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Innovation system, supply chain management and government subsidies: basis for sustainable development framework for energy vehicle industry

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Abstract

The Industrial Revolution's rapid industrialization and economic growth had a profound ecological impact, leading to environmental issues, including global warming and pollution. Recognizing the significance of addressing these challenges, nations are vigorously developing low-carbon industries, notably the new energy vehicle sector, aiming to foster sustainable growth. In China, a pivotal player in this sphere, fostering innovation in this industry becomes imperative for it to compete on a global scale and ensure sustainable development. However, technological innovation, a critical component, requires an integrated approach considering technological, organizational, and societal aspects. This study examines the establishment of an innovation system in the new energy vehicle industry in Shaanxi Province, emphasizing green supply chain management and government support. Through a comprehensive assessment, the study reveals the industry's developmental hurdles and proposes a framework for balanced progress, considering social and environmental sustainability. Recommendations focus on enhancing the innovation system through improved technology development and leveraging government research and development incentives. Additionally, advocating for greener production and marketing strategies to advance green supply chain management within enterprises is suggested. Leveraging government marketing subsidies can ease the cost burden on consumers, fostering the adoption of new energy vehicles. The study proposes a sustainable development framework adaptable to other automotive sectors, aiming to guide sustainable practices and urges future research to explore market dynamics and sustainability drivers further.

Keywords: industrial revolution, new energy vehicles, innovation system, green supply chain management, sustainable development

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1. Introduction

The Industrial Revolution, which began in the late 18th century, led to rapid industrialization and economic growth, but it also had a devastating impact on the planet's ecological environment. The burning of fossil fuels to power factories and machines released greenhouse gases into the atmosphere, causing global warming and climate change. Other forms of pollution, such as smog and water pollution, also became widespread during this period. These environmental problems have had a significant impact on human health and well-being, and they pose a serious threat to the sustainable development of human society. In order to completely solve these environmental problems, countries around the world are making every effort to develop low-carbon and economical new energy vehicle industries.

Unlike traditional cars, the development status of countries around the world in the field of new energy vehicles is on par. If China wants to enter the ranks of the automotive powerhouse and achieve sustainable development of the new energy vehicle industry, it must work hard on the innovation system. At the same time, with the end of the Covid-19 pandemic in the world, governments at all levels in China are trying to revive local economies, and the sustainable development of the economy and industries mainly depends on the development of independent innovation capabilities. The inherent constraint of China's new energy innovation system is technological innovation, but technological innovation is not an isolated link. Technological innovation should be a joint transformation of technology, organization, and society (He Xuelei, 2019). The technological innovation of the new energy vehicle industry needs to be combined with international transformation paths, national policies, and other aspects to build and improve the innovation system of the new energy vehicle industry (Liu Yongliang, 2022). However, the above methods can cause damage to interest groups and serious personnel migration. Therefore, it is of great significance to comprehensively explore the establishment of an innovation system for new energy vehicle technology and enhance the innovation capacity of the new energy vehicle industry in Shaanxi Province.

Made in China 2025 regards "building green management throughout the entire product lifecycle" as one of the key points in achieving the strategic goal of becoming a manufacturing powerhouse. In order to better achieve this strategic goal, the National Green Manufacturing Technology Standardization Technical Committee officially released four national standards for green supply chain management in 2020, with the aim of supporting China's manufacturing industry in green management at all stages of the supply chain, ensuring the effective operation of supplier selection, procurement, warehousing, and logistics (Xue Yang, Li Manzhu, Feng Yinhu, 2023).It can be seen that green supply chain management plays a crucial role in achieving sustainable development of new energy vehicles. In Shaanxi Province, most automobile companies still adopt the traditional supply chain management model, which focuses on price in the procurement management process. Companies often choose low-priced suppliers to cooperate, which will inevitably affect the long-term development of the company (Zhang Shaobo, 2017). Of course, in Shaanxi Province, a small number of companies have also realized this issue and hope to improve their competitiveness through innovation in supply chain management. However, what should be done to effectively drive relevant actions is an important issue faced by major manufacturers. Therefore, how to promote green supply chain management in the new energy vehicle industry is a very important topic.

On September 22, 2020, China solemnly announced during the general debate of the 75th United Nations General Assembly that it will increase its national independent contribution, adopt more powerful policies and measures, strive to peak carbon dioxide emissions by 2030, and strive to achieve carbon neutrality by 2060 (Huang Xinjing, 2022).Although the development of the new energy vehicle industry has received strong praise

and support from the country, it still faces various difficulties that must be faced in the process of developing new things. For example, due to outdated technology and high research and development costs, new energy vehicles often have higher prices than traditional cars, and new technologies often make consumers choose to give up due to distrust. Under various factors, it is difficult for the new energy vehicle industry to open up the market. Therefore, in order to develop the new energy vehicle industry, the country needs to introduce relevant policies to support it. Policies such as the "New Energy Vehicle Demonstration and Promotion Financial Subsidies" have also been introduced one after another (Chen Penghao, 2022), comprehensively supporting the sustainable development of the new energy vehicle industry. This also reflects China's determination to transform and upgrade new energy vehicle enterprises, improve supply chain management efficiency, and expand the scope of government subsidies to a certain extent. However, can government subsidies really improve corporate performance? Will government subsidies affect the normal operating environment of enterprises? These issues all need to be explored.

In view of this, in the context of vigorously developing the new energy vehicle industry in Shaanxi Province, the article takes Shaanxi Province as an example to study the sustainable development system of the new energy vehicle industry through the development of innovative systems, green supply chain management, and government support. It reveals the development difficulties of the new energy vehicle industry in Shaanxi Province, and then formulates an operating mechanism that can ensure table progress of enterprises and balance social and environmentally sustainable development.

Objective of the study - This study aims to analyzes the innovation system, supply chain management, and government subsidies to strengthen leading enterprises and form a new economic driving force for sustainable development of the new energy vehicle industry in Shaanxi Province. Specifically, this paper aims to describe innovation system in terms of target system, policy system and technical system; assess the green supply chain management in terms of green design, green production, green logistics, green marketing, and green recycling; determine the Government subsidies in terms of promotion subsidies, R&D subsidies and marketing subsidies; test the significant relationship between Innovation System, Supply Chain Management and Government subsidies and develop a sustainable development framework for new vehicle industry.

2. Methods

Research Design - This study mainly utilized a combination of theoretical and empirical analysis methods, using a descriptive research design to fully explain the research results. Descriptive research typically uses strict random sampling methods to select research subjects and uses closed questions to collect data on population distribution characteristics. Descriptive research aims to study and monitor a feeling that cannot be recognized by fair factors. Researchers attempt to collect information by providing survey questionnaires and distributing them to respondents. This descriptive research helps to effectively collect data from respondents, provide information about overall structure, phenomenon characteristics, and other aspects, in order to achieve specific research objectives. These are citations made within the text itself. For each citation used, please remember to provide an entry on the reference list found at the end of the paper. No extra or unaccounted reference, for this will reflect the quality of your work.

