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DEVELOPMENT OF ARTIFICIAL INTELLIGENCE (AI) SYSTEMS FOR BUSINESS SYSTEM OPTIMIZATION

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Abstract

The advancement of artificial intelligence (AI) technology has brought major changes in various fields including business. This study aims to analyze the potential for developing AI systems to optimize business processes in Indonesia using a literature review approach. This study highlights trends, benefits, and challenges in AI implementation and shows that AI can improve efficiency, productivity, and innovation. Although the application of AI in Indonesia is still in its early stages, its potential is very large, especially in logistics and e-commerce. However, challenges such as limited access to technology and low digital literacy are still the biggest obstacles. This study uses a systematic literature review (SLR) technique to explore the application of technologies such as machine learning (ML), natural language processing (NLP), and robotic process automation (RPA) to improve operational efficiency. This study shows that with the right implementation strategy, AI can help Indonesian companies compete in the global market and accelerate their digital transformation.

Keywords: ***Artificial intelligence, Business optimization, Digital transformation***

INTRODUCTION

The advancement of AI (artificial intelligence) technology has brought major changes in various fields, including the business world. AI is a major driver of digital transformation by providing solutions that increase efficiency, productivity, and innovation in business operations. This technology is used in various sectors such as banking, manufacturing, logistics, and e-commerce, with the aim of overcoming complex problems such as wasted resources, delayed operations, and slow decision-making. Several previous studies have discussed this topic (Hartati, 2021; Manik, 2023; Huda et al., 2024; Sri Pudjiarti 2024).

AI is increasingly being used in the logistics industry to improve work efficiency. With this technology, errors such as delays, wrong deliveries, or damaged goods can be minimized, thereby reducing operational costs and loss claims. Automation of processes such as reporting and filing claims speeds up problem handling, saves time, and reduces costs. In addition, AI enables transportation to be more efficient with fast and automated services, providing significant benefits for logistics companies (Alayida, NF, Aisyah, T., Deliana, R., & Diva, K., 2023). In the E-commerce sector, E-commerce is present as a solution to meet consumer needs for an online transaction platform that is practical, efficient, and supports easy buying and selling for both sellers and buyers (Setyawan, ART, 2022). However, the application of AI in the MSME sector is still hampered by a lack of understanding, technical skills, access to resources, and limited funds. In addition, a mindset that tends to maintain traditional methods further hinders the adoption of this technology. These things make the potential of AI not optimally explored.Fahmi, S., 2024).

The challenges of implementing AI in Indonesia are not only limited to technical aspects, but also the readiness of human resources and organizational culture. E-commerce companies often face challenges in adopting AI due to resistance to change. Management and employees are often hesitant to accept new technology because they do not understand its benefits or feel uncomfortable adapting to different systems (Debora Oktaviani, Fikra Terisha A, Mashita Ayuni, Tesalonika Sembiring, Wynne Lie, & Eryc Yeo., 2024). To overcome the challenges of implementing AI, companies can work with technology consultants who have experience in integrating IT, data analysis, and artificial intelligence (Rini Wijayaningsih, Najwa Andini, Refalina Indah Lestary, Andi Icha Halifah Rahma, Nasywa Tazqiya Ramadani, Jenio Prawirodinata, Yusuf Rahman Maulana., 2024)

This study aims to analyze the potential for developing AI systems for optimizing business processes in Indonesia through a literature review-based approach. This study focuses on identifying trends, key benefits, and challenges in implementing AI in the local business sector using current academic journals. This study is expected to help accelerate digital transformation in Indonesia while providing strategic guidance to stakeholders in designing and implementing effective AI systems.

In addition, this study aims to investigate how AI can help Indonesian companies compete in the global market. By using this technology, companies have the opportunity to increase their competitiveness through product innovation, cost efficiency, and faster and more accurate data-driven decision making. This is reasonable considering the increasingly competitive nature of the global economy, which requires high flexibility and responsiveness from economic actors. As an initial conclusion, the use of AI in Indonesia has great potential to transform the local business environment, but requires a planned and comprehensive implementation strategy. This research is expected to provide a strong scientific foundation to support the widespread adoption of AI

technology, not only in large companies but also in the MSME sector which is the backbone of the Indonesian economy.

METHODOLOGY

This research uses the systematic literature review (SLR) method, which is an approach to systematically collect, evaluate, and compile relevant research findings. The purpose of this method is to gain an in-depth understanding of how Artificial Intelligence (AI) systems are used to improve business process efficiency.

1. Collection of literature

   The literature collection process begins with searching for articles and publications from trusted sources such as Google Scholar. Keywords used include AI for business optimization, process automation with AI, machine learning in business processes, and other related word combinations. To maintain the focus of the research, the articles taken are selected from published scientific articles and journals.

