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Using No-Code/Low-Code Solutions to Promote Artificial Intelligence Adoption in Vietnamese Businesses

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Abstract

Recently, Artificial Intelligence (AI) has been emerging as a technology that has transformed and revolutionized various industries around the world. In recent years, businesses in Vietnam have also started to embrace AI applications to enhance their operations and gain a competitive edge in the market. As AI technologies continue to evolve rapidly, their impact on Vietnamese businesses is becoming increasingly profound. As artificial intelligence continues to progress across various fields, the need to democratize AI technology becomes increasingly clear. In a rapidly growing market like Vietnam, leveraging AI offers significant opportunities for businesses to improve operational efficiency, customer engagement, and overall competitiveness. However, significant barriers to AI adoption in Vietnam are the scarcity of skilled developers and the high cost of implementing traditional AI. No-code/low-code platforms offer an innovative solution that can accelerate AI adoption by making these technologies accessible to a wider audience. This article analyzes and understands the benefits of no-code/low-code solutions and proposes a roadmap for implementing no-code/low-code solutions in promoting AI applications in Vietnamese businesses.

Keywords: AI, Low-code, No-code, Vietnam, Roadmap

1. Introduction

Artificial intelligence (AI) is development of computer systems capable of executing complex tasks that previously required human intelligence, such as reasoning, making decisions, solving problems, recognizing speech. AI is an umbrella term for various computational strategies, including deep learning, machine learning and natural language processing [1]. AI is the field of research and application of technologies to build machines that work like humans. The goal of AI is to create computer systems capable of executing intelligent tasks and performing tasks that previously only humans could do. AI does not simply copy or simulate aspects of human intelligence but also involves developing and applying algorithms and mathematical models so that computers can learn and plan on their own, plan, think and make decisions based on data and experience. AI has many applications in today's life. It is becoming essential for today's life because it can solve complicated issues with an efficient way in various industries, such as finance, agriculture, entertainment, healthcare and

education [2, 3].

In recent years, the adoption of AI in Vietnamese businesses has been steadily increasing. However, the background of AI implementation in these organizations is still evolving. Historically, AI technologies were primarily utilized by large multinational companies with substantial resources to invest in research and development. It was not until recently that small and medium-sized enterprises in Vietnam began to explore the possibilities of leveraging AI to improve their operations and gain a competitive advantage in the market. While there is a growing interest in adopting AI solutions, concerns about cost, complexity, and the lack of in-house expertise have hindered widespread implementation. A report on the Government AI Readiness Index from Oxford Insights disclosed that Vietnam has increased its average score, gaining 54.48 points in 2023 compared to 53.96 in 2022 as shown in Fig.1 [4].
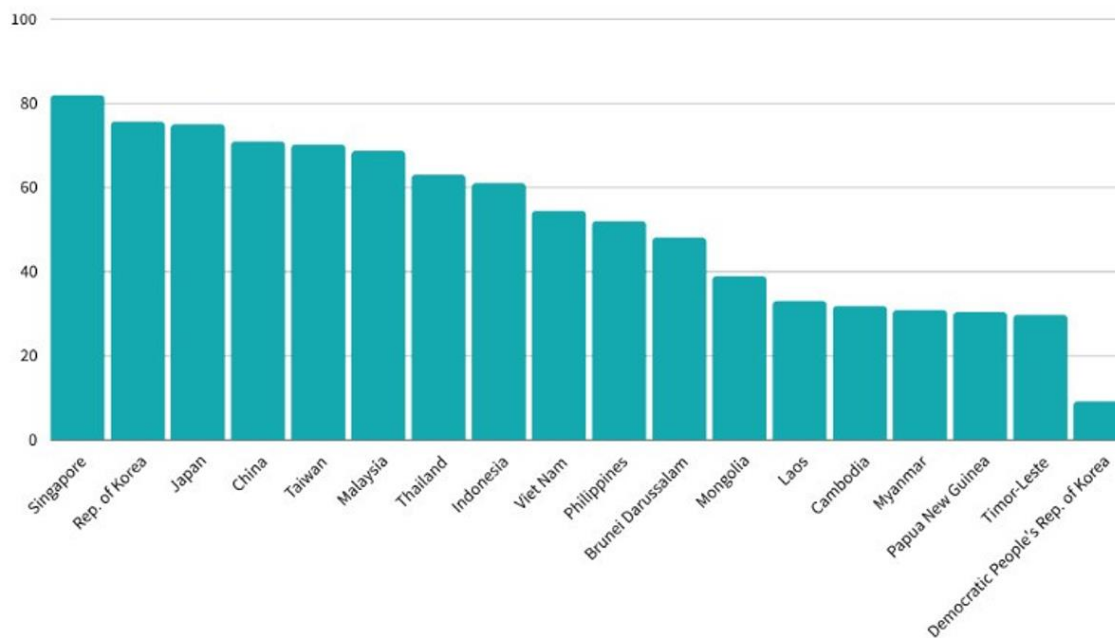
Figure 1. A report on the Government AI Readiness Index from Oxford Insights in 2023, Vietnam ranks 5th in ASEAN

