Artificial Intelligence (AI) in Enterprise Resource Planning (ERP) Systems: Systematic Literature Review

Thusitha Ananda Gunathilaka[1*]
[1]Faculty of Postgraduate Studies and Professional Advancement, NSBM Green University, Sri Lanka
Corresponding Author E-mail: dtagunathilaka@students.nsbm.ac.lk.

***Abstract*— Enterprise Resource Planning (ERP) systems are crucial in optimizing business processes by integrating various organizational functions such as finance, supply chain, human resources, and customer relations. Integrating Artificial Intelligence (AI) into ERP systems has revolutionized decision-making, automation, and predictive analytics, enhancing efficiency and strategic planning. This systematic literature review examines the current state of AI applications in ERP systems, By analyzing peer-reviewed articles, industry reports, and case studies, this review identifies trends, gaps, and future research directions in AI-enhanced ERP systems. The findings highlight how AI transforms traditional ERP functionalities into intelligent, adaptive platforms, while also addressing barriers to adoption.**

Keywords*— *Artificial Intelligence (AI), Enterprise Resource Planning (ERP), Sustainable Business Models (SBMs), Knowledge Management Systems (KMS)

I. INTRODUCTION

Enterprise Resource Planning (ERP) Past, Present, and Future, a comprehensive overview of the evolution of ERP systems, detailing their transition from earlier systems like integrated control packages and material resource planning systems to modern iterations influenced by digital innovations, particularly cloud computing and artificial intelligence. Research discusses recent developments in ERP systems, including cloud ERPs and postmodern ERPs, while highlighting the growing necessity for integrated enterprise-wide functionalities in various business areas such as accounting, sales management, customer relationship management, and supply chain management. Finally, the article poses observations based on the reviewed literature and the historical context of ERPs from the 1940s to the present[1].

A systematic literature review was conducted using Google Scholar to identify relevant research on the topics of "Enterprise Resource Planning (ERP) Systems and Artificial Intelligence" and "Artificial Intelligence and Business." An initial search yielded 60 research papers. After removing duplicates and applying inclusion criteria, a total of 17 research papers were selected for in-depth analysis.

II. LITERATURE REVIEW

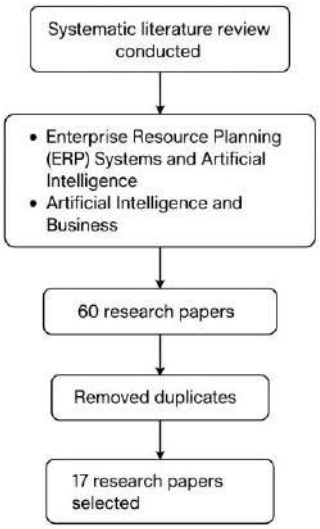


Fig. 1 Systematic Literature Review Model

According to the research AI in ERP systems, the study presents a systematic evaluation of the intersection of AI and ERP systems. The study describes how integrating AI with ERP can enhance business processes, improve efficiency, and provide competitive advantages. The analysis was conducted on 837 publications from the Scopus database, and a more detailed bibliometric analysis was performed on 296 publications. The findings highlight the most popular AI keywords in ERP studies, which include genetic algorithm, fuzzy logic, and machine learning, while identifying leading institutions such as Tsinghua University and Obuda University for their contributions. The study aims to guide future research in the area[2].

The AI canvas is a strategic tool designed to facilitate the integration of artificial intelligence (AI) into business operations. It aims to bring together data scientists and business experts to collaboratively discuss and define all relevant aspects necessary for the successful implementation of AI-based systems within a digital enterprise[3].

The distinction between general AI and narrow AI has significant implications for business strategies. While general AI is capable of exhibiting intelligent behavior similar to human intelligence across a wide range of scenarios, it remains largely elusive and not yet available for practical business applications. Conversely, narrow AI specializes in solving specific problems and executing singular tasks, which has already seen notable successes in industry applications, such as playing complex games or medical diagnosis[3].

Understanding the capabilities and limitations of these two types of AI guides businesses in their strategic planning, allowing them to leverage narrow AI for specific, high-impact applications while preparing for potential future developments in general AI[3].

Businesses must focus on how to generate value for customers and stakeholders by implementing narrow AI solutions where they can provide the most impact. As stated by P. Sondergaard from Gartner, "algorithms define action," highlighting the importance of algorithmic decisions in capturing value. This means that businesses need to identify use cases where narrow AI can create tangible value and integrate it effectively into their operations[3].

The research discusses[4] the significant paradigm shift in technology and management in Germany, particularly through the lens of artificial intelligence (AI). It emphasizes that AI is transforming various aspects of business, including models, processes, and stakeholder management. This transformation is referred to as "AI-driven management," which is essential for organizations to gain competitive advantages. The paper illustrates how different industries, such as the automotive sector, are merging traditional functions with AI capabilities to create innovative products and services. Additionally, the challenges of implementing such transformations, alongside security and safety concerns, are also addressed.