Research Participants - This study mainly analyzes data through market survey and fully explains the results. Researchers collect information by investigating respondents, and the main tool is market questionnaire, which is helpful to effectively collect data of specific respondents and conduct professional investigation and analysis. The researcher designed a questionnaire according to the needs of the article, and conducted an online market survey for two months from July 2023 to August 2023. Between September 2023 and October 2023, a two-month offline interview was conducted. Through the combination of online and offline research methods, the authenticity and reliability of the research are fully demonstrated. The object of this survey is the practitioners of new energy automobile industry in Shaanxi Province, mainly discussing the behavior and current situation of their enterprises in innovation system, green supply chain management and government subsidies.

Online questionnaires are mainly distributed by professional software and recycled after they are completed. First of all, a preliminary questionnaire test was conducted in early July 2023, and the questionnaire was revised according to the test results, so as to ensure the operability and reliability of the questionnaire; Secondly, according to the data processing mechanism, the collected questionnaires are screened, and invalid questionnaires and duplicate questionnaires are eliminated. There are three main screening methods: first, the questionnaires with repeated answers are eliminated; Second, the incomplete questionnaire and the questionnaire with quick answer time are eliminated. Third, the questionnaire with only one answer is eliminated. In order to ensure the integrity and accuracy of data; Finally, the effective questionnaire is analyzed and interpreted by using special tools, and corresponding opinions and suggestions are given according to the results. A total of 350 online questionnaires were distributed, and 326 valid questionnaires were recovered. The recovery rate of this online questionnaire was 93.14%.

The offline research is mainly conducted by interviewing leaders of enterprises related to new energy automobile industry in Shaanxi Province, mainly visiting 6 4S stores and 3 manufacturers. This paper mainly investigates the influence of eleven related factors that promote the sustainable development of new energy automobile industry, such as target system, policy system, technology system, green design, green production, green logistics, green marketing, green recycling, promotion subsidy, R&D subsidy and marketing subsidy, on these enterprises, as well as their current contributions and status quo.

Data Gathering - The main research method of this paper is market research, which is divided into online questionnaire survey and offline interview survey, which lasted for 4 months. This paper mainly shows the situation of online questionnaire survey. The first step is questionnaire design. In order to ensure the accuracy, clarity, reliability and rationality of the questionnaire, after the questionnaire was designed, the instructor corrected the questionnaire three times according to the research direction and content. At the same time, an expert from a research institute in Beijing was found to review the questionnaire, and a set of complete questionnaires was finally formed, which was easy to interpret.

The second step is the questionnaire test. From July 1, 2023 to July 15, 2023, we looked for 15 leaders and experts in the related fields of new energy automobile industry in Shaanxi Province to conduct a questionnaire test. These people are all researchers and senior practitioners in the new energy automobile industry. They have made in-depth research in the field of sustainable development of new energy vehicles, and have been giving macro guidance to the sustainable development of new energy automobile industry in their own enterprises. Therefore, they have good judgment ability on the rationality of the problem. At the same time, we also conducted a questionnaire test on 15 employees in the related fields of new energy vehicles in Shaanxi Province. These people are all front-line participants in the new energy automobile industry. They have a more intuitive feeling about the implementation of the policy and a deeper understanding of the questionnaire. The questionnaire test is divided into two times, and 30 questionnaires are distributed each time. The final effective questionnaire for the first time is 22, and the final effective questionnaire for the second time is 26. After the questionnaire was recovered, according to the opinions of these experts and front-line employees, the questions in the questionnaire were revised and improved again.

The third step is data analysis. After the questionnaire was recovered and an invalid questionnaire was put forward, the researcher used statistical software SPSS 24.0 (Cronbach's Alpha) to analyze the data. Kronbach (1951) thought that the value of Kehlenbach α coefficient was between 0 and 1, with 0 indicating complete inertness and 1 indicating complete consistency. Generally speaking, α coefficient of 0.7 and above can be regarded as good internal consistency. According to the tutor's opinion and the data of the first evaluation, the researcher adjusted and revised the questions and influencing factors of the questionnaire, and then conducted the second test. The α coefficients of the second test are all above 0.7, which proves that the trust is very good, which also means that this set of questionnaires can be used for formal sample survey. The trust analysis of the test questionnaire is shown in Table 1.

Table 1

Reliability Statistics

Indicators	Cronbach Alpha	Remarks
Target System	0.905	Excellent
Policy System	0.925	Excellent
Technical System	0.901	Excellent
Green Design	0.916	Excellent
Green Production	0.933	Excellent
Green Logistics	0.901	Excellent
Green Marketing	0.895	Good
Green Recycling	0.830	Good
Promotion Subsidies	0.951	Excellent
R&D Subsidies	0.749	Acceptable
Marketing Subsidies	0.896	Good

Data Gathering Procedure - Under the guidance of the tutor, the questionnaire was proofread and revised several times, and finally passed the reliability test before the formal market survey began. The researcher randomly distributed 350 questionnaires to the relevant employees in the new energy automobile industry in Shaanxi Province through professional software and procedures. Then analyze, study and explain the survey data.

Data Analysis - This research employed the frequency distribution and weighted mean and rank were used to describe innovation system in terms of target system, policy system and technical system; to assess the green supply chain management in terms of green design, green production, green logistics, green marketing, and green recycling; and to determine the Government subsidies in terms of promotion subsidies, R&D subsidies and marketing subsidies; The result of Shapiro-Wilk Test showed that p-values of all variables were less than 0.05 which means that the data set was not normally distributed. Therefore, Spearman rho was used as part of the non-parametric tests to determine the significant relationship. All analyses were performed using SPSS v. 28.

Ethical Consideration - Because the research results need to be made public, and the research process involves a wide range, covering almost all related enterprises in the new energy automobile industry in Shaanxi Province. In order to ensure that the risk of each interviewee is minimized, the researchers learned about the stress performance of the interviewees through interviews and interviews. Through the questionnaire test, we also know what adverse effects the questionnaire may have on the respondents. In order to solve these problems, the researcher will inform the interviewees of the confidentiality measures taken by the researcher during the investigation, including not revealing personal information and anonymous investigation, so as to reduce the psychological pressure and possible risks of the interviewees. In the whole research process, researchers always abide by the principles of respect, reciprocity and fairness.

3. Results and Discussion

Table 2

Innovation System in terms of Target System

Indicators	WM	VI	Rank
1.The company's industrial innovation goals are clear	3.27	Agree	4
2.The company will modify the industrial innovation path in due course	3.25	Agree	5
3.In the setting of the innovation goal system, the company consider both the immediate development goals and the future development goals	3.31	Agree	3
4.How to achieve the strategic goal of independent innovation in the new energy vehicle industry is the biggest challenge we face	3.34	Agree	2
5.Gaining industrial competitiveness is the core goal of new energy vehicle industry innovation	3.39	Agree	1
Composite Mean	3.31	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 2 presents the assessment of the innovation system in terms of target system. As observed the respondents agree on the cited indicators with a composite mean of 3.31. Topped in the list was Gaining industrial competitiveness is the core goal of new energy vehicle industry innovation with a weighted mean of 3.39. This indicates that the majority of respondents are very concerned about the core goals of innovation in the new energy vehicle industry, and they all believe that gaining industrial competitiveness is the core goal of new energy vehicle industry innovation. Due to the high technological content and wide coverage of the new energy vehicle industry, which has strong market driving capabilities, how to enhance the competitiveness of the new energy vehicle industry has become an important strategic issue for enterprises (Lai Li, Zhang Jingxin, Sun Yu, Cao Yuanyuan, 2022). In the context of a low-carbon economy, in order for the new energy vehicle industry in Shaanxi Province to achieve sustainable development, it is necessary to improve the competitiveness of enterprises and industries, and innovation is a key factor in promoting sustainable development and enhancing enterprise competitiveness (An Haiyan, 2018).

