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THE DEVELOPMENT OF XIAOMI CARS AND ARTIFICIAL INTELLIGENCE IN THE DIGITAL ERA

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ABSTRACT

In the digital age, the automotive industry is undergoing unprecedented changes, and the rapid development of artificial intelligence (AI) technology has promoted the innovation of smart cars. As a world-renowned technology company, Xiaomi has actively entered the automotive industry in recent years and is committed to integrating its advantages in smart hardware and AI into automobile manufacturing. This study aims to analyze how Xiaomi can use its technological advantages and innovation capabilities to promote the development of smart cars and explore its specific applications and achievements in the development of AI and automobiles. Using a case study method, the study found that its AI technology performs well in autonomous driving, intelligent interaction, and data analysis, improving the intelligence level of vehicles and user experience. The development of Xiaomi cars and AI has brought new development momentum to the smart car industry.

Keywords: *Artificial Intelligence*; *Automotive Industry*; *Digitalization*; *Development Trends*; *Xiaomi Auto*

1. Introduction

1.1 Background

In the digital age, the rapid development of smart technology has had a significant impact on people's lives. With the continuous advancement of artificial intelligence technology, smart cars will become an important trend of future growth. In March 2024, Xiaomi officially launched its first smart electric car, the Xiaomi SU7 series, which attracted widespread attention from the market. In the second quarter of 2024, the revenue of the smart electric car and other new products segment was RMB 6.4 billion, of which the revenue of smart electric cars was RMB 6.2 billion and the revenue of other related businesses was RMB 200 million. In the second quarter of 2024, the smart electric car and other new products segment achieved a gross profit margin of 15.4%. (Source: Xiaomi's second quarter announcement)

As one of Xiaomi Technology's newest businesses, Xiaomi Auto has attracted much attention.Xiaomi chief Lei Jun said that the biggest feeling he had in the past three years of making cars was that making cars was too difficult, and even big companies like Apple gave up. Consumers have widely accepted electrification, and the key to winning the next stage of competition in electric vehicles is to make cars as intelligent as possible, and this is exactly Xiaomi's advantage. Since 2016, Xiaomi has been investing resources in artificial intelligence research and development. Shortly after Xiaomi's press conference in March 2024, Xiaomi said that it had received more than 50,000 orders within 27 minutes of the sale. In order

to realize the intelligence, automation, and networking of automobiles, Xiaomi Auto is committed to integrating artificial intelligence technology into all aspects of the automotive industry. For example, in order to achieve functions such as autonomous driving, smart parking, lane keeping, etc., and to improve driving safety and convenience, Xiaomi Auto integrates artificial intelligence technology into the driving system.