The research highlights several challenges related to the implementation of AI in management. Traditional organizational and process structures, along with stakeholders who prefer outdated methods, can serve as barriers to innovation. This is often due to historical successes that lead to resistance against new technologies. The lack of proper implementation of AI-driven management can result in technological limitations, causing companies to fall behind competitors. Domain-fixed forecasts are often imprecise and irrelevant in a rapidly changing environment, leading to poor competitive decisions.

According to the research [5] the implementation of artificial intelligence (AI) in business enterprises, highlighting a readiness model to assist companies in overcoming challenges associated with AI integration. The research identifies seven key dimensions essential for AI readiness. Employee and culture, Technology management, Organizational governance and leadership, Strategy, Infrastructure, Knowledge and information, and Security. The research emphasizes that while many companies globally are adopting AI technologies, significant opportunities remain untapped. The framework was developed through systematic literature reviews, intending to inform businesses on how to effectively implement AI to transform their operations and maximize the benefits of this technology.

The accounting field has significant advancements and challenges brought about by AI, including its capability to enhance productivity, improve the reliability of accounting information, and reduce instances of fraud. Despite its benefits, the document also points out the potential disadvantages, such as the risk of disclosing trade secrets and technical vulnerabilities. Various applications of AI in accounting work, such as document management, inventory control, payroll processing, and financial analysis, are elaborated upon to showcase its value in enhancing the efficiency and effectiveness of accounting practices[6].

Smart Financial Information System that integrates ERP and AI for data analysis. It highlights the importance of agent technology and communication among agents to effectively complete tasks and construct a comprehensive data analytic model. The framework aims to improve business management processes by enhancing data sharing and resource allocation. The study emphasizes the role of trust mechanisms in multi-agent systems to facilitate cooperation and improve overall efficiency in financial information management[7].

The importance of accurate sales forecasting for businesses. Traditional forecasting methods often fail to keep pace with the dynamic nature of consumer behavior and market trends. The research explores how integrating Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) systems with Artificial Intelligence (AI) techniques, such as predictive analytics and machine learning, can improve sales forecasting accuracy. This integrated approach allows businesses to gain insights into customer behaviors and market dynamics, leading to better decision-making, personalized marketing, and enhanced customer engagement. The paper includes practical implications, a review of relevant studies, and recommendations for businesses seeking to optimize their sales forecasting processes[8].

The integration of AI in ERP systems emphasizes its potential to optimize business processes. It highlights various applications of AI across different dimensions of ERP, including customer relationship management, supply chain management, production, product lifecycle management, human resources, and financial management. The document underscores the importance of digitalization in industrial production and the role of ERP systems in improving efficiency, decision-making, and the overall integration of business processes. The advancements in AI technology present significant opportunities for enhancing the effectiveness of ERP systems[9].

The research explores the transformative effects of artificial intelligence (AI) in enhancing demand forecasting within Enterprise Resource Planning (ERP) systems. It emphasizes how AI-based predictive analytics can significantly improve forecasting accuracy, optimize inventory levels, and support data-driven decision-making across various industries like fashion retail, biopharmaceuticals, energy management, and transportation. The study highlights the limitations of traditional forecasting methods and showcases the advantages of integrating AI technologies in ERP systems for better organizational decision-making and competitiveness[10].

The research discusses the impact of artificial intelligence (AI) on the fulfillment of the purchasing function within Enterprise Resource Planning (ERP) systems, particularly focusing on SAP. It highlights the integration of AI throughout the entire lifecycle of ERP systems to enhance efficiency, decision-making, and overall performance. The paper notes that companies are increasingly adopting AI technologies to streamline processes, eliminate redundancy, and increase productivity across various operational areas. The implementation of AI in ERP systems offers several specific advantages, particularly in enhancing the purchasing function. Demand Forecasting, Supplier Selection and Evaluation, Purchase Order Automation, Cost Optimization, Supplier Risk Management, Inventory Management, Purchase Approval Workflow, Data Analytics and Reporting, Fraud Detection, Market Intelligence[11].

The research provides a technical review of the integration of ERP AI in the textile industry[12], particularly focusing on companies located in Lima, Peru. It highlights the advantages of these technologies, such as enhanced productivity, cost reduction, and improved operational efficiency through centralized management. However, the adoption of ERP and AI faces challenges, including resistance to change, a lack of skilled personnel, and high implementation costs. The research emphasizes the transformative potential of these technologies while calling for further investigation into barriers like workforce training and change management. The key benefits of integrating ERP systems and AI in the textile industry, product customization, Market trend prediction, waste reduction, enhancement of strategic decision-making, Increase in customer satisfaction, improvement in product quality, and Automation of preventive maintenance.