Next is how to achieve the strategic goal of independent innovation in the new energy vehicle industry is the biggest challenge we face, ranking second, with a weighted average score of 3.34. The market competition in China's new energy vehicle industry is becoming increasingly fierce, and the main core technologies still need to seek foreign aid, lacking the ability to innovate independently (Gao Yunsheng, Jin Tianyang, 2021). If we cannot break through the core technological barriers of the new energy vehicle industry, the competitiveness of China's new energy vehicle industry will not be greatly improved (Niu Zhiwei, Zou Zhaoxi, Wei Pingdong, 2020). In the setting of the innovation goal system, the company considered both the current development goals and the future development goals, ranking third with a weighted average score of 3.31. In the process of enterprise development, it is not only important to consider immediate interests, but also to consider the company's sustainable development strategy. Obtaining long-term development is very important. However, the company's industrial innovation goals are clear (3.27) and the company will modify the industrial innovation path in due course (3.25) have relatively low ratings, indicating that respondents believe that their company's industrial innovation goals are not clear and have not covered the path of industrial innovation based on the actual situation. This is unfriendly for the company. If the new energy vehicle industry in Shaanxi Province wants to achieve sustainable and stable development, it must overcome technological challenges, master core technologies, have clear innovation goals, and innovate innovation paths based on the current development status.

Table 3

Innovation System in terms of Policy System

Indicators	WM	VI	Rank
1.The company's innovation policy has inducement and policy coherence	3.21	Agree	5
2.The company has a special organization for innovation, such as the relationship and structure of industry-university-research organizations established for innovation	3.26	Agree	3
3.The enterprise plays a leading role in the innovation and development of the new energy vehicle industry	3.25	Agree	4
4.The company's innovation policy is supported by the government	3.30	Agree	1
5.The formulation of the innovation policy of the enterprise is strictly planned, reflecting the phased characteristics of industrial development	3.28	Agree	2
Composite Mean	3.26	Agree	

Table 3 presents the assessment of the innovation System in terms of Policy System. As observed the respondents agree on the cited indicators with a composite mean of 3.26. Topped in the list was the company's innovation policy is supported by the government with a weighted mean of 3.30. This indicates that the majority of respondents' companies have received government policy support on the path of innovation and development, which is a good phenomenon. The innovation policies of enterprises sometimes bring about market failures, such as uncertainty and exclusivity of profits, which require government macroeconomic regulation to solve (Kang Zhiyong, Liu Xin, 2021). And how the government regulates and supports it with what policies will also affect the innovative development mechanism of enterprises. Government support for enterprise innovation is usually systematic, stable, and sustainable, which is a policy synthesis of government promotion of enterprise innovation activities. Therefore, it is necessary to stimulate competition between local governments and enterprises for

policy resources to promote the innovative development of enterprises (Tian Zhilong, Chen Liling, Gu Jialin, 2019). Based on the basic experience of the new energy vehicle industry, Wang Hai (2021) studied and explored the relationship between local industrial policies and industry innovation and development, and believed that strengthening government policy support can effectively promote the innovative development of the new energy vehicle industry.

Following closely are the formulation of the innovation policy of the enterprise is strictly planned, reflecting the phased characteristics of industrial development, ranking second, with a weighted average score of 3.34. This indicates that the majority of respondents' companies have strict development plans in the direction and goals of innovation policy development, which also reflects the phased nature of industrial development. The innovative development policies of the new energy vehicle industry have a double-sided impact. If the new energy vehicle industry policy excessively stimulates the development of new energy vehicles, it will not only promote the popularization of new energy vehicles, but also affect the technological innovation of new energy vehicles (Jin Tong, et al., 2017). The innovation policy of the new energy vehicle industry is an important factor affecting the sustainable development of enterprises. Enterprises should be fully prepared before risks come, minimize the negative marketing of policies, and lay the foundation for the innovative and sustainable development of enterprises. In addition, the company has a special organization for innovation, such as the relationship and structure of industry-university-research organizations established for innovation, which ranks third in terms of relationship and structure, with a average score of 3.26. This indicates that respondents acknowledge the promoting role of industry, academia, and research in promoting innovation and development of enterprises, and their companies have also adopted this approach. Against the backdrop of the rapid development of new energy vehicles, the R&D and innovation capabilities of many enterprises related to the new energy vehicle industry are no longer sufficient to meet the rapid development of technology updates. Therefore, collaborative innovation has become a new breakthrough in the development of the new energy vehicle industry (Liu et al., 2021).

Behind them are the enterprise plays a leading role in the innovation and development of the new energy vehicle industry (3.25), and the company's innovation policy has inducement and policy coherence (3.21), Although the ranking is relatively low, the score is not very low, but it is sufficient to indicate that the leading role of the enterprise itself is not obvious in the innovative development process of the new energy vehicle industry in Shaanxi Province, and the sustainability of the policy itself is not good. However, in the process of innovative development of enterprises, the enterprise itself is the driving force for development. If internal forces are insufficient, relying solely on external forces such as policies is difficult to achieve stable and long-term development. Therefore, enterprises should formulate sustainable and coherent development strategies, grasp the mode and goals of innovative development in their own hands, and achieve the sustainable development strategy of the enterprise.

Table 4

Innovation System in terms of Technical System

Indicators	WM	VI	Rank
1.The new energy vehicle technology innovation system will become the core competitiveness of the automotive industry	3.38	Agree	3
2.The company's new energy vehicles have a more powerful Internet intelligent operating system than traditional vehicles	3.36	Agree	4
3.The sense of technology of this enterprise product means the ultimate user experience	3.29	Agree	5
4.The company's innovative technology system takes key technology as the core	3.39	Agree	2
5.The company needs to actively track and support the development of related technologies	3.41	Agree	1
Composite Mean	3.37	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 4 presents the assessment of the innovation System in terms of Technical System. As observed the respondents agree on the cited indicators with a composite mean of 3.37. Topped in the list was the company needs to actively track and support the development of related technologies with a weighted mean of 3.41. This proves that the majority of respondents believe that their companies require active tracking and support, which is conducive to the technological innovation and development of the enterprise. If the new energy vehicle industry

wants to achieve long-term development, it must provide development support from three aspects: government, technology, and industrial system. Su Xinyue (2021) believes that policy support from enterprises can effectively promote the development and innovation of related technologies based on the relationship between R&D investment and performance.

