Digital Technology Promotes the Innovation and Development of New Energy Vehicles: Taking Xiaomi Automobile as an Example

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Keywords: New Energy Vehicles, Digital Technology, Artificial Intelligence, Market Competition, Sustainable Development.

Abstract: In recent years, a profound change taken is taking place in the global automotive industry. Compared with fuel vehicles, new energy vehicles are gradually taking over the global market with their low carbon emission, high efficiency and energy saving features. And driven by digital technologies such as AI and IoT, automobile intelligence has become an industry trend. And this paper aims to explore how digital technology can promote product innovation and user experience of new energy vehicles. Through the study of the literature review, Xiaomi Automobile's success in integrating smart hardware and its ecosystem, as well as its application of autonomous driving, smart cockpit and connected car technologies. These prominent innovations not only enhance the user's traveling experience but also become the brand's market competitiveness. With the current intensification of market competition, Xiaomi Automobile is similarly facing many challenges in various aspects such as technology development and brand building. The results of the study show that by strengthening industrial cooperation, implementing a differentiated brand strategy and focusing on sustainable development, Xiaomi Auto can effectively respond to the current technical and market pressures and contribute to the long-term sustainable development of the new energy vehicle industry.

1 INTRODUCTION

In recent years, the trend of the Internet of Things (IoT) and Artificial Intelligence (AI) as well as the current global concern for the environment has been gradually rising, and in this context, the development of new energy vehicles is also gradually rising, and this is also a transition process for the global automotive industry to new energy vehicle development.

The Connectivity between automotive devices is oriented to provide users with a more convenient experience (Yarali, 2021). Through artificial intelligence, cars can change traditional driving patterns to provide safer and smarter alternatives, such as autonomous driving or smart cruising. Such intelligent driving systems not only utilize big data for real-time analysis but also make optimal driving decisions based on the surrounding environmental data. Such intelligent development not only improves driving safety but also raises the expectations of the user in terms of mobile experience.

The Internet of Things (IoT) is one of the most recent technologies that empower the automobile industry to create the next generation of vehicles. Using IoT-based automotive techniques is significantly renovating the way that people can easily interact with the vehicles (Kumuthini et al., 2024).

In the industry of new energy vehicles, the digital transformation of enterprises is not only a means to enhance the competitiveness of products, but also an important choice to comply with market development. In the current market, more and more automobile enterprises realize that in the big environment of digitalization, enterprise technology is not only a simple introduction, but also the introduction of a new business thinking and mode. By learning and studying the current advanced digital technology, it allows traditional automotive companies to achieve more efficient operations in a variety of areas such as research and development, manufacturing, sales and service, and also improves

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Mo, J.
Digital Technology Promotes the Innovation and Development of New Energy Vehicles: Taking Xiaomi Automobile as an Example.
DOI: 10.5220/0013849400004719

In *Proceedings of the 2nd International Conference on E-commerce and Modern Logistics (ICEML 2025)*, pages 548-553
ISBN: 978-989-758-775-7

the interaction with consumers, thus enhancing brand loyalty.

Xiaomi, as a long-term research in artificial intelligence, the Internet of Things and big data aspects of science and technology-oriented enterprises, in this aspect of intelligent technology has a very strong advantage, and for the new product Xiaomi car, Xiaomi is not only concerned about the enhancement of the performance of the car, but also more concerned about how to integrate the car into the user's lifestyle, so as to provide the user with a smarter and more convenient way of life.

In the face of fierce market competition, new energy vehicle manufacturers need to utilize digital means to continuously innovate their products and improve the quality of their products and services in order to meet the diversified needs of consumers. In such an environment, how to effectively use the enterprise's technology to achieve differentiated competition has become a new energy companiesnew energy company to face the primary challenge.

Against this background, the research objective of this thesis research is to investigate how digital technologies can lead to product innovation and user experience enhancement in new energy vehicles. Through a literature review and analysis, this paper will explore the practical application of digital tools in the transformation of the industry and analyze the shortcomings of related studies. This study hopes to provide useful insights for companies in the new energy vehicle sector to help them achieve greater success in their digital transformation process.

2 PATHWAYS OF DIGITAL TECHNOLOGY DRIVING INNOVATION IN NEW ENERGY VEHICLES

2.1 Artificial Intelligence and Autonomous Driving

Artificial intelligence is the core technology that transforms new energy vehicles into intelligent vehicles, especially in the field of autonomous driving. Artificial intelligence not only improves the safety and convenience of driving but driving but also becomes the technological frontier in corporate competition. As a typical cross-industry automotive representative, Xiaomi makes full use of its accumulation in AI algorithms, big data, terminal hardware and operating systems to create a differentiated autonomous driving system.

