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DIGITAL ERA ENTREPRENEURSHIP AND THE DEVELOPMENT OF NEW ENERGY VEHICLES IN EMERGING MARKET

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ABSTRACT

The rapid development of digital technologies has significantly transformed entrepreneurial ecosystems worldwide, fostering innovation across industries, including transportation. One of the most notable advancements is the emergence of New Energy Vehicles (NEVs), which integrate environmental sustainability with digital innovation. This study examines the role of digital entrepreneurship in driving the development of NEVs in emerging markets, with a particular focus on Indonesia. Using a qualitative descriptive approach based on secondary data, this research identifies key opportunities such as digital platform integration, government incentives, and increased environmental awareness. At the same time, it highlights persistent challenges, including high capital requirements, limited infrastructure, and technological complexity. The findings emphasize the importance of collaboration among entrepreneurs, policymakers, and educational institutions in developing a sustainable NEV ecosystem. This study contributes to the field of digital entrepreneurship within the creative and applied industry focus of Polimedia.

Keyword: digital entrepreneurship, new energy vehicles, sustainability, innovation, emerging markets

INTRODUCTION

The digital era has ushered in profound changes in how businesses are created, operated, and scaled. Advances in digital technologies such as artificial intelligence (AI), big data analytics, cloud computing, and the Internet of Things (IoT) have enabled entrepreneurs to develop innovative solutions that were previously unattainable. Digital entrepreneurship, characterized by the use of digital technologies to create and transform business models, has become a central driver of economic growth and competitiveness in the global economy. At the same time, the world is facing increasing environmental challenges, including climate change, air pollution, and resource depletion. The transportation sector is a major contributor to greenhouse gas emissions, prompting the need for sustainable alternatives. In this context, New Energy Vehicles (NEVs), including electric vehicles (EVs), hybrid vehicles, and hydrogen-powered vehicles, have emerged as a promising solution to reduce environmental impact while maintaining mobility efficiency. The intersection of digital entrepreneurship and NEV development represents a dynamic and rapidly evolving field. Digital technologies enhance the performance and usability of NEVs through features such as smart navigation, battery management systems, and connected vehicle ecosystems. Furthermore, digital platforms enable new business models such as ride-sharing, mobility-as-a-service (MaaS), and battery leasing. In emerging markets such as Indonesia, this convergence presents both opportunities and challenges. On one hand, increasing digital adoption and government support create a favorable environment for innovation. On the other hand, limitations in infrastructure, capital, and technical expertise pose significant barriers. This study aims to analyze how digital entrepreneurship contributes to the growth of the NEV sector in emerging markets and to identify the key opportunities and challenges faced by entrepreneurs. Additionally, it explores the role of higher education institutions, particularly Polimedia, in supporting this transformation.

Although previous studies have discussed digital entrepreneurship and the adoption of New Energy Vehicles separately, limited attention has been given to explaining how digital entrepreneurial ecosystems facilitate the development of NEVs in emerging markets,

particularly through the integration of technological innovation, policy support, and entrepreneurial capabilities. Existing studies also tend to focus on technological or environmental perspectives rather than examining entrepreneurship as the driving force behind the expansion of sustainable mobility ecosystems.

Therefore, this study proposes an integrated perspective that connects digital entrepreneurship with NEV ecosystem development by identifying opportunities, challenges, and strategic roles of higher education institutions in supporting sustainable innovation in emerging markets.

LITERATURE REVIEW

1. Digital entrepreneurship

Digital entrepreneurship refers to entrepreneurial activities that leverage digital technologies as a fundamental component of value creation. According to Nambisan (2017), digital entrepreneurship enables rapid innovation, scalability, and global reach. Unlike traditional entrepreneurship, digital ventures can operate with lower entry barriers and reduced operational costs.

The rise of digital platforms such as e-commerce, social media, and mobile applications has transformed how businesses interact with customers. Entrepreneurs can now use data-driven strategies to understand consumer behavior, personalize services, and optimize business operations. This transformation has also led to the emergence of new industries and business models.

Furthermore, digital entrepreneurship is closely linked to innovation ecosystems, where collaboration among startups, governments, and educational institutions fosters technological advancement. In emerging markets, digital entrepreneurship plays a critical role in economic development by creating jobs and promoting innovation.

2. New Energy Vehicles (NEVs)

New Energy Vehicles are vehicles that utilize alternative energy sources, such as electricity or hydrogen, instead of conventional fossil fuels. The adoption of NEVs is driven by the need to reduce carbon emissions and dependence on non-renewable energy sources.