Next is the company's innovative technology system takes key technology as the core, ranking second with a weighted average score of 3.39. This indicates that the majority of respondents believe that enterprises should focus on key technologies to promote the development of innovation systems. In this regard, many enterprises in China have already done well. Jianghuai Automobile Company adheres to the key technology research and development path of "energy conservation, environmental protection, safety, intelligence, internet connectivity, and comfort", and has promoted the establishment and development of a technology innovation system (Liu Borui, 2022). Yutong Bus Company has also tackled common core technologies in power system matching and integration, battery and its management, all of which cover the planning of high-precision and cutting-edge technologies in the new energy vehicle industry, and have formed a research and development team to carry out technological innovation (Liu Borui, 2022). In addition, the new energy vehicle technology innovation system will become the core competitiveness of the automotive industry, with a weighted average score of 3.38. This means that the majority of respondents believe that the main core competitiveness of their company is the establishment of a new energy vehicle technology innovation system. Research has shown that a complete technological innovation system can greatly enhance the competitiveness of enterprises, thereby promoting them to embark on an international development path faster, better, and more steadily (Han Lei, 2021). Scholars such as Zhang Ci (2014) studied the organizational relationships of sustainable development of enterprises from an ecological perspective. He believed that the technological innovation ecosystem is constructed by a combination of industrial competitiveness and organizational relationships. Wang Chenlu (2022) believes that enterprises can only survive in the fierce market competition if they have sufficient innovation capabilities, and technological innovation capability, as an intangible asset, is an important means to enhance the competitiveness of enterprises.

However, the company's new energy vehicles have a more powerful Internet intelligent operating system than traditional vehicles (3.36), and the sense of technology of this enterprise product means the ultimate user experience (3.29) rating is relatively low. This indicates that respondents believe that their company's new energy vehicles do not surpass traditional vehicles in terms of internet intelligent operating systems, and the technology and sense of technology of the company's products have not been effectively applied to the user experience. Like traditional fuel vehicles, the intelligent networking technology of new energy vehicles includes two categories: teaching system and practical system. However, new energy vehicles have their own unique characteristics, and their development requires the popularization and support of the industry and the government. They are themselves the crystallization of technology and technology. Therefore, the intelligent networking technology of the new energy vehicle industry needs to be more clearly reflected in order to attract consumers' favor.

Table 5

Summary Table on Innovation System

Key Result Areas	Composite Mean	VI	Rank
Target System	3.31	Agree	2
Policy System	3.26	Agree	3
Technical System	3.37	Agree	1
Grand Composite Mean	3.31	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 5 lists the evaluation results of the respondents on the innovation system. As observed the respondents agree on the cited indicators with a Grand Composite Mean of 3.31. Among the three dimensions of the innovation system, technical System ranks first with a weighted average score of 3.37, indicating that most respondents believe that the technology system is the most important in the innovation system and plays a very important role in the sustainable development of new energy vehicles. Based on the experience of the US new

energy vehicle industry, Hu Dengfeng (2010) constructed an innovation system for China's new energy vehicle industry from three parts: target system, policy system, and technical system. These three parts are mutually supportive and integrated processes. There are common technologies between the new energy vehicle industry and the traditional automotive industry, but there are also differences in key core technologies. The core of the technological innovation system of the new energy vehicle industry is the energy-saving technology of automobiles, which also needs to be matched with the production technology of new energy vehicles to form a technical system with key technologies (Sheng Yongshi, Li Erlu, Li Yutian, 2017). The technological development of all industries has unique laws. Although key technologies affect the development status of the industry, it is also necessary to cooperate with other supporting facilities to form an innovation system in order to ultimately increase the competitiveness of the industry (Long Guicheng, 2022). Therefore, the establishment of an innovation system for the new energy vehicle industry also requires the coordination of various elements in the innovation network of the entire industry, in order to further obtain more research results, promote the technological progress of new energy vehicles, and widely promote them in the market.

Next is the target system, ranking second in the composition index of the innovation system, with a weighted average score of 3.31. The establishment of the new energy vehicle industry innovation target system can promote industrial progress. China's new energy vehicle industry innovation goals not only consider the development form of the domestic automobile market, but also start to focus on the development form of the international market. Currently. Enterprises related to the production of new energy vehicles have begun to implement development strategies for energy conservation and emission reduction, and the new energy vehicle industry has become a leading force in the regional economy (Sheng Yongshi, 2017).

The policy system index ranks relatively lowest with a weighted average score of 3.26, indicating that the policy system is not the primary factor considered by the respondent's company in the process of establishing an innovation system.

Table 6

Green Supply Chain Management in terms of Green Design

Indicators	WM	VI	Rank
1.Our products are designed with material or energy savings in mind	3.35	Agree	3
2.When designing products, we consider the reuse and recycling of products or parts	3.31	Agree	4
3.When designing its products, we consider avoiding or reducing the use of harmful materials or production processes that have a serious impact on the environment	3.39	Agree	1
4.When designing products, the company considers cooperation with suppliers related to environmental protection and energy conservation (e.g. product design, process improvement, etc.)	3.38	Agree	2
5.We conduct education and training on green topics within the company	3.28	Agree	5
Composite Mean	3.34	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 6 presents the assessment of Green Supply Chain Management in terms of Green Design. As observed the respondents agree on the cited indicators with a composite mean of 3.34. Topped in the list was When designing its products, we consider avoiding or reducing the use of harmful materials or production processes that have a serious impact on the environment with a weighted mean of 3.39，this indicates that the respondent's company will consider green production in the product design process, avoid the use of harmful materials, and thus reduce environmental pollution. Green production, as one of the important forces in green technology innovation activities, has become the main production mode advocated by the new energy vehicle industry. In order to achieve the goal of limiting enterprise pollution and environmental damage, enterprises spontaneously began to adopt green technology innovation, improve green production efficiency, and take responsibility for environmental protection on their own (Yan Jiahuan, 2023). In addition, with the aggravation of environmental pollution, the government has also begun to carry out macroeconomic regulation. When the pollutant emissions of enterprises cause serious harm to the environment, the government will demand that enterprises stop production. Therefore, enterprises will control the emission of pollutants in the production process and actively adopt technological innovation to improve the level of green production (Li Guangpei, 2018). The new energy

vehicle industry in Shaanxi Province is developing rapidly. In this situation, enterprises must consider how to reduce consumption and pollution, change from traditional production methods to green intensive production methods, and promote green transformation and development.

Next is when designing products, the company considers cooperation with suppliers related to environmental protection and energy conservation (e.g., product design, process improvement, etc.) ranking second with a weighted average score of 3.38, this indicates that enterprises have begun to consider collaborating with upstream industries in the supply chain to implement production methods and strategies for environmental protection. The supply chain of the new energy vehicle industry has a certain degree of uncertainty, and there is risk propagation among various participants in the supply chain. The stable operation of the entire supply chain also has a significant impact on the normal operation of the new energy vehicle industry. Any supply chain risk event may lead to the outbreak of the entire supply chain risk event, resulting in overall losses (Liu Wei, 2022). Liu Haohua (2016), based on an analysis of government reports, believes that the emergence of risks is due to changes in customer demand that suppliers did not detect in a timely manner. This requires all upstream suppliers in the supply chain to pay high attention to customer demand in order to protect the green and innovative development of the enterprise. Various participants in the supply chain set environmental goals and jointly develop environmental measures to reduce pollution and emissions. Collaborating with upstream can affect production processes, while collaborating with downstream can affect product design (Vachon S, Klassen R D, 2008). In addition, our products are designed with material or energy savings in mind, with a weighted average score of 3.35, this means that the respondent's company has already considered material and energy conservation in the design process. Wang Jiahuan (2023) believes that with the rapid development of China's economy and the deepening contradiction between the ecological environment, harmonious coexistence between humans and nature has become the production goal of many enterprises. Therefore, the economical use of environmentally friendly materials and resources and energy plays a crucial role in promoting green design in supply chain management.

