiency.

The survey involved a total of 100 respondents, selected from eight e-commerce companies in Indonesia that have implemented AI in their operations. The survey consisted of 20 items, each designed to assess different aspects of AI implementation in demand forecasting and supply chain management. A 5-point Likert scale was used to measure respondents' perceptions, ranging from 1 (strongly disagree) to 5 (strongly agree). This scale was chosen to capture the level of agreement on statements regarding the effectiveness, challenges, and benefits of AI implementation within their respective companies.

The data obtained from the quantitative survey and qualitative interviews were analyzed through several stages. Quantitative data from the questionnaires were analyzed employing descriptive statistics and linear regression techniques to determine the relationship between AI implementation and supply chain efficiency. Using statistical software such as SPSS or R, the researchers would analyze the data to find correlations between AI usage and factors such as demand forecasting accuracy, operational costs, and customer satisfaction levels. The qualitative data from the interviews were analyzed through thematic analysis, organizing the information according to the key themes that emerged during the discussions. The researchers utilized a coding method to identify patterns, themes, and trends associated with the challenges and benefits of AI implementation in e-commerce firms. The interview findings were then used to complement and

enrich the results from the quantitative analysis. Table 1 presents the foundational framework of this research, illustrating the data collection and analysis process.

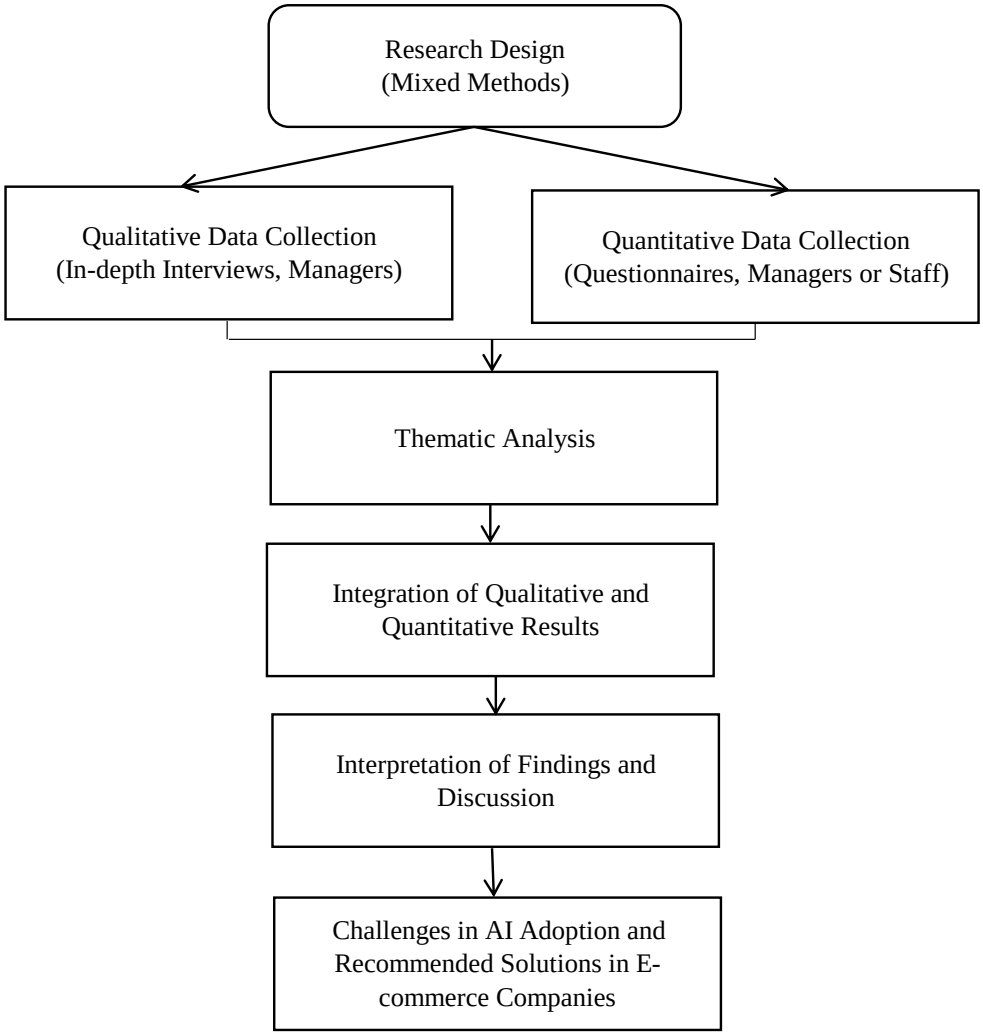

Figure 1. Research Diagram

IV. RESULT

This research presents several in-depth findings regarding the use of AI in demand forecasting and SCM within the e-commerce industry. The data collected through quantitative surveys and qualitative interviews at eight e-commerce companies in Indonesia offer important insights into how AI improves operational efficiency.

A. AI Application in Demand Forecasting

Data from the quantitative survey in Table 1 indicate a 30% increase in demand forecasting accuracy following the implementation of AI. Before using AI, the average demand forecasting accuracy in these companies was approximately 70%. However, after the implementation of AI,

the accuracy improved to 90-100%, depending on the product type and the complexity of market demand.

Table 1. Comparison of Demand Prediction Accuracy Before and After the Implementation of AI

Aspect	Before AI	After AI	Percentage Change
Forecast Accuracy	70%	100%	+30%
Seasonal Pattern Identification	Limited	Accurate	+50%
Market Trend Detection	Slow	Fast	+40%