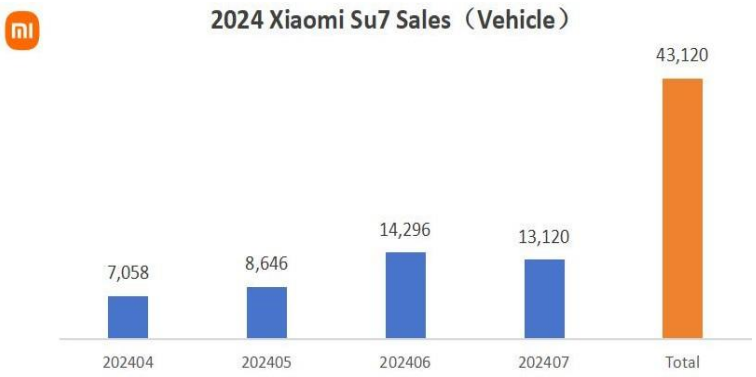


Figure 1.1 Xiaomi SU7 sales from April to July 2024

Source: Xiaomi's second quarter announcement

According to Figure 1.1 Xiaomi Auto's total sales from April to July were 43,120 units. The sales of millet SU7 show a trend of growth month by month from the data.Xiaomi's electric vehicle factory continues to accelerate capacity construction, and will fully switch to a double-shift system from June 2024. The production line optimization and maintenance will be completed in July. It is expected that the goal of delivering 100,000 Xiaomi SU7 series vehicles will be achieved ahead of schedule in November 2024, and the new goal of delivering 120,000 Xiaomi SU7 vehicles will be achieved in 2024. Xiaomi Auto continues to improve the intelligent ecology of the Xiaomi SU7 series through OTA upgrades, and continuously improves the user's intelligent experience through R&D investment in related fields such as autonomous driving and smart cockpits. In terms of autonomous driving, the autonomous driving city navigation (City NOA) will be fully launched in 10 cities in mainland China on June 6, 2024, and the comfort and efficiency of city navigation will be continuously improved through continuous OTA upgrades. The goal is to fully launch city navigation in China in August 2024.

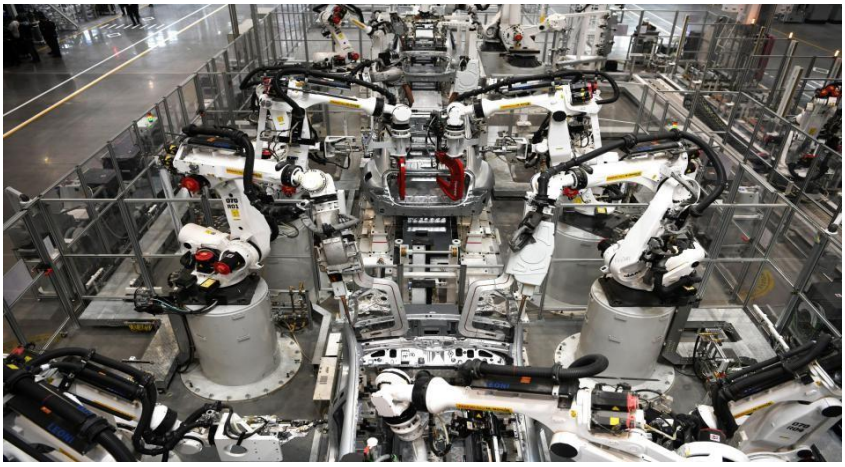


Figure 1.2 The original picture of the Xiaomi factory

Source:Xiaomi official website

Figure 1.3 Xiaomi SU7 car pictures
Source:Xiaomi official website

The Xiaomi Automobile Factory is located in Yizhuang Economic Development Zone, Beijing. The factory covers an area of 718,000 square meters, which is equivalent to the area of the Forbidden City. Every Xiaomi SU7 is born here, and a new car rolls off the assembly line every 76 seconds. The Xiaomi Automobile Factory insists on self-construction and self-research, achieving high automation, intelligence, green and sustainable development, and becoming a model of new quality productivity.

1.2 Problem Statement

In the digital age, the main problem for the development of Xiaomi Auto and AI is the challenge of intelligent technology. It faces the compatibility problem of software and hardware. Secondly, the R&D investment of algorithm and model optimization is high and the time cost is large. AI technology needs to continuously optimize and update algorithms and models to improve the accuracy and safety of autonomous driving. In addition, the personalized services provided by AI and Xiaomi Auto are not comprehensive enough, which limits its potential in improving the accuracy and safety of autonomous driving. If AI and Xiaomi Auto develop slowly, it may delay industry innovation.

1.3 Research Questions

This paper will explore the relationship between artificial intelligence and Xiaomi Auto in detail and speculate how artificial intelligence will affect the automotive industry in the future.
The research questions are as follows:
1. How does Xiaomi Auto develop with artificial intelligence in the digital age?
2. How will this development affect the development trend of the automotive industry?

1.4 Research Objectives

The research on the development of Xiaomi Automobile and artificial intelligence mainly includes: analyzing Xiaomi's strategic planning and technological investment in the automotive industry, clarifying the application direction of Xiaomi Automobile's artificial intelligence technology, and exploring cooperation in artificial intelligence technology,Provide strategic suggestions to promote the efficient development of Xiaomi Automobile and artificial intelligence, and propose corresponding data management and processing solutions according to the research results.