However, when designing products, we consider the reuse and recycling of products or parts (3.31), and we conduct education and training on green topics within the company (3.28), rating is relatively low. This indicates that the respondent's company is not doing well in the reuse and recycling of products and components, and there is also a lack of unified training and education on green concepts within the company. For the new energy vehicle industry in Shaanxi Province, if efforts can be made in the reuse of materials and components, then enterprises will save a lot of costs and be beneficial for environmental protection; In addition, enterprises should attach importance to the training and popularization of internal green production education, in order to create a green production atmosphere within the enterprise.

Table 7

Green Supply Chain Management in terms of Green Production

Indicators	WM	VI	Rank
1.Cleaner production is implemented in the production process of the enterprise	3.35	Agree	3
2.The production process of the enterprise strictly controls product quality to ensure that the quality requirements are met	3.40	Agree	1
3.Continuous improvement (e.g., optimization or simplification) of production processes in the production process of the enterprise to reduce environmental impact	3.39	Agree	2
4.The company recycles and reuses used materials, parts or products in its production process	3.33	Agree	4
5.We re-manufacture parts and products in the production process of our company	3.31	Agree	5
Composite Mean	3.35	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 7 presents the assessment of Green Supply Chain Management in terms of Green Production. As observed the respondents agree on the cited indicators with a composite mean of 3.35. Topped in the list was the production process of the enterprise strictly controls product quality to ensure that the quality requirements are met with a weighted mean of 3.40. This means that the majority of respondents' companies strictly control product quality during the production process to avoid waste caused by defective products. In the green supply

chain management of enterprises, product quality is an important factor affecting enterprise performance (Liu Junjun, 2020). Feng et al. (2018) learned through a questionnaire survey that green supply chain management is mainly influenced by product quality, inventory, and production efficiency. Many times, solving environmental problems is not just about reducing pollutant emissions, but rather exploring the source at a deeper level, such as controlling product quality, operational efficiency, and costs (Choi D, Hwang T, 2015). In traditional supply chain management, companies often control product quality after the fact, while the concept of green production requires mastery of the entire product's pre market and post market, effective resource management, strict emphasis on product quality control, and the achievement of zero defects and zero inventory (Zhang Shaobo, 2017).

Next is continuous improvement (e.g., optimization or simplification) of production processes in the production process of the enterprise to reduce environmental impact, ranking second with a weighted average score of 3.39, this indicates that Shaanxi Province's new energy vehicle related enterprises attach great importance to simplifying and optimizing processes in the production process, in order to reduce environmental pollution. The production process runs through the entire supply chain management process, including all enterprise activities from upstream to downstream. Innovation in the production process is very beneficial for improving the economic and environmental performance of enterprises (Yang, 2010). Wu (2013) found through research that green production processes help promote integration among suppliers, customers, and within enterprises. In addition, cleaner production is implemented in the production process of the enterprise, with a weighted average score of 3.35, this indicates that the respondent's company will choose clean production during the production process. At present, Shaanxi Province has introduced a series of policies that require clean production in the new energy vehicle industry. However, the new energy industry belongs to the heavy asset industry, with large investment and long return cycles. Due to financial constraints, enterprises cannot have stable financial support in green production and it is difficult to implement clean production in the long term (Wang Jiahuan, 2023). Yang Panpan (2017) also believes that some government policies or measures have not achieved the expected results in the specific implementation process of enterprises, such as some enterprises experiencing frequent phenomena such as "unclean clean production" and "non circular economy". However, clean production is of great significance for the healthy and sustainable development of green supply chains (Liu Jie, 2018). Therefore, major enterprises should establish clean production standards to promote the development of green production methods in enterprises.

However, the company recycles and reuses used materials, parts or products in its production process (3.33) and we re-manufacture parts and products in the production process of our company (3.31), the score is relatively low among the three factors. This indicates that the materials and component products used in the production process by the respondent's company have not been fully reused, but have chosen to remanufacture and produce component products. This is also a significant loss for the company, and the company should pay attention to this investment.

Table 8

Green Supply Chain Management in terms of Green Logistics

Indicators	WM	VI	Rank
1.The enterprise fully implements green warehousing	3.24	Agree	5
2.The company uses degradable and recyclable green packaging materials for packaging	3.28	Agree	3
3.The company fully implements green distribution	3.26	Agree	4
4.The development of green logistics by the enterprise has been effectively supported by the government	3.30	Agree	2
5.The biggest limiting factor for the implementation of green logistics is cost	3.36	Agree	1
Composite Mean	3.29	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 8 presents the assessment of Green Supply Chain Management in terms of Green Logistics. As observed the respondents agree on the cited indicators with a composite mean of 3.29. Topped in the list was the biggest limiting factor for the implementation of green logistics is cost with a weighted mean of 3.36. This

indicates that many respondents believe that their unit will be limited by costs during the implementation of green logistics. The manufacturing industry is a high-cost industry, especially the new energy vehicle industry, with large initial investment and long recovery cycles. Strengthening control over green logistics costs may have increased enterprise investment in the early stages, but in the long run, enterprises will achieve high environmental and economic benefits (Zhang Jinsong, Yu Haifeng, Liu Jia, 2015).

Next is the development of green logistics by the enterprise has been effectively supported by the government, ranking second with a weighted average score of 3.30, this indicates that respondents unanimously believe that in order for enterprises to develop green logistics, they must obtain effective support from the government. Li Xiaoxia (2009) believes that increasing investment in infrastructure and the construction of laws and regulations, through improved standards, systems, and some policy incentives, can reduce the cost of green logistics and achieve the healthy development of green logistics. The development of green logistics requires external driving forces such as market regulation, which can take the form of government regulation. Under government regulation, if a company fails to comply with rules and regulations, it will be punished, and in severe cases, it will lose its reputation (Pugh, 2002). Li Weiwei (2019) found through research that effective government support has a promoting effect on green logistics for enterprises. When government support and regulation work together, the entire green supply chain management of enterprises will also have a greater promoting effect. In addition, the company uses degradable and recyclable green packaging materials for packaging, with a weighted average score of 3.28, this indicates that most respondents' companies use green packaging during the packaging process to promote the development of green logistics. However, the company fully implements green distribution (3.26) and the enterprise fully implements green warehousing (3.31), rating is relatively low.

This indicates that the respondent's company is not doing well enough in green delivery and green warehousing. Enterprises must practice the concept of green environmental protection, actively promote green distribution and storage, and cooperate with green packaging and supporting policies to promote the great development of green logistics for enterprises.