2. The collected literature was filtered according to certain criteria.
   - Inclusion criteria: articles describing the application of AI to improve business efficiency including technologies such as machine learning, natural language processing (NLP), and robotic process automation (RPA).
   - Exclusion criteria: articles not related to the topic. For example, research that does not contain empirical results or only discusses theoretical aspects without practical applications.

3. Data analysis and compilation.

   Once the selection process is complete, the selected literature is analyzed to identify important patterns and trends. The data found is grouped according to the type of AI technology used, the industry in which it is applied, and the results achieved.

4. Validation of findings

   To ensure the accuracy of the research results, triangulation was carried out by comparing information from various sources. In addition, relevant academic research trends and industry reports are also included.

RESULTS AND DISCUSSION

This research aims to explore the application of Artificial Intelligence (AI) in business process optimization, with a focus on machine learning (ML), natural language processing (NLP), and robotic process automation (RPA). Based on the analysis of selected literature, we have identified various patterns of AI application in various industry sectors. This section details the part of this technology in various business areas and its impact on operational efficiency and more data-driven decision making.

1. Application of AI to business processes

   AI has proven to play a significant role in the digitization and automation of various aspects of business processes. One of the most prominent applications is in the manufacturing sector. This sector uses machine learning (ML) technology to improve the efficiency of machine maintenance and management using a technique called predictive maintenance. Machine learning algorithms analyze sensor data generated by machines to detect potential damage or failures before they occur. This not only reduces unexpected repair costs but also increases machine uptime and ultimately increases productivity. maintenance schedules and avoid high repair costs. This technology allows businesses to optimize emergencies (Hardini, IR, 2019).

   In addition, AI is also used in supply chain management to predict market demand and optimize delivery of goods. For example, in the distribution industry, AI can help manage inventory and organize shipments efficiently by using historical data and demand trends to predict when and where products should be shipped. Research shows that AI has great potential to improve the quality of life, especially in the health sector, such as in detecting diseases, predicting treatment outcomes, and providing care tailored to individual needs (Topol, EJ, 2019). According to Rajkomar et al. (2019), AI has significant potential in supporting diagnosis and health services. With the ability to analyze medical data, AI can improve diagnostic accuracy and enable more personalized care for each patient (Rajkomar et al., 2019).

   In the financial sector, the application of AI is more focused on safety and improving operational procedures and performance. One example is the application of AI in the fraud detection process. In the banking sector, AI systems are used to analyze the behavior of customers who make large transactions and identify unusual patterns that may indicate fraudulent transactions (Basri & Almutairi, 2023; Itri et al, 2021). Research by Fraisse & Laporte (2022) shows that AI can play an important role in banks' internal credit risk management. By using AI technology, banks are able to predict minimum capital requirements more accurately and efficiently (Fraisse & Laporte, 2022).

2. Using machine learning to automate business processes

   Machine learning (ML) is increasingly becoming a key technology in automating several business processes, especially those that require large amounts of data. In manufacturing, ML is used to automatically find product defects through pattern recognition of production images. According to studies, the application of ML in this area enables faster and more precise quality control procedures and reduces the amount of manual effort required to evaluate the quality of each item produced. This not only improves production efficiency but also helps maintain consistent quality of the end product. The financial and banking sectors are not left behind in the application of machine learning. This technology is used to predict the possibility of default risk in lending. In addition, big data and ML algorithms

analyze relevant data related to finances and other customer behavior such as previous loan history in order to conduct risk assessments and predictions related to client credit. Accounting information systems are designed to process financial data into information that supports decision making. According to Haddad (2021), the application of AI, such as Expert Systems, Knowledge Representation, and Machine Learning, increases the efficiency, accuracy, and analytical capabilities of these systems. AI technology helps automate financial data management and provides more appropriate solutions, thereby supporting more effective decisions and improving the performance of commercial banks (Haddad., 2021) In e-commerce, the application of ML enables a more personalized user experience. Customer behavioral data or ML algorithms include products that customers usually search for, previous purchases and preferences, to suggest relevant products to customers. This not only improves the customer shopping experience but also increases sales and customer retention. In addition, this technology is also used in warehouse control for efficient routing. ML algorithms predict the shortest route based on travel history, traffic time and other factors. This helps companies in minimizing transportation costs and improving delivery times, which are important contributors to customer satisfaction.