1.5 Limitations

This study has limitations, such as limited access time and challenges faced by researchers in accessing sensitive historical or internal data. These limitations may affect the final research results and the scope and depth of the research project, which requires maximizing the effective use of time and resources.

2. Literature Review

2.1 Digital Transformation and Smart Manufacturing

There has been much talk about the industry's digital transformation, particularly the transition from traditional to smart manufacturing. Berman and Bell (2011) stress that in order to encourage the development of smart linked devices, new business models combining digital and physical elements are required. Manyika et al. (2013) expounded upon this change by pinpointing disruptive technologies, such as artificial intelligence (AI) and the Internet of Things (IoT), that are revolutionizing enterprises and the global economy. These technologies provide real-time data collecting and analysis, which can enhance production productivity and decision-making processes (Chen & Chen, 2019). According to Xiaomi, this entails utilizing digital tools to innovate in the automobile sector in keeping with the broader trend of smart manufacturing's digital transformation.

2.2 The role of artificial intelligence in the automotive industry

Particularly in the development of autonomous cars and smart car technologies, artificial intelligence is essential to the growth of the automotive sector. In their analysis of artificial intelligence's employment in the automobile industry, Fang and Zhang (2020) emphasized the technology's effects on user experience, efficiency, and vehicle safety. Advanced driver assistance systems (ADAS) and autonomous driving capabilities are made possible by AI and are essential to the development of smart automobiles in the future (Zhou & Guo, 2019). This larger trend may be observed in Xiaomi's foray into the automotive sector, where the company is utilizing AI to develop cutting-edge vehicle solutions that enhance consumer comfort and safety (Zhang &Tang, 2022).

2.3 Xiaomi’s Digitalization and AI Development Strategy

An comprehension of Xiaomi's foray into the automobile sector requires a knowledge of its strategic approach to digital transformation and AI Artificial intelligence. Porter and Heppelmann (2015) talk about how connected and intelligent goods are changing businesses and how new approaches to value generation and competitive advantage are needed. Xiaomi, a company renowned for its quick adoption of new technologies, is using big data and artificial intelligence to power its smart manufacturing processes (Wang & Zhang, 2020). This tactic is in line with the disruptive innovation theoryput forward by Christensen et al. (2015), since Xiaomi plans to introduce AI-powered smart automobiles in an effort to upend the established auto industry. Su and Zhang (2021) provide other examples of how AI and big data analytics may be used to boost manufacturing creativity and efficiency， Xiaomi is probably going to use this approachin its car division.

2.4 Smart Manufacturing and Supply Chain Management

AI is also crucial to supply chain management and the production of automobiles. In their 2020 study, Wang and Zhang examined how smart manufacturing technology can be used to increase production efficiency and product quality. They found that manufacturing companies can achieve highly flexible production and significantly lower production costs by utilizing machine learning algorithms and big data analysis. Furthermore, Li et al. (2022) noted that artificial intelligence (AI) technology may boost supply chain management, the supply chain's responsiveness and dependability, and businesses' capacity to compete in the market.

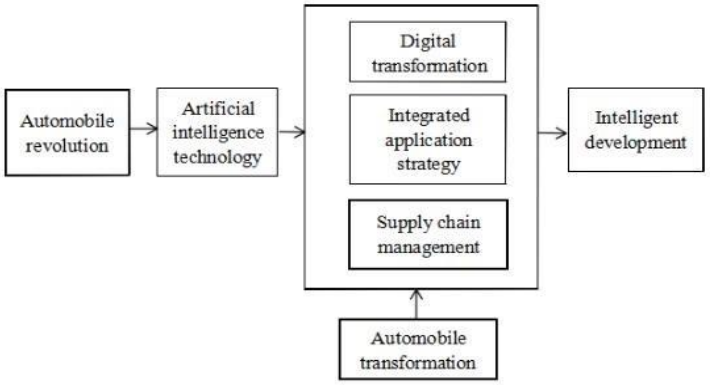
2.5 Xiaomi's strategic layout and technological advantages