Table 9

Green Supply Chain Management in terms of Green Marketing

Indicators	WM	VI	Rank
1.The company actively participate in environmental protection and sustainable development projects, and strengthen the image of corporate social responsibility by supporting social and environmental improvement through actions.	3.38	Agree	1
2.Companies develop and adhere to credible green standards to ensure that the environmental performance of their products is in line with their commitments.	3.35	Agree	3
3.Companies provide accurate and transparent environmental information.	3.33	Agree	4.5
4.Companies encourage consumers to engage in environmental action and provide relevant education and information.	3.36	Agree	2
5.Enterprises convey environmental protection ideas through marketing activities.	3.33	Agree	4.5
Composite Mean	3.35	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 9 presents the assessment of Green Supply Chain Management in terms of Green Marketing. As observed the respondents agree on the cited indicators with a composite mean of 3.35. Topped in the list was the company actively participate in environmental protection and sustainable development projects, and strengthen the image of corporate social responsibility by supporting social and environmental improvement through actions with a weighted mean of 3.38. This indicates that most of the companies in which the interviewees work can actively participate in environmental protection activities, fulfill their responsibilities for sustainable social development, and contribute to the development of the green supply chain of the enterprise. In green supply chain management, corresponding evaluation systems should be established, information platforms should be established, and corporate social responsibility reports should be released (Liu Jie, 2018). Jin Liang et al. (2019) analyzed the value of optimal patent licensing contract design, demand information disclosure strategy, and corporate social responsibility for a system composed of patent holding enterprises, brand enterprises, and OEM

manufacturers. At present, many excellent enterprises in the new energy vehicle industry in Shaanxi Province are actively exploring and practicing green marketing, continuously strengthening and consolidating the development of enterprise green supply chain management, in order to enhance brand reputation and fulfill social responsibility.

Next is companies encourage consumers to engage in environmental action and provide relevant education and information, ranking second with a weighted average score of 3.36, this proves that the respondent's company encourages consumers to participate in environmental protection actions together and provides them with corresponding green marketing education and information. Shaanxi Province is located in the northwest region of China, where pollution is relatively severe. Consumers of new energy vehicles are people with strong environmental protection awareness. Therefore, encouraging consumers to participate in corporate environmental protection actions together is extremely beneficial for the development of green marketing for enterprises. In addition, companies develop and adhere to credible green standards to ensure that the environmental performance of their products is in line with their commitments, with a weighted average score of 3.35, this indicates that the products produced by the respondent's company meet national standards in terms of environmental protection, and the companies have also established corresponding green standards. The country should also actively develop green marketing, improve the overall green supply chain management of products, establish national or regional standards for green supply chain management, occupy a leading position on the path of sustainable development, and maintain the unity of national or regional new energy vehicle industry and environmental interests (Fang, 2021).

Ranked side by side at the end is companies provide accurate and transparent environmental information (3.33) and enterprises convey environmental protection ideas through marketing activities (3.33), rating is relatively low. This indicates that due to the many industries involved in the new energy vehicle industry and the complex development of related industries, it is difficult for enterprises to provide accurate and transparent environmental information, and it is also difficult to convey environmental protection concepts through marketing activities. However, some companies have also started exploring. Haima Automobile Company began a series of public relations activities such as "Protecting Mother River" in 2018, encouraging consumers to participate in Haima Automobile's marketing activities and achieving good results.

Table 10

Green Supply Chain Management in terms of Green Recycling

Indicators	WM	VI	Rank
1.The reuse rate of waste parts in the enterprise is high	3.12	Agree	5
2.The remaining production materials of the enterprise are effectively recycled	3.21	Agree	4
3.The enterprise carries out environmental audits to ensure that the products meet the environmental requirements	3.32	Agree	1
4.The enterprise applies the environmental management information system	3.28	Agree	3
5.The enterprise attaches great importance to the environment in the development process to ensure the harmonious development of the natural environment and the enterprise	3.30	Agree	2
Composite Mean	3.25	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 10 presents the assessment of Green Supply Chain Management in terms of Green Recycling. As observed the respondents agree on the cited indicators with a composite mean of 3.25. Topped in the list was the enterprise carries out environmental audits to ensure that the products meet the environmental requirements with a weighted mean of 3.32. This indicates that the respondent's company has conducted a good environmental audit to ensure that the product meets environmental requirements. Liu Junjun (2020) Through research on green supply chain management in the new energy vehicle industry, it was found that as a tool for environmental management, conducting environmental audits to ensure that products meet environmental requirements can improve the practice of technological green supply chain management. The previous research suggests that the new energy vehicle industry in Shaanxi Province has not done particularly well in terms of overall green recycling during the production process, but has done well in terms of environmental standards for products.

Therefore, enterprises can leverage their strengths and avoid weaknesses, vigorously promote environmental audit efforts, and promote the development of green recycling.

Next is the enterprise attaches great importance to the environment in the development process to ensure the harmonious development of the natural environment and the enterprise, ranking second with a weighted average score of 3.30, this indicates that the respondent's company attaches great importance to environmental protection during the development process, and they are all aware of the importance of harmonious development between the natural environment and the enterprise. In the process of development, enterprises inevitably cause damage to the environment. However, in the current era of harmonious development between humans and nature, enterprises have to pay attention to this issue and cannot blindly pursue economic efficiency while neglecting ecological environment protection. Enterprises should correspondingly and bear the social responsibility of harmonious coexistence with nature. In this regard, enterprises can work together with the government, market, and society to promote the harmonious development of enterprises and nature (Nie Shuliang, 2023). Shaanxi Province has a unique geographical location and is more important in environmental protection. Therefore, in the process of harmonious coexistence with nature, new energy vehicle enterprises need fair government regulation to achieve sustainable development (Bromley, 2006). In addition, the enterprise applies the environmental management information system, with a weighted average score of 3.28, it can be seen that enterprises related to the new energy vehicle industry in Shaanxi Province basically have their own environmental management information systems. The environmental management information system includes five major parts, namely user management, pollution management, pollution monitoring, statistical analysis, and environmental evaluation (Liu Chunming, 2018). Although many enterprises have already established their own environmental management information systems and have several times the functions of environmental monitoring and data statistics, further improvement and improvement are needed to achieve intelligent analysis and decision-making of the collected information (Jia Zhijun, 2012).

However, the remaining production materials of the enterprise are effectively recycled (3.21) and the reuse rate of waste parts in the enterprise is high (3.12), rating is relatively low. This indicates that the recycling of surplus production materials and the reuse of waste parts by enterprises related to the new energy vehicle industry in Shaanxi Province are generally in line with the previous research.