According to an industry report, the global market of AI will contribute more 13 trillion U.S. dollars or 1.2% of the GDP of the global economy by 2030. In Vietnam, the AI community has extremely potential so the government has set policies to increase the development of AI adoptions, including the national strategy for researching, developing, and applying AI by 2030 with Decision No. 127/QD-TTg dated January 26, approving the National Strategy for Research, development and application of AI until 2030 [5]. Under this strategy, the country will develop AI R&D and transform the field into an important technological field in Vietnam in the fourth industrial revolution [6].

Vietnam has been experiencing a surge in the adoption of AI within its business landscape due to its potential to revolutionize various industry sectors. The significance of AI in Vietnamese business lies in its ability to enhance operational efficiency, improve decision-making processes, and drive innovation. By leveraging AI technologies, companies in Vietnam can automate routine tasks, analyze large volumes of data to extract valuable insights and predict market trends with greater accuracy. This not only leads to cost reductions and productivity gains but also permits businesses to stay competitive in today's rapidly evolving market

environment. Furthermore, the integration of AI can help Vietnamese firms better understand customer preferences and behavior, leading to more personalized services and improved customer satisfaction levels. As AI advances, its role in shaping the future of Vietnamese business will become increasingly vital [7]. However, a report on the AI Readiness Index by Cisco in 2023 revealed that only 27% of Vietnamese organizations feel prepared to deploy AI technologies, signifying a vast room for growth [8]. Pioneering the integration of AI into business management platforms is MISA. This assistant, known as MISA AVA, delivers immediate operational data, allowing business leaders to quickly and accurately assess financial, commercial, and personnel information [9]. Although Vietnamese companies have started recognizing AI's potential in catalyzing growth and innovation but the path to AI adoption is fraught with numerous challenges. This paper explores the key hurdles that Vietnamese businesses face in integrating AI technologies, including financial constraints, lack of expertise, data privacy and regulatory obstacles. Therefore, we propose some solutions and a roadmap to promote AI adoption in Vietnamese businesses.

2. Research Methods

2.1 Theoretical Background

2.2.1 Artificial Intelligence

Artificial Intelligence (AI) is a transformative field of computer science that revolutionizes how we interact with technology. AI refers to the capacity of a digital computer or computer-controlled robot to implement tasks commonly associated with intelligent beings. This includes processes such as reasoning, meaning discovery, generalization, and studying from past experiences. Since the advent of digital computers in the 1940s, we've seen impressive demonstrations of their capabilities, from discovering mathematical proofs to playing chess. However, despite advances in processing speed and memory capacity, programs still need to achieve a human's full flexibility and everyday knowledge. Nonetheless, AI was found applications in a variety of fields, including voice recognition, search engines, medical diagnosis and chatbots [10].

2.2.2 Machine learning

Machine learning (ML) is a subset of AI that uses algorithms to learn from data and make predictions. These predictions can be made through supervised learning, where algorithms learn patterns from existing data, or unsupervised learning, where they find general patterns in data. ML models can forecast numerical values based on historical data, categorize events as true or false, and cluster data points based on commonalities. It uses various algorithms to enable the machine automaticity of learning without intervention or human assistance and regulation of actions move accordingly. Machine learning requires the correct set of data to perform learning. This capacity to learn from data and improve over time makes machine learning extremely versatile and powerful. It's the driving force behind many of the technological advances we look at today, from voice assistants and introduction systems to self-driving cars and predictive analytics [11].

2.2.3. Deep learning

Deep learning (DL) is a subfield of ML handling with algorithms based essentially on multi-layered artificial neural networks (ANN) based on the structure of the human brain. Deep learning models learn to automatically extract features from raw data through multiple layers of processing, allowing them to perform well on a variety of unstructured data types, such as images, text, and audio [12].