The research study introduces[13] an AI-based chat toolset designed to enhance the insights derived from Enterprise Resource Planning (ERP) systems using OpenAI's text-generation model. It aims to improve the interpretability of complex ERP data, facilitating more efficient decision-making processes and organizational productivity. The toolset allows users to interact with ERP systems via natural language queries, eliminating the need for traditional reporting and direct system access. The research details the steps for developing this innovative toolset, including data extraction, preprocessing, and an interactive chatbot system. The findings emphasize the toolset's potential for significantly improving user experience and efficiency in data retrieval while suggesting avenues for future research into its applicability across various ERP platforms.

The research outlines the complexities involved in embedding Generative AI into ERP solutions, which serve as central repositories for business processes across various functions such as finance, supply chain, and marketing. The paper addresses the systematic development and operation of Generative AI applications in ERP through use case analysis, business requirement derivation, solution framework design and implementation, and effectiveness evaluation. Benefits of Generative AI include improved user experience, streamlined content creation, and enhanced developer productivity[14].

ERP software customization discusses the concept of algorithm bias. The research aims to provide insights into the types of design biases encountered during ERP customization and presents a new AI version of a customization algorithm that utilizes machine learning techniques. The study further illustrates potential biases inherent in existing algorithms and offers a roadmap for mitigating algorithmic bias in practice[15].

It highlights how AI, particularly machine learning and deep learning, is being utilized to enhance customer experiences, improve operational efficiency, manage supply chains, and maintain product quality control. The use of these technologies is aimed at predicting and analyzing data, which aids businesses and government entities in various functions such as sales growth, fraud detection, inventory management, and portfolio management.

Systematic literature review on the interplay between AI and SBMs within the context of the Sustainable Development Goals (SDGs). The research conducted a bibliometric analysis of 73 publications dated from 1990 to 2019, aiming to explore AI's role in influencing production and consumption patterns for sustainable resource management, particularly aligned with SDG #12. The paper addresses the challenges linked to innovation, which encompass ethical, social, economic, and legal dimensions. It also highlights the significance of Knowledge Management Systems (KMS) in promoting the integration of AI into SBMs and identifies a gap in the literature regarding this integration. The findings suggest that AI could serve as a crucial element in the cultural shift necessary for achieving sustainable objectives, prompting companies and policymakers to advance AI applications in their sustainability efforts.

The Light and the Darkness discusses the dual nature of artificial intelligence (AI) - its potential benefits and its darker implications. The authors categorize AI's advantages into business-to-consumer (B2C) and business-to-business (B2B) settings, highlighting that B2C benefits primarily arise from customized experiences, while B2B benefits manifest through improved efficiencies. The paper also identifies key drivers of the dark side of AI, which include a lack of

trust and power asymmetries, with trust issues being more pronounced in B2C contexts and power disparities in B2B environments. The authors aim to enhance understanding of both the positive and negative aspects of AI, particularly focusing on the underexplored dark side in B2B scenarios[17].

The research paper[18] explores the integration of Artificial Intelligence (AI) in Enterprise Resource Planning (ERP) systems, emphasizing the transformative potential and challenges associated with this evolution. It highlights significant opportunities such as enhanced predictive analytics, intelligent automation, and personalized user experiences that can increase user satisfaction and productivity. However, it also addresses challenges like data quality issues and organizational resistance to change. The paper notes a trend where over 50% of organizations plan to incorporate AI capabilities over the next two years. Finally, it provides guidelines for aligning AI initiatives with broader business objectives to achieve sustainable competitive advantages[18].

The research[19] investigates the integration of Artificial Intelligence (AI) technologies into disaster recovery strategies for SAP S/4HANA systems deployed in cloud environments. The study emphasizes three main aspects: proactive failure prediction, automated response mechanisms, and optimization of Recovery Time Objectives (RTO). It highlights how advanced machine learning models, predictive analytics, and intelligent automation can transform disaster recovery strategies, enhance system resilience, reduce downtime, and achieve significant improvements in recovery times. The research also points out the importance of continuously refining AI models and addresses ethical considerations in autonomous decision-making.

III. CONCLUSION

This systematic literature review explores the integration of Artificial Intelligence (AI) technology with Enterprise Resource Planning (ERP) systems, emphasizing both its potential benefits and limitations. The review process involved an initial identification of 60 research papers from Google Scholar using the keywords "Enterprise Resource Planning (ERP) Systems and Artificial Intelligence" and "Artificial Intelligence and Business." After removing duplicates and applying selection criteria, 17 high-quality research papers were selected for in-depth analysis. This process is visually summarized in the accompanying flowchart Fig. 1.

The findings reveal that integrating AI with ERP systems significantly enhances organizational productivity and operational efficiency. It also strengthens customer-organization relationships by enabling more responsive, data-driven decision-making and personalized service delivery. Despite a few challenges, such as implementation complexity and data security concerns, the overall impact of AI integration is positive.

This review provides a strategic roadmap for business leaders, offering insights into how AI technologies can be effectively leveraged to transform ERP systems and drive sustainable business growth.

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