In terms of functionality, the Xiaomi SU7 has excellent NOA technology. As nowadays, road traffic accidents represent a major public health concern as they are the primary cause of death and disability worldwide, resulting in over a million deaths annually and between 20 and 50 million injuries, some of which can lead to permanent disabilities (Emam and Gerdts, 2024). Therefore, Xiaomi pays great attention to this aspect, and its NOA function is able to perform automatic lane changing, obstacle avoidance, traffic signal recognition and steering in complex urban environments, which significantly improves the level of driving intelligence and user experience.

Xiaomi's advantage lies in its establishment of a complete data closed-loop system. Xiaomi ' s approach mainly includes , connecting Mi supply chain on a global level where Xiaomi leverages its international brand influence, total supply chain established from its cell phone business, and Mi Fans who have been using the product and service based on the MIUI system or Xiaomi's IoT platform; (Lee et al., 2023).By having a global presence, Xiaomi is able to effectively integrate its supply chain operations, enabling efficient resource allocation and cost management. This, in turn, enables Xiaomi to respond quickly to market demand as well as provide strategic positioning for technological advancement. In addition, active interaction with Mi fans is a continuous and effective feedback loop that allows Xiaomi to improve its products and services. Xiaomi utilizes its MIUI system and IoT platform to gather user insights and plays an equally pivotal role in enhancing user experience and fostering brand loyalty.

As a result, Xiaomi has not only maintained its competitive edge, but has also paved the way for innovative growth, setting industry benchmarks in technology and customer satisfaction. This comprehensive ecosystem approach underscores Xiaomi's commitment to excellence and innovation.

In contrast to Xiaomi, Tesla is more inclined towards an "edge computing capability + no lidar" solution. Tesla's full self-driving (FSD) computer is the world's first purpose-built computer for the highly demanding workloads of autonomous driving. It is based on a new System on a Chip (SoC) that integrates industry-standard components such as CPUs, ISP, and GPU, together with custom neural network accelerators (Talpes et al., 2020). This innovative approach allows Tesla to process data in real-time directly within the vehicles, minimizing latency and enhancing the immediacy of decision-making vital for safe autonomous driving. By eschewing lidar technology, Tesla relies heavily on

its advanced software algorithms and computer vision through cameras, positioning itself distinctively within the autonomous vehicle market. This edge computing strategy not only reduces the reliance on high-bandwidth cloud computing but also ensures that updates and enhancements can be rolled out over-the-air to constantly improve performance. Tesla's method emphasizes the importance of robust onboard processing capabilities, highlighting the company's commitment to pioneering scalable and efficient solutions for autonomous transportation. This positions Tesla as a front-runner in the industry, driven by a unique blend of hardware innovation and software excellence. However, there are still limitations in its performance on China's complex urban roads.

Huawei, on the other hand, focuses on constructing a full-stack solution. In May 2019, Huawei officially established an auto business unit. On October 30, 2020, Huawei released the intelligent car solution "HI", which aims for in-depth cooperation with automobile manufacturers. (Lee et al., 2023). This landmark strategic move also represents Huawei's ambition to leverage its technological expertise in a number of areas, including 5G, cloud computing, and AI, to drive innovation, as well as enter the automotive industry. The “HI” solution demonstrates Huawei's commitment to partnering with carmakers to enhance the smartness and connectivity of the modern automobile. However, Huawei's ecosystem integration capabilities are slightly less impressive than Xiaomi's complete closed loop of integrating car, home and user experience. Huawei specializes in creating high-tech solutions tailored to cars but faces challenges in creating a seamless user experience across different domains such as smart homes and IoT platforms.

2.2 Marketing Strategies

Unlike many companies that rely on traditional spokesperson marketing strategies, Xiaomi is personally endorsed by its founder and president Lei Jun, who successfully attracts significant attention through his influence on social media. Lei Jun's entrepreneurial story and the durability and high cost-performance ratio of Xiaomi products enhance consumer trust. This kind of market promotion conducted via social media laid a solid foundation for the launch of Xiaomi cars.

With its outstanding features, as well as powerful performance and competitive price, Xiaomi SU7 has won the positive response of many young consumers upon its launch. As a result, the Xiaomi SU7 has performed very well in the market, and it has received enthusiastic support from many young consumers right after its release.