2.2.4 Neural Network

Neural networks (NN) are a key component of DL, a subset of ML that has revolutionized AI. These

networks are inspired by the structure of the human brain, with interconnected nodes, or neurons, that process information and learn from data. The fundamentals of neural networks involve layers of neurons, each with weights that are adjusted during training to minimize errors in predicting outcomes. The input layer receives data, which is then passed through multiple hidden layers before reaching the output layer. Through a process called backpropagation, neural networks iteratively update the weights to improve their accuracy in making predictions. This process of training neural networks involves feeding them labeled data and adjusting their parameters until they can accurately generalize to new, unseen data. Neural networks have shown significantly success in many fields, from image and speech recognition to natural language processing and autonomous driving. The ability of neural networks to learn complex patterns and relationships in data makes them a powerful tool in advancing artificial intelligence [13]. The relationship between NN, DL, ML and AI is shown in Fig. 2.
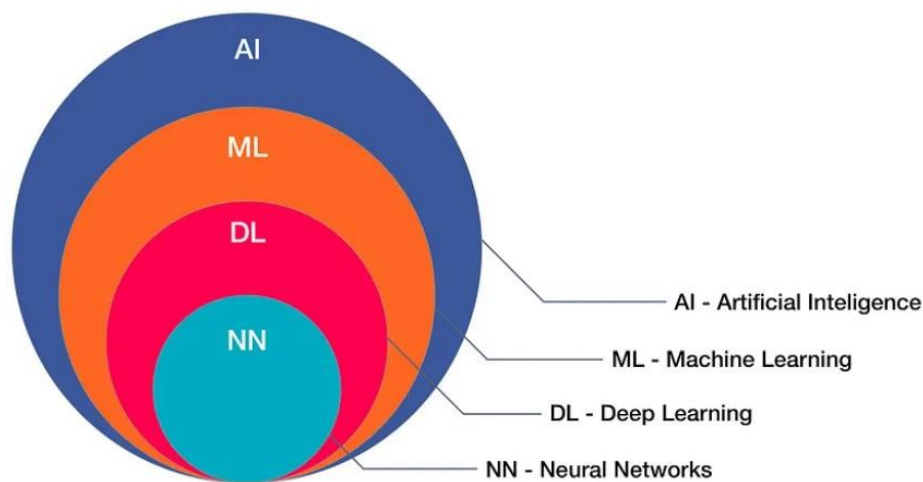
Figure. 2. Relationship between NN, DL, ML, and AI

2.2.5 Low code/No-code (LCNC) platforms

Low code is a method of designing and developing applications using visual graphical tools and embedded functions that reduce traditional or professional coding requirements. Professional coding is still part of the development process, but low-code development offers an enhanced and simplified experience to help users begin creating quickly. No-code is a method that advantages from a similar user experience as low-code. However, it goes further by permitting non-technical business users to develop applications without writing even a single line of code. Low-code development platform (LCDP) and no-code development platform (NCDP) are based on model-driven design rules, automated code generation, and visual programming. These platforms are intentionally designed to target users who are already familiar with the workflows in their business department, regardless of their coding experience [15]. The integration of AI with no-code/low-code platforms in business holds significant potential for increasing efficiency and innovation. These platforms allow non-technical users to leverage the power of AI without the need for extensive coding knowledge, democratizing access to advanced technologies within organizations. By enabling users to build and deploy AI solutions quickly, businesses can accelerate their digital transformation journeys and stay ahead of the competition in today's fast-paced market [16].

2.3. Research Methods

To analyze the challenges in applying AI in businesses, we surveyed 120 Vietnamese enterprises in four industry groups: agriculture, manufacturing, logistics and services. On the other hand, the research uses

qualitative methods to collect and synthesize data from domestic and foreign documents, papers, and specialized reports. Specifically, in this study, we used keywords to search for domestic and foreign documents such as "Challenges of AI Development in Vietnam" and "Opportunities and Challenges of AI adoption in businesses". Therefore, the method used is mainly synthetic analysis after studying relevant document sources including legal documents, reports, and strategic planning for AI development in Vietnam to as a basis for proposing appropriate solutions [17].