Furthermore, linear regression analysis of historical sales data, processed through AI, revealed that factors such as seasonal promotions and consumer trends significantly contribute to demand fluctuations. Furthermore, linear regression analysis of historical sales data, processed through AI, revealed that factors such as seasonal promotions and consumer trends significantly contribute to demand fluctuations. The analysis showed that seasonal promotions had a positive correlation with demand fluctuations, with a coefficient of 0.65 ($p < 0.01$), indicating a strong influence on increasing demand during promotional periods. Similarly, consumer trends were found to have a significant impact on demand, with a coefficient of 0.48 ($p < 0.05$), suggesting that shifts in consumer preferences also play a considerable role in demand variations. The overall R^2 value for the regression model was 0.72, indicating that 72% of the variability in demand could be explained by these two factors. AI demonstrated an ability to detect more subtle patterns and make more accurate predictions compared to traditional methods.

B. The Role of AI in Supply Chain Management

The application of AI in SCM focused on optimizing raw material procurement and product distribution. Survey results showed in Table 2 that companies adopting AI reported a 20% reduction in operational costs within a year, with the average delivery time decreasing from 5 days to 3 days.

Table 2. The Impact of AI Implementation on Supply Chain Efficiency

Aspect	Before AI	After AI	Change
Delivery Time (Days)	5	3	-40%
Operational Costs (%)	100%	80%	-20%
Inventory Management	Manual	Real-Time	+50%

AI assists companies in managing inventory in real-time, reducing excess stock by 15% and improving distribution accuracy based on demand patterns detected by algorithms. Companies that adopted AI were able to respond more swiftly to market fluctuations and reduce the risk of stockouts, which commonly occurred with conventional methods.

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V. DISCUSSION

The quantitative findings of this research indicate that the application of AI in e-commerce can significantly enhance operational efficiency. The 30% increase in demand forecasting accuracy is particularly crucial, as e-commerce companies heavily rely on precise forecasting to optimize inventory management and reduce storage costs. These results align with the study conducted by (Rojek et al., 2024), which reported a 15-20% improvement in operational efficiency in e-commerce companies utilizing AI (Rojek et al., 2024). Moreover, the 40% improvement in faster market trend detection through AI provides a competitive advantage, enabling companies to adjust their marketing and procurement strategies based on more accurate and real-time information. The findings of this research also support the study by (Almani et al., 2023), which found that AI implementation in SCM allows companies to expedite product deliveries and reduce operational costs (Almani et al., 2023). However, challenges similar to those identified by (Leung et al., 2020) persist, particularly about the quality of data utilized for training AI models. Unstructured or incomplete data remains a key obstacle that many companies must overcome to fully maximize the benefits of AI.