Xiaomi's foray into the smart automobile industry is well-founded thanks to its accomplishments in the domains of Internet of Things and smart hardware. Chen et al. (2022) claim that Xiaomi used its technical advantages in smartphones and Internet of Things devices to create electric cars with highly intelligent and automated functionalities. According to Lee and Kim (2022), Xiaomi's smart car company may benefit greatly from its successful experience in the smart home ecosystem, giving it a distinct competitive edge in the market.

2.6 Theoretical framework of technology development

According to the notion of technology development, new technological systems and application scenarios may be created by the mutual penetration , which will have a substantial positive impact on the economy and society (Gambardella & McGahan, 2010). Teece (2018) went on to say that developing technology may lead to new business models and market prospects in addition to better product features and performance. This theory offers a crucial foundation for understanding Xiaomi Auto's technology development strategy and itspossible market effect as it artificial intelligence.

3. Research Method



This essay uses a case study and literature review methodology. The process of doing a literature review involves using databases and literature searches to look up research on topics such as artificial intelligence development, supply chain management, digital transformation, and the auto industry. sorting and evaluating Xiaomi-related research materials, with a focus on the company's business plan and technological advancements. After that, the opinions and information from the literature are combined to examine Xiaomi's distinct qualities in terms of digital transformation and technological application.

Taking the development of Xiaomi Cars and artificial intelligence in the digital age as examples, it examines how technologies can penetrate and merge with each other to create new technology systems and application scenarios that have the potential to produce significant economic and social benefits. It can also deeply and thoroughly analyze Xiaomi's performance in automotive and artificial development, providing rich data and a solid foundation for future research.

4. Results and Discussion

4.1 Autonomous driving technology

Xiaomi has committed a great deal of resources, research, and development to the creation of a highly automated driving system. These systems include the following significant technologies:
Awareness of the environment: Xiaomi vehicles use a variety of sensors, including cameras, millimeter-wave radar, lidar, and computer vision technology, in addition to computer vision technology to enable real-time environment perception. These sensors allow autonomous driving systems a comprehensive awareness of their environment by recognizing items such as people, traffic signs, and other automobiles, among other things.
Path planning: Xiaomi's autonomous driving system uses deep learning algorithms to analyze environmental data and determine the optimal driving path in real time.The technology automatically adjusts the route based on data about the destination, traffic, and road conditions in order to preserve driving economy and safety.
Xiaomi's autonomous driving technology enables sophisticated control and decision-making, including as parking, changing lanes, and avoiding obstacles. By utilizing decision tree algorithms and reinforcement learning, the system is able to replicate human judgment and make decisions about safe driving.

4.2 Car intelligent assistant

Intelligent in-car assistants powered by artificial intelligence (AI) are standard in Xiaomi vehicles, offering drivers and passengers a pleasant interactive experience. The in-car intelligent assistant may do the following tasks:
Voice control: With Xiaomi's AI assistant, customers can effectively recognize and process speech, allowing them to manage various in-car electronics like the air conditioning, entertainment system, and navigation with simple voice requests. This increases user convenience while also enhancing driving safety.
NLP stands for natural language processing. Intelligent assistants are capable of comprehending and reacting to natural language input from the user, including intricate queries, directives, and responses. The system may offer trip planning, news updates, weather forecasts, and other services thanks to NLP technology.
Sentiment analysis: By utilizing artificial intelligence (AI) and sentiment analysis technologies, in-car helpers are able to recognize and adapt to the user's emotional state. For instance, the assistant can improve the user's driving experience by playing calming music or providing encouraging words when it senses the user is in a bad mood.

4.3 Connected car ecosystem

By utilizing its advantages in Internet of Things (IoT) and smart homes, Xiaomi has created a linked car ecosystem that makes it possible for automobiles to easily interact with other smart devices.