3. Results and discussion

3.1 Key challenges of AI adoption in Vietnamese business

The results of the survey of key challenges when applying AI in Vietnamese enterprises with four industry groups are shown in Fig. 3.
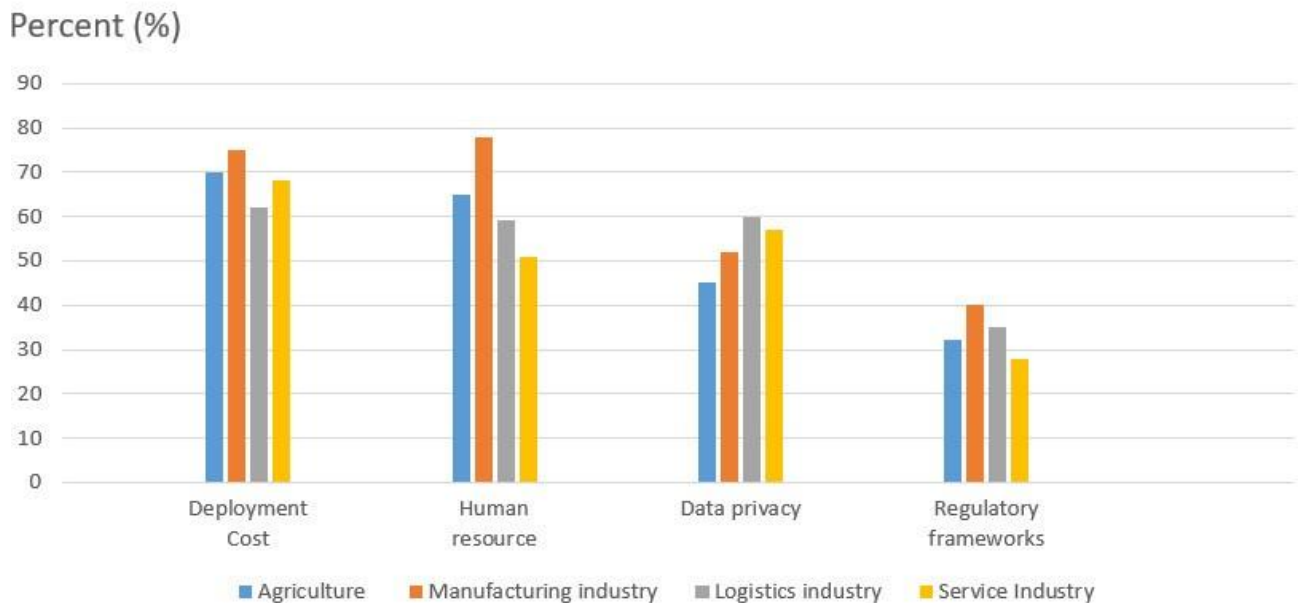
Figure 3. Key challenges of AI adoption in enterprises of four industry groups: agriculture, manufacturing, logistics and services.

As shown in Fig. 3, the biggest challenge is deployment costs. A group of businesses in the manufacturing industry believes that the biggest challenge when deploying AI is the implementation cost at a rate of 75%. Deployment costs include the cost of building and hosting the AI model. Implementing AI technologies requires substantial upfront investment in hardware, software, and human resources. Vietnamese small and medium-sized enterprises (SMEs), which form the backbone of the economy, often operate on tight budgets and may find it financially daunting to embark on AI projects. Furthermore, the return on investment (ROI) in AI solutions may not be immediately apparent, heightening the perceived financial risk. The pressure to demonstrate quick returns further complicates the decision-making process, making it difficult for enterprises to invest in AI technologies wholeheartedly.

The second major challenge in applying AI to business is the shortage of skilled experts. AI implementation

requires a high level of technical proficiency, including expertise in machine learning, data science, and software engineering. In Vietnam, there is a limited pool of professionals who possess the requisite skills. Educational institutions in Vietnam are still in the nascent stages of incorporating AI-focused curricula, resulting in a talent gap that constrains the ability of businesses to deploy AI technologies effectively. Moreover, even though a few Vietnamese universities have started offering specialized courses in AI and data science, the number of graduates in these fields remains insufficient to meet the growing demand. This shortage compels companies to either invest heavily in training their existing workforce or look for talent in the international market, both costly and time-consuming endeavors.

The next challenge is data security. Businesses are racing to invest more and more in AI because of its potential to revolutionize everything from marketing to manufacturing. But the rush to embrace the AI trend comes with a big data security risk. Here's an analysis of how AI adoption could jeopardize data security.

The last challenge is regulatory frameworks. The regulatory landscape for AI in Vietnam is still in its nascent stages. This poses a dual challenge: the lack of clear guidelines can lead to legal ambiguities and compliance risks, while overly restrictive regulations could stymie innovation. Ethical concerns, such as data privacy and job displacement due to automation, also require careful consideration to ensure the responsible deployment of AI technologies.