The International Energy Agency (2023) reports that global electric vehicle sales have grown significantly in recent years, reflecting increasing consumer demand and technological advancements. Governments worldwide are also promoting NEVs through policies such as subsidies, tax incentives, and infrastructure development.

NEVs offer several advantages, including lower emissions, reduced operating costs, and improved energy efficiency. However, challenges such as high initial costs, limited charging infrastructure, and battery performance issues remain significant barriers to widespread adoption.

3. Integration of Digital Technology in NEVs

Digital technology plays a crucial role in enhancing the functionality and performance of NEVs. Modern vehicles are equipped with advanced systems such as real-time navigation, predictive maintenance, and connectivity features that improve user experience.

For example, IoT technology enables vehicles to communicate with charging stations and other infrastructure, creating a connected ecosystem. Artificial intelligence can optimize energy consumption and improve battery performance. Big data analytics allows companies to analyze usage patterns and develop more efficient systems.

This integration creates new opportunities for entrepreneurs in areas such as software development, data analytics, and digital services. It also highlights the importance of interdisciplinary collaboration between technology, business, and design sectors.

METHOD

This study employed a **qualitative literature review** approach to examine the role of digital entrepreneurship in supporting the development of New Energy Vehicles (NEVs) in emerging markets. Rather than collecting primary empirical data, this research synthesized findings from previous studies and authoritative reports to develop a comprehensive understanding of opportunities, challenges, and strategic implications for digital entrepreneurship in the sustainable transportation sector. The literature sources consisted of peer-reviewed journal articles, books, conference proceedings, and official reports published by international organizations, including the **International Energy Agency (IEA)**, the **Organisation for Economic Co-**

operation and Development (OECD), the **World Bank**, and relevant Indonesian government publications. To ensure the relevance of the analysis, the selected literature primarily covered publications issued between **2020 and 2025**, while seminal references were retained to strengthen the theoretical foundation. The literature review process was conducted through three stages. First, relevant publications were identified using keywords such as *digital entrepreneurship*, *new energy vehicles*, *electric vehicles*, *green innovation*, *emerging markets*, and *sustainable mobility*. Second, the identified literature was screened based on its relevance to the research objectives, focusing on studies discussing the relationship between digital entrepreneurship and the development of NEVs. Finally, the selected literature was organized into several thematic categories, including opportunities for digital entrepreneurship, challenges in NEV development, and the strategic role of higher education institutions in fostering sustainable innovation.

The collected data were analyzed using **thematic analysis**, involving data reduction, theme categorization, and interpretation. The analysis aimed to identify recurring patterns, similarities, and differences across previous studies to construct an integrated understanding of how digital entrepreneurship contributes to the growth of the NEV ecosystem in emerging markets. Through this synthesis, the study proposes strategic implications for entrepreneurs, policymakers, and higher education institutions in promoting innovation and accelerating the transition toward sustainable mobility.

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RESULT AND DISCUSSION

4.1 Opportunities for Digital Entrepreneurship in the NEV Ecosystem

The literature synthesis indicates that the transition toward a green economy has created significant opportunities for digital entrepreneurship in the New Energy Vehicle (NEV) industry. Growing environmental awareness, combined with rapid digital transformation, has accelerated the emergence of innovative business models that integrate sustainability and technology. Previous studies consistently highlight that digital entrepreneurs are no longer limited to vehicle manufacturing but also contribute to supporting services such as digital platforms, charging infrastructure, battery management systems, and mobility applications.

The analysis also shows that digital technologies, including Artificial Intelligence (AI), the Internet of Things (IoT), cloud computing, and big data analytics, play a crucial role in improving the efficiency and usability of NEVs. These technologies enable entrepreneurs to develop value-added services such as predictive maintenance, smart charging systems, vehicle monitoring applications, and mobility-as-a-service (MaaS) platforms. Consequently, digital entrepreneurship has shifted from merely creating products toward developing integrated mobility ecosystems that generate long-term economic and environmental value.

In Indonesia and other emerging markets, government incentives further strengthen these opportunities through tax reductions, subsidies, and infrastructure development programs. These policy interventions create a more favorable entrepreneurial ecosystem and encourage investment in sustainable transportation. The findings suggest that digital entrepreneurship is becoming an important driver of innovation in supporting the transition toward low-carbon transportation systems.