Smart home linkage: Using the Xiaomi ecosystem, consumers can operate their smart house and automobile gadgets from a distance. This includes seeing the smart camera, activating the sweeping robot, and turning on the air conditioner. The users' lives are made more convenient by this seamless connectivity.
Remote control and monitoring: Using the mobile app, users may remotely operate and keep an eye on many aspects of the automobile, such as the battery level, fuel level, and door lock, in real time. Additionally, remote diagnostics may identify potential problems with a vehicle and suggest maintenance to keep it safer and more dependable.

4.4 Big data analytics and personalized services

Xiaomi Automobile uses big data and artificial intelligence (AI) to offer individualized services that improve customer experience.
Driving behavior analysis: Based on the user's driving habits, the system can offer tailored safety instructions and driving advise. For instance, encourage the user to modify their driving style to increase fuel economy or decrease risky driving practices based on their driving patterns.
Service and maintenance advice: The system may offer personalized service and maintenance recommendations

based on use data from the vehicle. For instance, reminding users to check their tires, replace their oil, and other maintenance tasks helps to keep their cars in excellent shape.
Travel optimization: The system can offer ideas and optimal travel routes to lessen traffic and increase travel efficiency by examining users' past travel data.

4.5 Man-machine interaction interface

Xiaomi Automobile fully utilizes AI technology in the design of its human-computer interface to deliver a smart and intuitive operating experience.
Interface that adapts: To make operation easier, the vehicle system interface might provide the information and features that are most frequently utilized, based on the habits and preferences of the user.
Based on the user's use patterns, the system may provide intelligent recommendations for frequently used apps and features.

4.6 Impact of AI on Xiaomi Auto

4.6 1 Promote intelligent development

Xiaomi Auto incorporates AI technologies to increase the intelligence of automobiles. This covers a variety of features such as in-car intelligent assistants, intelligent aided driving systems, and autonomous driving. The functionality and driving pleasure of automobiles are enhanced by this clever breakthrough. Technology for autonomous driving: high-level autonomous driving capabilities are achieved via the use of AI and sensor technologies. Real-time navigation, lane maintenance, collision warning, and other features are provided by intelligent assisted driving (AI) technology. In-car intelligent assistant: achieve smooth communication with the in-car system by using speech recognition and natural language processing technologies.

4.6 2 Improve user experience

Cars that employ AI technology are better able to recognize and cater to the demands of their customers, offer individualized services, and increase customer happiness. recommendation system for recommending routes, music, and other items based on user behaviors and likes. The in-car system may identify the driver's emotions using emotion recognition technology and offer suggestions or comments accordingly.

4.6 3 Accelerate the construction of the connected car ecosystem

Xiaomi enables it to integrate cars into a wider connected ecosystem, improving the connectivity and intelligence level of vehicles. Through the Xiaomi ecosystem, users can control smart devices at home in the car. Through mobile phone applications, users can monitor and control the vehicle status in real time.

4.6 4 Promote the popularization of autonomous driving technology

Xiaomi's investment and innovation in autonomous driving technology will accelerate the popularization of autonomous driving technology in the market and promote the industry to develop in the direction of automation and intelligence. Xiaomi promotes the research and development and application of autonomous driving technology through cooperation with technology companies and automakers. Actively participate in the formulation of industry standards for autonomous driving technology and promote the improvement of relevant regulations.

4.6 5 Lead the trend of personalized services

AI technology enables Xiaomi Auto to provide highly personalized services to meet the needs of different users, which will become an important competitive advantage in the future automotive market. Provide personalized driving suggestions and safety tips by analyzing the user's driving behavior. Provide customized maintenance and maintenance suggestions based on vehicle usage data.