3. Application of natural language processing in customer experience

   Natural language processing is a branch of AI that allows computers to understand and respond to human language naturally. In a business context, NLP has been widely applied to customer service. For example, chatbots that serve customers 24/7. Chatbot systems powered by NLP technology can provide answers to frequently asked questions, troubleshoot problems, and product recommendations. This helps companies reduce operational costs, given the high cost of servicing. NLP is used in sentiment analysis, where it helps organizations understand customer opinions expressed on social media, emails, or product reviews. Companies use analytical data to recognize how customers feel about their products or services, whether positive, negative, or neutral. Hence, it helps companies make faster decisions about product development, marketing, and customer relationship management. Dialogflow, Google's NLP/NLU platform, is designed to create intelligent and responsive chatbots. The platform supports integration with popular services such as Line, Facebook Messenger, Telegram, Google Assistant, and Amazon Alexa, making it easy for developers to build chatbots that are compatible across multiple applications (Nadzif, MA, & Soelistijadi, R., 2024).

4. Robotic process automation (RPA) in business process optimization

   Robotic process automation (RPA) is a technology created to make routine rule-based tasks more automated, without the need for human intervention. This technology has proven to be an effective way to increase efficiency, reduce human error, and reduce operational costs. By using RPA, organizations can increase the speed of business processes that previously took a long time if done manually. The use of RPA is already widespread in the industrial sector, such as in finance, health, logistics. In the financial sector, RPA is often used to automate banking transaction processes, invoice processing, and account reconciliation. These processes can be handled quickly by software robots, replacing the role of human labor which is usually needed in large quantities. Not only that, RPA also supports financial institutions in carrying out good regulatory compliance management, such as carrying out accounting processes to ensure that all transactions are in accordance with applicable regulations (Jeman, B., & Tandean, VA, 2024). By using this method, it can reduce the risk of errors in financial reports.

   Robotic automation in e-commerce impacts logistics, warehousing, and marketing by increasing efficiency. Robots speed up deliveries, reduce errors, and handle repetitive tasks such as picking and sorting items. In marketing, robots help shift routine tasks, allowing marketers to focus on creativity. This saves time, reduces costs, and increases productivity, all while minimizing human error (Joseph, A., 2022) In logistics, robotic process automation (RPA) is applied to automate tracking, shipping, inventory updates, and distribution route planning. This technology can increase efficiency by processing data quickly and accurately, thereby reducing transportation costs and speeding up the delivery process. By implementing RPA, companies can increase supply chain efficiency and ensure customer satisfaction with consistent, on-time delivery, making it an important strategy in increasing competitiveness.

5. Trends in AI research and implementation in business processes

   From the literature analysis conducted, there are several trends that appear to emerge in the use of AI in business processes. One example is AI-as-a-service (AIaaS), which allows companies to use cloud-based AI technology without designing a complex internal AI infrastructure. This model makes it easy for small and medium-sized companies to use AI in their operational activities, which were previously difficult to do due to cost and resource issues. The use of cloud computing allows savings on IT infrastructure costs and reduces maintenance costs. In addition, this service provides large and flexible storage capacity, which can be adjusted to user needs (Anik, 2013). However, the use of AI is not without its challenges. One of the main challenges is how this technology can be integrated with existing systems. Many companies still use legacy IT infrastructure and face difficulties when trying to integrate AI systems into their systems. This can lead to higher costs and time-consuming implementation processes. In addition, another challenge faced is the lack of skilled workers in the data science and artificial intelligence sector. Many companies need to allocate investment in employee training or recruit AI experts to help develop and maintain AI-based systems. Companies that are less prepared to face these challenges may find it difficult to implement AI efficiently.

6. Validation of findings and consistency with industry reports

In order to ensure the validity of the results of this study, triangulation was carried out by comparing the findings of this study with relevant industry reports and academic studies. Based on the findings presented in the Mckinsey Global Institute report (2018), it is known that the use of AI in various industrial sectors can increase productivity by up to 40%, in various sectors. This is in accordance with several sources of literature reviews which show that the implementation of AI can reduce operational costs and improve decisions based on data, especially in the context of risk analysis and big data management.

CONCLUSION

This study shows that artificial intelligence (AI) has great potential to improve the efficiency and productivity of business processes in various industrial sectors in Indonesia, such as manufacturing, logistics, e-commerce, banking, and healthcare. AI technologies including machine learning (ML), natural language processing (NLP), and robotic process automation (RPA), have been shown to support activities such as predictive maintenance, personalization of customer experiences, and process automation, thus providing a positive impact on company performance. However, the implementation of AI in Indonesia still faces several challenges, such as limited technological infrastructure, high adoption costs, and a lack of skilled workers in the field of AI. These challenges underline the importance of a mature implementation strategy, human resource training, and supporting infrastructure development so that AI can be widely adopted, especially in MSMEs. With the right approach, AI has the potential to becomethe main driver of Indonesia's digital transformation. This technology can increase the competitiveness of local companies and enable them to compete globally. This study is expected to be a strategic reference for stakeholders in optimizing the benefits of AI technology to support economic growth in the digital era.

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