4.2 Challenges in Developing Digital Entrepreneurship for NEVs

Despite these opportunities, the literature consistently identifies several major challenges that hinder the growth of digital entrepreneurship within the NEV sector. The most frequently discussed challenge is the substantial initial investment required for research and development, battery production, charging infrastructure, and technological innovation. Such financial barriers often limit the participation of startups and small enterprises in the emerging mobility market.

Infrastructure availability also remains a critical

issue. Many emerging markets still face limited charging facilities, insufficient energy distribution networks, and uneven digital infrastructure. These conditions reduce consumer confidence and slow the adoption of electric vehicles. Furthermore, technological complexity requires multidisciplinary expertise in engineering, software development, artificial intelligence, and data analytics, creating a shortage of skilled human resources capable of supporting innovation in this sector.

Another important challenge identified from the literature relates to consumer acceptance. Public concerns regarding vehicle performance, charging accessibility, battery durability, and purchase costs continue to influence purchasing decisions. Therefore, successful digital entrepreneurship requires not only technological innovation but also effective communication strategies, digital marketing, and public education to improve consumer trust and market acceptance.

4.3 Strategic Role of Higher Education Institutions

The literature review reveals that higher education institutions play a strategic role in strengthening digital entrepreneurship ecosystems, particularly by preparing graduates with interdisciplinary competencies. Universities are expected to integrate entrepreneurship education with digital technology, sustainability, and innovation to produce graduates capable of responding to future industrial challenges.

For Politeknik Negeri Media Kreatif (Polimedia), this opportunity aligns closely with its educational focus on creative industries and applied sciences. Through curriculum development, project-based learning, business incubation, and industry collaboration, students can develop entrepreneurial competencies while contributing innovative solutions for sustainable mobility. Moreover, the institution's expertise in digital media, branding, and communication provides additional value in promoting NEV adoption through creative campaigns, user experience design, and digital storytelling.

These findings suggest that collaboration among universities, industry, and government represents a critical factor in accelerating innovation within the NEV ecosystem. Educational institutions should therefore function not only as knowledge providers but also as innovation hubs that facilitate technology commercialization and startup development.

4.4 Proposed Framework of Digital Entrepreneurship for Sustainable NEV Development

Based on the synthesis of previous studies, this research proposes an integrated conceptual framework illustrating the relationship between digital entrepreneurship and sustainable NEV development in emerging markets.

The framework demonstrates that digital technologies serve as the primary enabler of entrepreneurial innovation. Entrepreneurial activities supported by government policies, digital infrastructure, industrial collaboration, and higher education institutions collectively contribute to strengthening the NEV ecosystem. These interactions ultimately promote sustainable mobility, environmental sustainability, and green economic growth.

Unlike previous studies that primarily discussed digital entrepreneurship or NEVs separately, this study integrates both perspectives into a comprehensive conceptual framework that highlights the interconnected roles of technology, entrepreneurship, policy support, and education. This integrated perspective represents the main contribution of this study and provides strategic implications for policymakers, educational institutions, and entrepreneurs seeking to accelerate sustainable transportation development in emerging markets.

CONCLUSION

This study demonstrates that digital entrepreneurship plays a strategic role in accelerating the development of the New Energy Vehicle (NEV) ecosystem in emerging markets by integrating technological innovation, entrepreneurial capabilities, and sustainability-oriented business models. The literature synthesis indicates that digital technologies, government support, and increasing environmental awareness have created substantial opportunities for entrepreneurs to develop innovative products and services that contribute to sustainable mobility. Nevertheless, several challenges remain, including high investment costs, limited charging infrastructure, technological complexity, and low consumer awareness, all of which require coordinated efforts from multiple stakeholders.

The main contribution of this study lies in proposing an **integrated conceptual perspective** that connects digital entrepreneurship, higher education, government support, and technological innovation as interrelated components of sustainable NEV ecosystem development. Unlike previous studies that primarily examined digital entrepreneurship or New Energy Vehicles independently, this study synthesizes these perspectives into a comprehensive framework that explains how entrepreneurial activities supported by digital technologies can accelerate the transition toward green transportation in emerging markets.

From a practical perspective, the findings emphasize the importance of strengthening collaboration among government, industry, and higher education institutions to foster innovation and entrepreneurial capacity in the green economy. For Politeknik Negeri Media Kreatif (Polimedia), integrating digital entrepreneurship, sustainability, and creative technology into teaching, research, and business incubation programs can enhance students' readiness to participate in future industries. Future studies are recommended to validate the proposed conceptual framework through empirical research involving entrepreneurs, policymakers, and higher education institutions across different emerging-market contexts.

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