2.3 Internet of Vehicles (IoV): Building a Smart Connected Mobility Experience

The intelligentization of new energy vehicles has always been a very important technology, that is, Telematics. Because Telematics is a bridge to realize the comprehensive connection of vehicles, people, clouds and things, it can provide users with many intelligent functions, such as remote control, intelligent cockpit, interconnection of in-vehicle devices and so on. With years of technical accumulation in the field of Internet of Things and mobile intelligent terminals, Xiaomi has made Xiaomi cars unique in Telematics, and such a deep integration also demonstrates Xiaomi's outstanding technological leadership and user experience advantages.

Taking the Xiaomi SU7 as an example, users can remotely control the vehicle through the Xiaomi Car App or Xiao Ai, including functions like remote unlocking, air conditioning pre-start, vehicle power monitoring, vehicle location, and electronic fencing, greatly enhancing the convenience and intelligence of everyday vehicle usage. This is also attributable to Xiaomi's smart home ecosystem, because at this stage, the Xiaomi eco-chain has basically covered all hardware areas of the smart home, which makes Xiaomi’s core position unshakable.

In addition, Xiaomi Auto's intelligent cockpit system is based on the “Surge OS” operating system, demonstrating powerful hardware and software integration capabilities, and realizing cross-screen connectivity and content synchronization with Xiaomi's cell phones, tablets, televisions, and other devices.SU7 is equipped with interactive displays, including a central control screen, a passenger entertainment screen, and a heads-up display (HUD), supporting navigation screen projection, music sharing, trip reminders, and various application streams. SU7 is equipped with interactive displays, including a central control screen, a passenger entertainment screen and a head-up display (HUD), which support navigation screen projection, music sharing, trip reminders and a variety of application streams, creating an immersive travel experience in which “people, cars and homes are fully interconnected”.

Xiaomi's greatest advantage in the field of the Internet of Vehicles lies in its concept of "ecosystem empowerment," which integrates vehicles into the existing IoT smart home system through a unified system architecture. This innovation transforms vehicles from isolated transportation tools to integral elements of smart living. As of March 2018, Mi AI of Xiaomi can control 118 models of intelligent hardware on the platform and support the interactive use of millions of intelligent devices in various scenarios (Zheng et al., 2023). Such seamless integration not only enhances the user experience but also opens up new possibilities for connected lifestyle applications. The ability to control and interact with so many devices is a similar reflection of Xiaomi's extensive reach and technological prowess in developing a cohesive ecosystem. This level of eco-collaboration ensures that Xiaomi's in-car information system has the practical and powerful functionality and connectivity that makes it so competitive in the industry. By embedding cars into its vast IoT network, Xiaomi enhances its ability to innovate and facilitate the incorporation of future technological advances, positioning itself as a leader in the integration of smart home and automotive technologies.

3 XIAOMI AUTO'S UNIQUE DIGITAL INNOVATION STRATEGY

3.1 Technology Integration and Ecological Synergy

Xiaomi has created a seamless user experience by deeply integrating its technological strengths in smartphones, smart homes, and the Internet of Things (IoT) into its automotive products. Car owners can not only control in-vehicle devices (such as air conditioning, lighting and entertainment systems) through their cell phones, but also connect Xiaomi's smart home products to their cars to realize cross-device and cross-scene intelligent control. In addition, with Xiaomi's powerful cloud computing capabilities, the vehicle can synchronize data in real time for remote upgrades to optimize the driving experience.

3.2 Community-Driven Customization

Xiaomi adheres to the concept of “user first” and actively encourages users to participate in the development and design of automotive products. To support online promotions, Xiaomi has launched other offline activities, such as city meetings, the Geek Party, and Popcorn and Netizen initiated meetings in the same city (Yang, 2022).

3.3 Asset-Light Digital Operation

Xiaomi adopts an asset-light model to integrate supply chain resources through a digital platform to reduce high costs in traditional manufacturing. For example, Xiaomi cooperates with third-party manufacturers to share production resources, which not only saves the cost of factory construction, but also enables Xiaomi to adjust its production schedule more flexibly and respond quickly to market demand. Meanwhile, through digital management, Xiaomi is able to track market trends and consumer demand in real time, so as to optimize the production process, improve efficiency and reduce costs.

4 CHALLENGES AND RECOMMENDATIONS

4.1 Main Challenges

Xiaomi cars face many challenges in rapid development. First, the development of self-driving technology requires a huge investment from Xiaomi. Automatic driving technology driving involves a lot of investment in hardware and software development, which poses a huge financial and technical challenge to Xiaomi Auto.

