THE ROLE OF BIG DATA AND ARTIFICIAL INTELLIGENCE IN HR PLANNING TO SUPPORT DIGITAL ENTREPRENEURSHIP INNOVATION

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ABSTRACT

In the last decade, the development of information technology has advanced rapidly, with Big Data and Artificial Intelligence (AI) as two major innovations reshaping the landscape of business and management. Big Data, which refers to large and complex datasets that are difficult to process with traditional methods, has become a valuable asset for organizations in planning and managing human resources (HR). This research aims to explore how Big Data and AI can be applied in HR planning to support digital entrepreneurship innovation, as well as to identify the benefits and challenges of implementing these technologies. This study employs a qualitative approach using a literature review method. Data for this research were collected through a systematic literature search on Google Scholar, focusing on articles published between 2018 and 2024. The results of the study indicate that Big Data provides deep insights through complex and detailed data analysis, enabling companies to plan their workforce needs more accurately and responsively to market changes. AI, on the other hand, enhances efficiency by automating HR processes and providing predictive analytics that can support strategic decision-making. Case studies from companies like Walmart, Unilever, and Airbnb demonstrate how the implementation of these technologies can improve HR planning processes and support innovation in digital businesses.

Keywords: Big Data, Artificial Intelligence, HR Planning, Innovation, Digital Entrepreneurship

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PERAN BIG DATA DAN ARTIFICIAL INTELLIGENCE DALAM PERENCANAAN SDM UNTUK MENDUKUNG INOVASI KEWIRAUSAHAAN DIGITAL

ABSTRAK

Dalam dekade terakhir, perkembangan teknologi informasi telah mengalami kemajuan pesat, dengan Big Data dan kecerdasan buatan sebagai dua inovasi utama yang mengubah lanskap bisnis dan manajemen. Big Data, yang merujuk pada kumpulan data besar dan kompleks yang sulit diproses dengan metode tradisional, kini menjadi aset berharga bagi organisasi dalam merencanakan dan mengelola sumber daya manusia (SDM). Penelitian ini bertujuan untuk mengeksplorasi bagaimana Big Data dan AI dapat diterapkan dalam perencanaan SDM untuk mendukung inovasi kewirausahaan digital, serta mengidentifikasi manfaat dan tantangan dari penerapan teknologi ini. Penelitian ini menggunakan pendekatan kualitatif dengan metode tinjauan pustaka. Data untuk penelitian ini diambil melalui pencarian literatur yang sistematis di Google Scholar dengan fokus pada artikel-artikel yang diterbitkan antara tahun 2018 hingga 2024. Hasil studi menunjukkan bahwa Big Data menyediakan wawasan yang mendalam melalui analisis data yang kompleks dan terperinci, memungkinkan perusahaan untuk merencanakan kebutuhan tenaga kerja dengan lebih akurat dan responsif terhadap perubahan pasar. AI, di sisi lain, meningkatkan efisiensi dengan mengotomatisasi proses SDM dan memberikan analisis prediktif yang dapat mendukung keputusan strategis. Studi kasus dari perusahaan seperti Walmart, Unilever, dan Airbnb menunjukkan bagaimana penerapan teknologi ini dapat memperbaiki proses perencanaan SDM dan mendukung inovasi dalam bisnis digital.

Kata kunci: Big Data, Kecerdasan Buatan, Perencanaan SDM, Inovasi, Kewirausahaan Digital

INTRODUCTION

In the last decade, the development of information technology has advanced rapidly, with Big Data and Artificial Intelligence (AI) as two major innovations reshaping the landscape of business and management. Big Data, which refers to large and complex datasets that are difficult to process with traditional methods, has become a valuable asset for organizations in planning and managing human resources (HR). Data generated from various sources—such as customer interactions, survey results, and operational data—offer deep insights that can influence strategic decisions in HR planning (Nocker & Sena, 2019).

AI, on the other hand, provides the capability to intelligently and automatically analyze data (Morgan, 2023). AI can identify patterns and trends that may not be visible through conventional data analysis by using machine learning algorithms and advanced analytics techniques. In the context of HR planning, AI enables the automation of critical processes such as recruitment, performance assessment, and career development planning, increasing efficiency and reducing bias in HR decisions.

The integration of Big Data and AI in HR planning is highly relevant, especially in the context of digital entrepreneurship. Digital entrepreneurship involves the efforts to create, manage, and grow new businesses by leveraging digital technology (Sudewa et al., 2023). In this rapidly changing business environment, a deep understanding of employee needs and preferences, as well as the ability to predict workforce trends, becomes crucial for success. Big Data and AI can provide the necessary information to formulate HR strategies that are adaptive and responsive to market changes.