4.6 6 Promote cross-border cooperation and innovation

Xiaomi has an edge in cross-border collaboration due to its background in smart home technology and electronics. Automakers, IT firms, and service providers will work together more closely in the future to support the creative growth of the automotive sector. Xiaomi has formed strategic alliances with several automakers and tech firms in order to collaborate on the development of smart car technologies. Encourage technical innovation and growth in the automobile sector via collaboration.
The way the automobile industry is developing has been significantly impacted by the combination of AI technology and Xiaomi Auto. By encouraging intelligent development, enhancing user experience, quickening the growth of the connected automobile ecosystem, making autonomous driving technology more widely used, setting the standard for tailored services, encouraging international collaboration, Through innovation, Xiaomi Auto has not only improved its own competitiveness in the market but also set the standard for technical advancement in the automobile sector.

5. Conclusion and Implications

5.1 Conclusion

Cars may operate at a highly automated level thanks to the use of autonomous driving technology, which increases convenience and safety. Traveling has become more sophisticated and customized for consumers because to the advent of intelligent vehicle technologies. In addition, the utilization of intelligent manufacturing technologies enhances the efficiency of the car manufacturing process and raises the caliber of the final product. Impact-wise, the combination of artificial intelligence technology and Xiaomi Auto will push the automobile sector toward digitization and intelligence, alter the nature of market competitiveness, and foster cross-border collaboration and industrial innovation.

5.2 Implication

5.21 Theoretical Implication

Implications: The complexity of AI technology development indicates that cross-domain technology requires effective development strategies and compatibility design. AI technology development theory emphasizes the synergy and compatibility issues between different technology systems.
Implications: In theory, this indicates that when designing digital transformation strategies, special attention should be paid to the compatibility and modular design of technology systems to reduce risks. This requires enterprises to have flexible technology adaptability and establish continuous update and monitoring mechanisms to cope with the rapidly changing technology environment.

5.22 Management Implications

To maintain compatibility and synergy across various technology systems, management must develop clear

development strategies early in the technology process. To guarantee the rationality of investment returns, management must do thorough risk assessment and cost-benefit analysis before making any technological investment choices.
ramifications To save costs and hazards, Execute a thorough data security plan and carry out frequent security assessments to guarantee the efficiency and adherence to data security protocols. Organize training sessions for new technology, invite outside specialists to offer advice, and create individualized programs for skill development.

5.23 Suggestions for future research

This study not only offers insightful information, but it also creates a number of new research directions:

1. Optimize AI algorithms and data management: For autonomous driving, it is recommended that Xiaomi invest resources to continuously optimize AI algorithms, especially safety and accuracy.
2. Promote personalized intelligent services: AI should provide customized services based on user habits, preferences, and historical behavior data to improve user experience.
3. Explore the expansion of AI technology application scenarios: In addition to autonomous driving, AI can play a role in vehicle health monitoring, remote fault diagnosis, and Internet of Vehicles security protection. It is recommended that Xiaomi develop related applications to improve the level of vehicle intelligence.
4. Strengthen industrial chain cooperation: Xiaomi can carry out in-depth cooperation with automakers, technology companies, and research institutions to jointly promote the research and development and application of AI technology in the automotive field.
5. Adapt to and guide regulations: In the development of AI automotive technology, Xiaomi needs to actively communicate with the government and regulatory agencies to promote the formulation of laws and standards related to autonomous driving and smart vehicles to ensure the legality and compliance of new technologies.
6. Long-term strategy and sustainable development: To ensure long-term competitiveness, Xiaomi needs to maintain long-term investment in AI technology and autonomous driving, especially in R&D and talent reserves. It also needs to increase its exploration of cutting-edge technologies, such as the deep integration of 5G communications and AI, to ensure technological leadership.
7. Strengthening leadership, psychological capital is a key driver of employee engagement, data sharing infrastructure (later reidentified as knowledge management) is a key driver of employee support, and transformational leadership is a key driver of employee empowerment.
8. Encouraging employee excellence, survival and sustainability in today's business dynamics largely depend on the effectiveness of the corporate culture in the organization. This organizational culture is largely driven by the actions of everyone in the organization.

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