Table 11

Summary Table on Green Supply Chain Management

Key Result Areas	Composite Mean	VI	Rank
Green Design	3.34	Agree	3
Green Production	3.35	Agree	1.5
Green Logistics	3.29	Agree	4
Green Marketing	3.35	Agree	1.5
Green Recycling	3.26	Agree	5
Grand Composite Mean	3.32	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 11 presents the assessment of Summary Table on Green Supply Chain Management. As observed the respondents agree on the cited indicators with a Grand Composite Mean of 3.32. Topped in the list was Green Marketing and Green Production with a Composite Mean of 3.35. This further demonstrates that green marketing and green production have played a very important role in the development of the new energy vehicle industry in Shaanxi Province. The research results of Majid et al. (2019) indicate that a green orientation will require enterprises to consider the elements of green environmental protection in all their operations, and promote the implementation of green practices through green marketing and green production, thereby achieving excellent environmental performance. China has also formulated relevant regulations and policies for green supply chain management. In 2015, the Ministry of Finance, the National Development and Reform Commission, the Ministry of Industry and Information Technology, and the Ministry of Environmental Protection issued the "Implementation Plan for the Environmental Protection Leader System", which provides appropriate policy mechanisms for environmental leaders and advocates for green production and consumption. If the enterprise

implements green production internally, the energy-saving and emission reduction effects of green production will become more apparent as the experience of management and technical personnel improves. Following closely is green design, ranking second with a weighted average score of 3.34. In 2017, the Ministry of Industry and Information Technology released the "Guiding Opinions on Promoting Green Consumption: The First Batch of Green Manufacturing Demonstration Projects", which identified 201 green factories and 193 types of green design products, including new energy vehicle related products. Luthra S, Garg D, Haleem A (2016) believe that the successful implementation of green supply chain mainly depends on the mutual practice and interaction of various factors. For most new energy vehicle related industries, green design is a technical and important factor in their practice of green supply chain management.

The lower ranked ones are Green Logistics (3.29) and Green Recycling (3.12), with a lower weighted comprehensive score. This indicates that the majority of respondents' companies are not as good at green logistics and green recycling as green marketing, green production, and green design.

Table 12

Government Subsidies in terms of Promotion Subsidies

Indicators	WM	VI	Rank
1.The government has corresponding subsidies and preferential policies for this brand	3.27	Agree	1.5
2.The government has a policy of reducing parking fees and charging fees for the products of the enterprise	3.23	Agree	3
3.The government does not restrict the driving of vehicles of this brand	3.22	Agree	4
4.The government does not restrict the purchase of vehicles of this brand	3.27	Agree	1.5
5.Vehicles of this brand have priority parking	3.06	Agree	5
Composite Mean	3.21	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 12 presents the assessment of Government Subsidies in terms of Promotion Subsidies. As observed the respondents agree on the cited indicators with a composite mean of 3.21. Topped in the list was the government has corresponding subsidies and preferential policies for this brand and The government does not restrict the purchase of vehicles of this brand with a weighted mean of 3.27. This indicates that relevant enterprises in the new energy vehicle industry in Shaanxi Province have received corresponding government subsidies and policy incentives, and the government does not restrict the purchase of this brand. At present, the new energy vehicle industry in Shaanxi Province has incurred excessive investment due to high research and development and promotion costs in the early stage. Therefore, compared to traditional fuel vehicles, new energy vehicles are more expensive. In order to promote the sales of the new energy vehicle industry, the government will provide certain subsidies to enterprises and provide consumers with some preferential policies. Hardman (2016) found through research that in order to improve the competitiveness of the new energy vehicle industry and increase the sales of new energy vehicles, the government should increase car purchase subsidies to reduce the high prices caused by high costs for enterprises. He believes that market mechanisms should be guided to promote the sustainable development of the new energy vehicle industry. High government subsidies can only increase the market share of new energy vehicles in the short term, but enterprises cannot completely rely on government subsidies.

In addition, due to serious environmental pollution issues, Shaanxi Province has implemented policies on limited purchase and operation of traditional fuel vehicles. However, there is no relevant policy on purchase and operation of new energy vehicles. Liu Yiming (2016) believes through analysis that implementing the policy of car purchase restrictions can alleviate traffic pressure and environmental pollution to a certain extent, but it cannot fundamentally solve the problem. Zhang Zhen (2018) proposed that limiting the purchase of automobiles can improve environmental pollution to a certain extent, but it is difficult to achieve practical results because environmental pollution is not only caused by automobile exhaust, but also inevitable pollution brought about by the industrialization process. Even with the purchase restriction, the number of cars is increasing, which cannot fundamentally solve the problem. Xing Xing and Tan Minqiu (2017) argue that traditional fuel powered vehicles can cause serious air pollution and pose a serious threat to human health during use. Therefore, it is necessary to

replace traditional fuel powered vehicles with new energy vehicles to achieve the goal of reducing exhaust emissions and protecting the environment. Wu Tianqi, Sun Xiaoqi, and Li Lu (2018) also believe that we should vigorously develop the new energy vehicle industry and prioritize the use of new energy vehicles, which will alleviate the pressure caused by traffic congestion and air pollution.

Next is The government has a policy of reducing parking fees and charging fees for the products of the enterprise, ranking second with a weighted average score of 3.23, this indicates that the government will encourage the use of new energy vehicles by reducing parking costs and product usage costs. Since 2017, some first-tier cities such as Wuhan, Zhengzhou, and Shenzhen have issued policies to exempt parking fees for new energy vehicles in municipal road parking spaces, in order to promote the sales and use of new energy vehicles. Liu Jin (2017) believes from a broader perspective that policies such as no restrictions on the purchase of new energy vehicles, no lottery purchases, and no parking fees belong to government subsidies. Qian Zihang (2022) believes that government subsidies should exit multiple policies in various aspects of the use of new energy vehicles, including the reduction and exemption of parking fees for new energy vehicles on municipal roads.

However, the government does not restrict the driving of vehicles of this brand (3.22) and Vehicles of this brand have priority parking (3.06), rating is relatively low. This indicates that in the subsidies provided by the Shaanxi Provincial Government for new energy vehicles, there are no restrictions on the driving and use of new energy vehicles, and priority parking rights are also given, but the intensity is not sufficient. Due to environmental pollution issues, the government will impose restrictions on the use of fuel powered vehicles, while there are no restrictions on the use of new energy vehicles. However, this is only a policy for some new energy vehicles, and some gasoline electric hybrid vehicles are still restricted.

Table 13

Government Subsidies in terms of R&D Subsidies

Indicators	WM	VI	Rank
1.Companies receive government subsidies for R&D	3.29	Agree	2.5
2.The government pays more attention to the independent research and development capabilities of enterprises	3.37	Agree	1
3.Subsidies for key core technologies of enterprises mainly rely on financial support from the government	3.16	Agree	5
4.The scientific research subsidies for new energy vehicles are quite different from traditional vehicles	3.28	Agree	4
5.Government scientific research subsidies are conducive to the formation of technical barriers for local enterprises	3.29	Agree	2.5
Composite Mean	3.28	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 13 presents the assessment of Government Subsidies in terms of R&D Subsidies. As observed the respondents agree on the cited indicators with a composite mean of 3.28. Topped in the list was the government pays more attention to the independent research and development capabilities of enterprises with a weighted mean of 3.37. This indicates that the independent research and development capabilities of most respondents' companies are highly valued. At present, China's new energy vehicle industry has achieved significant achievements in self-research and development. BYD, Yutong, SAIC, and others have achieved significant results in the development of plug-in and hybrid vehicles, especially BYD, which has even reached the international first-class level in independent research and development. Fisher Vanden et al. (2006) found through their research on the influencing factors of China's energy that investment in independent research and development is the main factor affecting changes in China's energy efficiency. Chen Xue (2023) believes that in the early stages of the development of the new energy vehicle industry, some enterprises became dependent on government subsidies, resulting in less investment in their own independent research and development, leading to problems such as resource waste. Yang Ye et al. (2015) found that although government subsidies can make up for the problem of insufficient R&D funds for enterprises, they can also to some extent lead to the extrusion of existing R&D funds for enterprises, leading to their dependence on government subsidies. Lee and Cin (2011) argue that government subsidies can stimulate a company's ability to conduct independent research and

development by reducing its research and development expenses. In summary, the purpose of government subsidies is to enhance the independent research and development capabilities of the new energy vehicle industry, thereby increasing the market share of new energy vehicles.