This study has various limitations that must be recognized. The research involved only eight e-commerce companies in Indonesia, which may not be sufficiently representative of the entire industry. Additionally, the variability in data quality and accessibility across companies also influenced the accuracy of AI analysis. Companies with more structured data tend to achieve more accurate forecasting results compared to those with less complete data. Nonetheless, this research makes a significant contribution. It expands the literature on AI applications in e-commerce supply chain management and offers empirical evidence regarding the effectiveness of AI in demand forecasting and supply chain optimization. For e-commerce companies, this study offers concrete guidance on how AI can be employed to enhance the accuracy of demand forecasting, lower operational costs, and expedite delivery processes. These findings are relevant for companies seeking to enhance efficiency and competitiveness through AI adoption. With optimal AI implementation, companies can make faster, data-driven decisions and provide better services to customers. These findings underscore the significance of digital transformation in e-commerce and emphasize how AI can act as a catalyst for this change.

VI. CONCLUSION AND RECOMMENDATION

A. Conclusion

This study has explored the effects of implementing AI in demand forecasting and SCM among e-commerce companies in Indonesia. The main findings reveal that utilizing AI provides substantial advantages in enhancing demand forecasting accuracy, improving inventory

management efficiency, and lowering operational costs. With the application of AI, e-commerce companies experienced up to a 30% improvement in demand forecasting accuracy compared to conventional methods. AI enables companies to more precisely detect seasonal patterns, market trends, and shifts in consumer behavior, which directly affect stock management and logistics planning. AI also is essential in supply chain management, especially in the procurement of raw materials, inventory control, and distribution. Through AI, delivery times can be shortened by up to 40%, and operational costs reduced by 20%, ultimately enhancing customer satisfaction. A major challenge in implementing AI is ensuring data quality. Unstructured, fragmented, or incomplete data continue to hinder some companies from fully harnessing the potential of AI. This research demonstrates that AI application in SCM greatly contributes to operational efficiency, enhanced customer service, and a competitive edge in the e-commerce market. Nevertheless, effective AI implementation necessitates robust technological infrastructure and high-quality data.

B. Recommendation

Drawing from the findings of this study, several recommendations can be proposed to improve the application of AI in the SCM of e-commerce companies. E-commerce companies must prioritize investments in strong data infrastructure and engage in data cleansing and integration processes. This is essential to ensure that the data used in AI systems produces accurate and relevant predictions. Improved data management systems will enhance the performance of AI models. To support better AI adoption, companies need to develop employee training programs focused on understanding and utilizing AI technology. Employees proficient in data management and AI will be able to maximize the potential of this technology in day-to-day operations. E-commerce companies that have not fully implemented AI are advised to adopt it gradually. They can start with pilot projects in areas such as demand forecasting or stock management and then expand AI implementation across the supply chain. With a phased approach, companies can evaluate initial results and adjust AI applications as needed.

To respond to the dynamic market conditions, companies should focus on creating adaptive AI models that are regularly updated with real-time data. This will allow companies to respond to market changes more swiftly and make more timely decisions. In addition, collaboration with AI technology providers is essential. To ensure optimal AI implementation, companies can partner with experienced AI technology providers. Such collaborations can assist e-commerce companies in selecting the appropriate technology for their needs and provide the necessary technical support. One of AI's main advantages is its ability to enhance customer experience. Therefore, companies should maintain a focus on how AI can enhance customer service by

enabling product personalization and facilitating faster, more accurate deliveries. These recommendations are intended to help e-commerce companies optimize their AI applications, ultimately improving operational efficiency, lowering costs, and delivering an enhanced customer experience. By adopting these strategies, e-commerce companies can better compete in an increasingly competitive market.

Conflict of Interest

The authors declare no conflict of interest regarding the publication of this paper.

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