Big Data offers a broad and detailed view of workforce dynamics, enabling companies to analyze data related to employees, such as satisfaction levels, required skills, and retention patterns (Singh et al., 2022). Meanwhile, AI can use this data to make accurate predictions about future workforce needs and to design appropriate skill development programs (Morandini et al., 2023). Thus, companies can quickly respond to changes in the industry and enhance their competitiveness.

However, the implementation of Big Data and AI in HR planning is not without challenges. Privacy and data security issues are major concerns, as the use of employee personal data requires strict protection. Additionally, the implementation of these technologies requires significant investment in infrastructure and proper training. Companies must also consider ethical and transparency aspects in the use of these technologies to avoid potential data misuse and discrimination.

The role of Big Data and AI in supporting digital entrepreneurship innovation is also marked by the need for new skills and changes in organizational structure. Organizations must be ready to adopt new technologies and integrate analytical tools into their HR processes while ensuring they have a skilled workforce to utilize these technologies.

Therefore, rapid technological changes have a significant impact on how companies plan and manage their HR. Big Data and AI offer opportunities to enhance efficiency and innovation in HR planning, but also require a careful and strategic approach to address related challenges. This research aims to explore how Big Data and AI can be applied in HR planning to support digital entrepreneurship innovation, as well as to identify the benefits and challenges of implementing these technologies.

LITERATURE REVIEW

Big Data

Big Data refers to extremely large and complex datasets that are difficult to process with traditional techniques (Jain et al., 2016). This data often encompasses very high volume, velocity, and variety, originating from various sources such as business transactions, social media, sensors, and IoT devices. Big Data enables organizations to uncover patterns, trends, and insights that are not visible in smaller datasets by storing and analyzing vast amounts of data (Udeh et al., 2024). This supports more informed and strategic decision-making by revealing information that can impact various aspects of business, including customer behavior, operational efficiency, and product development.

Artificial Intelligence (AI)

Artificial Intelligence (AI) is a technology that enables computer systems to mimic human cognitive functions, such as learning, adapting, and making decisions (Collins et al., 2021). AI utilizes various techniques, including machine learning and deep learning, to analyze data, recognize patterns, and make predictions or recommendations. In a business context, AI can be used to automate processes, enhance data analysis, and personalize customer interactions. AI functions to improve operational efficiency, reduce costs, and identify opportunities that are not visible through traditional data analysis (Yaiprasert & Hidayanto, 2024).

HR Planning

HR planning is a strategic process involving the identification, analysis, and planning of an organization's workforce needs to achieve long-term business goals (Chiara et al., 2023). This includes various activities such as forecasting workforce needs, recruitment planning, skill development, and talent management. The objective of HR planning is to ensure that the organization has the right number and type of employees with the appropriate skills, as well as to manage changes in workforce requirements arising from growth, new technologies, or market changes (Aslam et al., 2014).

Innovation

Innovation is the process of creating and implementing new ideas, products, or methods that provide added value and enhance efficiency (Diawati et al., 2023). Innovation includes not only the development of new products but also improvements in processes, business models, and organizational strategies. It often involves using the latest technologies or new methods to solve existing problems, improve customer experiences, and create competitive advantages. In business, innovation is key to adapting to market changes and meeting evolving customer needs (Harahap et al., 2024).

Digital Entrepreneurship

Digital entrepreneurship is the practice of creating and managing new ventures by leveraging digital technology to maximize business opportunities and operational efficiency (Kraus et al., 2018). This includes various activities such as app development, e-commerce platforms, and the use of digital tools for marketing and sales. Digital entrepreneurship harnesses technology to access global markets, optimize operations, and create innovative business models (Soltanifar et al., 2021). This approach enables entrepreneurs to overcome modern market challenges and capitalize on opportunities emerging from digital technology developments.