3.2 Using LCNC platforms to promote AI Adoption in Vietnamese Businesses

The benefits of LCNC solutions are shown in Fig. 4.
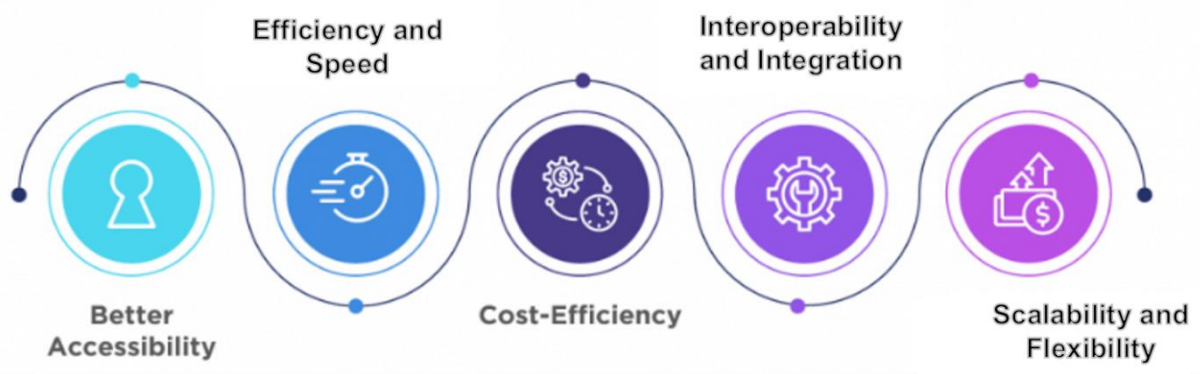
Figure 4. The benefits of AI adoption through LCNC platforms, touching upon accessibility, efficiency, cost-effectiveness, and innovation.

3.2.1 Better Accessibility

Low code and no code solutions are designed that way to be used with little or no technical background. One of the most significant advantages of LCNC platforms is their ability to democratize AI technology. Traditionally, the implementation of AI required a team of data scientists, software engineers, and IT specialists, making it a resource-intensive endeavor. However, LCNC platforms offer intuitive interfaces—such as drag-and-drop features and pre-built templates—that simplify the development process, allowing non-technical employees to participate in AI-driven initiatives. This can overcome the problem of lack of shortage of skilled experts when implementing AI.

3.2.2 Efficiency and Speed

The agility provided by LCNC platforms is another compelling benefit. In traditional development environments, creating AI models and applications can be a lengthy process, often fraught with iterative testing, debugging, and deployment hurdles. LCNC platforms mitigate these issues by offering pre-configured components, automated workflows, and real-time feedback mechanisms.

For instance, businesses can rapidly prototype AI models to test their feasibility before making significant investments. This iterative approach not only accelerates the development cycle but also advances decision-making capabilities by providing quicker insights and results. The increased speed and efficiency enable organizations to stay agile and responsive in a fast-paced market environment, thereby gaining a strategic advantage.

3.2.3 Cost-Effectiveness

Implementing AI technologies can be prohibitively expensive, especially for SMEs. Traditional AI deployment requires substantial human resources, infrastructure, and ongoing maintenance investment. LCNC platforms offer a more cost-effective alternative by reducing the need for specialized talent and minimizing development time. Additionally, many LCNC platforms operate on scalable pricing models, allowing businesses to pay only for the features and resources they use. This flexibility makes it easier for organizations to manage their budgets and scale their AI initiatives according to their needs. Furthermore, the reduced time-to-market directly translates to cost savings, as businesses can quickly bring AI-driven products and services to market, capturing opportunities and generating revenue sooner.

### 3.2.4 Interoperability and Integration

LCNC platforms are designed with interoperability in mind, making it easier to integrate AI solutions with existing systems and workflows. Seamless integration is crucial for businesses looking to enhance their current operations without overhauling their entire IT infrastructure. Many LCNC platforms support various APIs and third-party applications, ensuring that the AI components can communicate and function harmoniously with other software tools. This interoperability also facilitates data integration, enabling businesses to harness insights from various sources and generate more comprehensive and accurate AI models. The integration capabilities of LCNC platforms thus ensure that AI adoption is smooth and non-disruptive, maximizing the return on investment.