Secondly, competition in the field of intelligent cars is extremely fierce, and a large number of emerging car companies has have risen rapidly (Xue, 2025). Secondly, the competition in the field of intelligent vehicles is extremely fierce, with a large number of emerging car companies rising rapidly. As a result, Xiaomi Auto is facing tremendous pressure in the competitive market, as traditional carmakers like Tesla in the US and BYD in China have been developing intelligent and electrified vehicles for a long time and have mature technologies. At the same time, some new energy car companies like Xiaopeng and Azalea are also moving farther and farther down the road of intelligent driving technology. For Xiaomi Auto, the release of the Xiaomi SU7 Ultra is not only a challenge to the technological limits of traditional car brands, but also a new innovation in automotive intelligence. However, such breakthrough technology may also intensify the competition with other

innovative enterprises, especially in terms of intelligent technology and brand influence.

4.2 Strategic Recommendations

Firstly, cooperative research and development (R&D) has emerged as a highly effective strategy for enterprises to enhance their R&D efficiency and ease resource bottlenecks (Huang &and Tan, 2024). Strengthening technical cooperation and expanding industrial alliances is crucial. Xiaomi can solve the technical difficulties encountered in the development of autonomous driving and smart car technology by cooperating with established traditional automakers, or emerging new energy vehicle brands and various research institutions. Especially after the emergence of intelligent models such as the Xiaomi SU7 Ultra, cooperation with other companies can help Xiaomi further accelerate the speed of research and make more breakthroughs. And in forming industrial alliances with other companies, Xiaomi can also utilize the experience of its partners to shorten the research and development cycle and reduce cost pressures while obtaining external technical support.
Secondly, the implementation of differentiated market positioning as well as brand building strategy is crucial for Xiaomi. Through differentiated positioning, Xiaomi can gain a competitive advantage in the market for cars. And through Xiaomi's original advantages in smart hardware and IoT ecosystem, it can allow Xiaomi to demonstrate uniqueness in terms of user needs such as smart cockpit, in-vehicle information service and personalization to meet the needs of different consumers.

Lastly, paying attention to sustainable development and environmental protection strategies is vital. As global environmental standards rise, new energy vehicles (NEVs) are crucial in addressing environmental pollution and energy shortages (Fan et al., 2024). Xiaomi can promote the sustainable development of new energy vehicles by strengthening green transportation and environmentally friendly designs. Through these strategies, Xiaomi can effectively respond to the current technological, market, and competitive pressures, continue to strengthen its technological capabilities and brand influence, and achieve sustainable long-term development in the smart automotive industry.

5 CONCLUSION

In this paper, through the method of literature review, in-depth research has been conducted to study how digital technology can promote the product innovation and user experience of new energy vehicles. This study examines how digital technologies can be applied to the transformation of the smart car industry and analyzes the shortcomings of the study. The paper examines in detail Xiaomi Automobile's performance in AI, Internet of Vehicles (IoV), and integration with smart ecosystems, and summarizes some application paths to provide suggestions for the digital transformation of enterprises.

The study shows that Xiaomi Auto, as a technology leader, has fully utilized its technological advantages in AI and IoV to promote the intelligence of new energy vehicles. The launch of Xiaomi SU7 Ultra establishes industry standards in intelligent cockpit and autonomous driving technology, and technology and demonstrates Xiaomi's advantages in technology integration and ecological synergy. The perfect data closed-loop system enables users to enjoy a more personalized travel experience, thus enhancing brand loyalty.

In terms of responding to market competition and technological challenges, this paper proposes specific countermeasures. First, it is recommended that Xiaomi Automobile strengthen technical cooperation with traditional car companies and technology companies to break through the bottleneck of automatic driving and intelligent technology through joint research and development. Through industrial alliances, Xiaomi can not only obtain external technical support but also shorten the R&D cycle with the experience of its partners. This cooperation model helps Xiaomi to take advantage of the fierce market competition.

Second, this paper emphasizes the importance of implementing differentiated market positioning and brand building. Xiaomi should continue to strengthen its strengths in the smart hardware and IoT ecosystems, attract a broader consumer base through a clear brand story and market positioning, especially when launching its flagship models, and create a strong brand image to further enhance its market competitiveness.

As the world places more emphasis on environmental protection, Xiaomi is advised to enhance its investment in the sustainable development of new energy vehicles. By adopting environmentally friendly technologies, using recyclable materials, and improving battery efficiency, Xiaomi can enhance its brand image, as well as meet policy requirements and consumer expectations for environmental protection.

Looking ahead, with the continuous advancement of digital technology, the new energy automotive industry will realize deep integration in terms of intelligence, environmental protection and user experience. If Xiaomi Auto can continue to increase investment in technology research and development and optimize product design and user services, it will win greater success in market competition and make greater contributions to the sustainable development of the industry.

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