RESEARCH METHODOLOGY

This research employs a qualitative approach using a literature review method to explore the role of Big Data and Artificial Intelligence (AI) in human resource (HR) planning to support digital entrepreneurship innovation. A qualitative approach was chosen to gain an in-depth understanding of the phenomenon under study, allowing for the analysis of concepts, theories, and practices relevant to the research topic. Data for this research were collected through a systematic literature search on Google Scholar, focusing on articles published between 2018 and 2024. The selection process began by identifying 41 relevant articles based on established keywords and topics. These articles then underwent a rigorous selection process to ensure their quality and relevance to the research focus. Selection criteria included contributions to the understanding of the topic, methodologies used, and relevance to the role of Big Data and AI in HR planning and digital entrepreneurship. After the selection process, only 25 articles met the criteria and were used in this literature review. The use of this data allows the research to provide a comprehensive and detailed overview of the topic under study. Descriptive analysis was applied to present and depict findings from the collected literature, identifying patterns, trends, and insights relevant to the use of Big Data and AI in the context of HR planning and digital entrepreneurship innovation. This

approach aims to present a deep and structured analysis of how Big Data and AI technologies can influence and support HR planning processes and their impact on innovation in digital entrepreneurship.

RESULTS AND DISCUSSION

In the modern context, Big Data and Artificial Intelligence (AI) have become two key elements in developing effective human resource (HR) strategies. Big Data, which involves the analysis of large and complex datasets, provides deep insights through comprehensive information processing from various sources such as customer transactions, survey results, and operational data. Companies can identify relevant trends and patterns for HR planning by leveraging this data. For example, big data analysis can reveal seasonal patterns in product demand, enabling companies to plan their workforce needs more accurately. AI, on the other hand, accelerates data processing and provides deep predictive capabilities (Khalifa & Albadawy, 2024). This allows companies to make more precise data-driven decisions, such as predicting future workforce needs based on historical trends and current market conditions. Companies can design more responsive and adaptive HR strategies by integrating these two technologies, which is crucial for navigating rapidly changing market dynamics.

An example of Big Data application in HR planning can be seen at Walmart, which uses this technology to manage and optimize the workforce in its stores. Walmart collects data from various sources, including sales transactions and inventory, to analyze customer behavior and sales trends. This data allows Walmart to perform more accurate workforce planning by adjusting the number of staff available to meet customer demand and seasonal trends. For instance, during promotional periods or holidays, data analysis may indicate an increase in demand, enabling Walmart to add staff to ensure optimal service. This improves operational efficiency and ensures that customers have a satisfying shopping experience, which in turn can enhance customer loyalty and sales.

Meanwhile, AI has significantly transformed how companies manage and optimize HR processes (Murugesan et al., 2023). For example, Unilever has integrated AI into its recruitment process to increase efficiency and objectivity. Unilever can automatically screen and assess candidate applications by using machine learning algorithms, minimizing the time required for selection and reducing bias in candidate evaluation. This process allows Unilever to identify the most suitable candidates more quickly and accurately. Additionally, AI helps reduce potential discrimination in recruitment by ensuring that candidate evaluations are based on data and objective criteria rather than subjective judgments that can be influenced by human bias.

The use of AI in HR planning is also evident in how companies design skill development programs. IBM is an example of a company using AI to create personalized training recommendations for its employees. AI can recommend the most suitable courses and training programs to enhance the necessary skills by analyzing performance and skill data. This approach supports individual career development and overall productivity. AI helps identify training needs and ensures that employees receive relevant and beneficial training, ultimately improving their skills and advancing their careers within the company (Zirar et al., 2023).

In the context of digital entrepreneurship, Big Data and AI provide significant benefits in understanding markets and optimizing product or service offerings (Chae & Goh, 2020). For example, Airbnb uses Big Data to analyze user preferences and market trends. Data collected from user reviews, searches, and transactions helps Airbnb design new features and improve their offerings to meet the ever-changing needs of customers. AI is also used to manage dynamic pricing, adjusting rental rates based on demand and market factors. This approach allows Airbnb to increase revenue and customer satisfaction by offering prices that align with current market conditions.

Despite the many benefits, using Big Data and AI in HR planning also faces significant challenges, particularly regarding data privacy and security. Organizations must ensure that employees' personal data is well protected and that privacy policies are adhered

to. For example, Facebook has faced criticism over managing user data, highlighting the importance of transparency and ethical data management. Companies must implement strict security measures and clear privacy policies to protect employees' personal information and avoid legal and reputational issues arising from data breaches.

In addition to privacy challenges, the investment in infrastructure and training for Big Data and AI technology is significant. Companies need to ensure they have adequate systems to manage and analyze data, as well as skilled staff to effectively use these technologies. For instance, fintech companies that rely on advanced technology for their services must invest in proper infrastructure and continuous training for employees to fully leverage the potential of Big Data and AI. Without sufficient investment, companies may struggle to implement and utilize these technologies effectively (Handoyo et al., 2023).