3.2.5 Scalability and Flexibility

The scalable nature of LCNC platforms offers another significant advantage. As businesses grow and their needs evolve, LCNC platforms can easily accommodate new requirements without necessitating a complete redevelopment of existing solutions. This scalability ensures that organizations can continue to innovate and expand their AI initiatives in line with their strategic objectives. Flexibility is another crucial aspect. LCNC platforms often come with a variety of customization options, enabling businesses to tweak and adjust their AI applications as needed. This adaptability ensures that the AI solutions remain relevant and effective over time, providing sustained value.

3.3 Roadmap for implementing LCNC and AI in businesses

The roadmap for deploying LCNC and AI in Vietnamese businesses as shown in Fig.5.
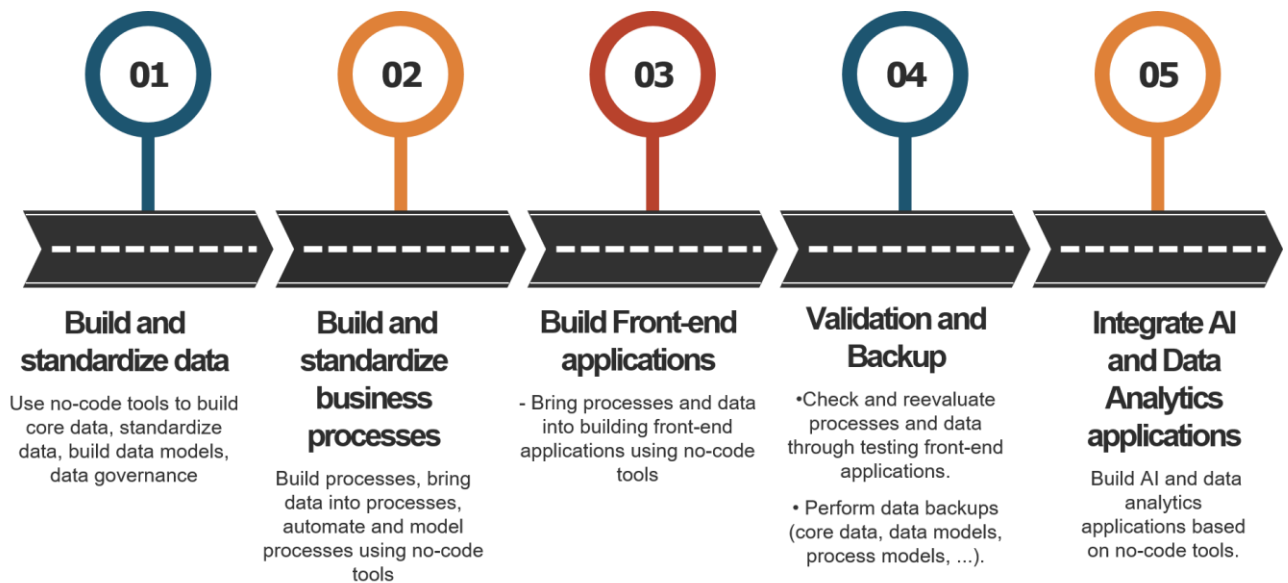
Figure. 5. Proposition of a roadmap for building information and AI systems for businesses based on NCLC solution

In the first step, build and standardize data using no-code tools to build core data, standardize data, build data models, and data governance. The second step is building and standardizing business processes, bringing data into processes, and automating and modeling processes using no-code tools. The third step is to build Front-end applications and bring processes and data into building front-end applications using no-code tools. The fourth step is validation, checking, and reevaluating processes and data through testing front-end applications. The final step is to integrate AI and Data Analytics applications based on no-code tools.

4. Conclusions

The application of AI in Vietnamese enterprises holds immense potential to drive economic growth, enhance operational efficiency, and foster innovation. However, the journey towards comprehensive AI integration is fraught with challenges ranging from technological and financial constraints to talent deficits and regulatory uncertainties. Integrating no-code/low-code solutions in Vietnamese enterprises can significantly accelerate the adoption and deployment of AI technology. By empowering business users with the ability to create and deploy AI solutions without the need for extensive programming knowledge. However, to leverage the full potential of no-code/low-code solutions, it is essential to address scalability, integration, security, and skill development challenges. Furthermore, by fostering a culture of rapid experimentation and prototyping, businesses can quickly iterate and improve their AI applications, keep up with evolving market demands, and stay competitive. in an increasingly digital landscape. In this study, we analyze the current challenges and propose a roadmap for implementing low-code/code solutions to apply AI to Vietnamese businesses. Overall, the use of no-code/low-code platforms have enormous potential to revolutionize the way businesses in Vietnam leverage AI to drive future growth and success.

Acknowledgment

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