The digital transformation brought about by the adoption of new technologies also leads to changes in organizational culture (Gagan Deep, 2023). For example, General Electric (GE) has undergone digital transformation to integrate Big Data and AI into their operations. This process requires changes in the work culture and adaptation from staff to optimize the use of technology. Companies must carefully manage this cultural change, ensuring all team members adapt to the changes and support the digital transformation process to achieve the desired outcomes.

Ethical considerations in the use of AI in HR planning are crucial. AI systems used in recruitment must be designed to avoid discrimination and bias. A positive example is companies like HireVue, which have developed AI-based selection tools focused on reducing bias in candidate assessments. These tools use video analysis to objectively evaluate candidates' skills and fit, helping to create a fairer recruitment process. This approach ensures that recruitment decisions are based on objective and relevant data rather than subjective factors that can affect the fairness of the process.

In the context of digital entrepreneurship, the utilization of Big Data and AI also supports innovation in product and service development. Technology companies like Google use big data to identify new market opportunities and develop innovative products. AI helps design new features that meet the evolving needs of the market by analyzing usage patterns and user feedback (Haleem et al., 2022). This approach supports the growth and success of digital entrepreneurship by enabling companies to quickly adapt to changes in customer needs and preferences.

Overall, the application of Big Data and AI in HR planning offers numerous benefits, including increased efficiency, reduced bias, and the ability to make more accurate data-driven decisions. However, challenges such as data privacy, investment in technology, and organizational cultural changes must be carefully managed. Organizations that successfully navigate these challenges can leverage the potential of these technologies to support innovation and growth in the context of digital entrepreneurship, allowing them to remain competitive and responsive to market changes.

CONCLUSION

This study has highlighted the importance of Big Data and Artificial Intelligence (AI) in human resource (HR) planning and their impact on digital entrepreneurship innovation. Big Data provides deep insights through the analysis of complex and detailed data, enabling companies to plan their workforce needs more accurately and responsively to market changes. AI, on the other hand, enhances efficiency by automating HR processes and providing predictive analytics that can support strategic decision-making. Case studies from companies such as Walmart, Unilever, and Airbnb demonstrate how the application of these technologies can improve HR planning processes and support innovation in digital business.

The implications of this research indicate that the adoption of Big Data and AI in HR planning not only enhances operational efficiency but also influences overall business

strategy. Companies integrating these technologies can optimize recruitment processes, skill development, and performance management, thereby improving their market competitiveness. Additionally, the implementation of these technologies can help companies respond more quickly and effectively to changing market trends and customer needs, supporting innovation in digital entrepreneurship.

Based on the findings, several recommendations can be made for companies looking to adopt Big Data and AI in HR planning. First, companies should invest in adequate IT infrastructure and staff training to effectively manage and leverage these technologies. Second, it is crucial to implement strict data privacy and security policies to protect employee personal information. Third, companies should ensure that the use of AI in HR is conducted with consideration for ethics and transparency to avoid bias and discrimination in recruitment and performance evaluation processes. Finally, organizations need to adapt their corporate culture to support digital transformation and ensure that all team members are aligned with the changes.

This study has several limitations to consider. First, the analysis is based on data from articles published within a specific time period (2018-2024), which may not cover the full spectrum of research related to Big Data and AI in HR planning. Second, as this study uses a literature review approach, the findings may not reflect the most recent practices or very new innovations in the field. Third, focusing on articles sourced from Google Scholar may limit the scope of relevant literature, as there may be other sources offering additional insights. Fourth, the case studies included in the discussion may not represent all industries or company sizes, so the results may not be fully generalizable to all contexts.

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Table. Key Findings on the Role of Big Data and Artificial Intelligence in HR Planning and Digital Entrepreneurship Innovation

No	Aspect	Key Findings
1	Big Data	Provides deep insights through the analysis of large datasets, helping to plan workforce needs more accurately and responsively
2	Artificial Intelligence	Automates HR processes, enhances efficiency, and provides predictive analysis for strategic decision-making.
3	HR Planning	Utilizes Big Data and AI to improve recruitment, skills development, and performance management.
4	Innovation	Accelerates product and service development and supports business strategies through data analysis and AI predictions.
5	Digital Entrepreneurship	Optimizes operations and creates innovative business models by leveraging Big Data and AI to understand market and customer needs.
6	Case Studies	Walmart uses Big Data for workforce planning; Unilever and IBM use AI for recruitment and skills development; Airbnb leverages Big Data and AI for dynamic pricing.
7	Challenges	Issues with data privacy, need for infrastructure investment, and organizational culture changes.
8	Ethics	Importance of transparency and ethical data management to avoid bias and discrimination in AI and Big Data applications.