Next is Companies receive government subsidies for R&D and Government scientific research subsidies are conducive to the formation of technical barriers for local enterprises, Tied for second place with a weighted average score of 3.29. This proves that most enterprises related to the new energy vehicle industry in Shaanxi Province have received government research and development subsidies, and most respondents believe that government research and development subsidies are beneficial for enterprises to form technological barriers. Guerzoni et al. (2016) conducted a study on the output and R&D investment of the new energy vehicle industry from two aspects: research subsidies and public procurement. The results showed that enterprise output significantly benefits from government R&D subsidies. Lhuillery et al. (2014) found through a study comparing more than 10 companies in France that government R&D subsidies and indirect subsidies have a positive and positive effect on the output of enterprises. Lu Chao (2021) also believes that when the government's research and development subsidies increase, the prices of products and the profits of various participants in the supply chain will correspondingly increase. When the R&D subsidy coefficient increases, the greenness of the product, wholesale price, retail price, and profit of supply chain members all correspondingly increase. Yalabik et al. (2011) studied the impact of government policies and market mechanisms on green production in the new energy vehicle industry and found that the reward system of government subsidies is more conducive to green technology innovation for enterprises than punishment methods.

In addition, regarding technological barriers, Zhang Chen's (2023) study found that companies related to the new energy vehicle industry should focus their main efforts on establishing innovation systems to overcome technological barriers and achieve technological innovation. Chen Penghao (2022) believes that government research and development subsidies cannot help companies overcome technological barriers in image technology. Therefore, the government should identify the direction of subsidies, help companies break away from their dependence on government subsidies, enable them to leverage their independent research and development capabilities, break down technological barriers, achieve comprehensive product upgrades, and seize more excellent markets.

However, the scientific research subsidies for new energy vehicles are quite different from traditional vehicles (3.28) and Subsidies for key core technologies of enterprises mainly rely on financial support from the government (3.16) rating is relatively low. This indicates that the government research subsidy method for the new energy vehicle industry in Shaanxi Province is not significantly different from traditional cars. At the same time, the core technology of enterprises does not entirely rely on government financial support, mostly relying on their independent research and development capabilities.

Table 14

Government Subsidies in terms of Marketing Subsidies

Indicators	WM	VI	Rank
1.Government marketing subsidies can effectively stimulate the market demand for new energy vehicles and promote industrial development	3.34	Agree	4
2.The government's marketing subsidy policy stimulates the research and development and innovation of new energy vehicle technology	3.32	Agree	5
3.The government's marketing subsidy policy can encourage more consumers to choose to buy new energy vehicles, thereby reducing the pollution of road traffic to the environment and improving air quality and ecological environment	3.36	Agree	2
4.The government's marketing subsidy policy will help enhance the competitiveness of the new energy vehicle industry	3.35	Agree	3
5.Governments need to balance subsidy policies to ensure that their effects are sustainable in the long term and in harmony with other environmental and economic policies	3.38	Agree	1
Composite Mean	3.35	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 14 presents the assessment of Government Subsidies in terms of Marketing Subsidies. As observed the

respondents agree on the cited indicators with a composite mean of 3.35. Topped in the list was Governments need to balance subsidy policies to ensure that their effects are sustainable in the long term and in harmony with other environmental and economic policies with a weighted mean of 3.38. This is sufficient to indicate that in Shaanxi Province, government subsidies for the new energy vehicle industry should be long-term and effective, and should be coordinated with the local regional economy and environment. Wang Wenbin et al. (2011) fully considered how government subsidies affect the reward and punishment mechanisms of the supply chain, and that government subsidies can further affect decision-making issues in the supply chain. Cao Yu et al. (2019) studied the impact of government coordinated subsidy policies on the promotion of the new energy vehicle industry in the face of non-government subsidies, single government subsidy policies, and government coordinated subsidy policies. Through comparison, it was found that the government's coordinated subsidy policies have a more significant promoting effect on the new energy vehicle industry. When new energy vehicles were just emerging in China, their main customers were bus and taxi users. Han Xingguo (2020) conducted research and empirical analysis on listed companies in the new energy bus industry and found that with the rapid development of new energy vehicles, private new energy cars have become increasingly popular, and government subsidies for new energy buses have begun to decrease, which may have a negative impact on the performance of enterprises in the short term, However, in the long run, it is more conducive to sustainable development for enterprises that survive in competition.

Next is The government's marketing subsidy policy can encourage more consumers to choose to buy new energy vehicles, thereby reducing the pollution of road traffic to the environment and improving air quality and ecological environment, ranking second with a weighted average score of 3.36. This indicates that the government's subsidy for the impact of new energy vehicles will encourage more consumers to purchase new energy vehicles, which can effectively solve the problem of road traffic congestion and improve the urban environment and air quality to a certain extent. With the rapid development of industrialization, resource consumption is increasing every day, and environmental pollution is even more severe. Therefore, many scholars have begun to study a series of new energy industries in order to promote harmonious development of regional economy and environment. Yang Wenrun (2022) pointed out that new energy vehicles naturally have the advantages of "energy conservation, emission reduction, and pollution reduction", which have made outstanding contributions to society and the environment. Therefore, supporting the development of the new energy vehicle industry can effectively save resources and alleviate environmental pressure. Of course, it is now the responsibility and goal of every country to significantly improve energy utilization and global ecological issues while ensuring sustained economic growth and improving people's living standards.

Ranked third is the government's marketing subsidy policy will help enhance the competitiveness of the new energy vehicle industry, with a weighted average score of 3.35. This indicates that many respondents believe that the government's subsidy policies can improve the competitiveness of the new energy vehicle industry in Shaanxi Province. Chen Zheng (2014) believes that government policies and subsidy interventions will incentivize relevant enterprises to engage in technological innovation, thereby promoting technological progress and enhancing their competitiveness. Zhao et al. (2019) used empirical research to analyze the impact of government subsidies on enterprises, and found that government subsidies for technology intensive enterprises can improve their core competitiveness. Yang Wenrun (2022) studied the impact of different forms of government subsidies on enterprises. He believes that no matter what form of subsidy is used, it can improve enterprise performance and thus enhance its competitiveness. Chao Peipei (2016) believes that reasonable government subsidies can stimulate enterprises' research and development enthusiasm, thereby increasing the core competitiveness of new energy vehicle enterprises.

The last two factors are Government marketing subsidies can effectively stimulate the market demand for new energy vehicles and promote industrial development (3.34) and the government's marketing subsidy policy stimulates the research and development and innovation of new energy vehicle technology (3.32). This indicates that in Shaanxi Province, government marketing subsidies have not had a significant effect on stimulating new energy vehicle technology and innovation. If enterprises want to achieve sustainable development, they should

weaken their dependence on the government and further improve their core technology innovation capabilities.

Table 15

Summary Table on Government Subsidies

Key Result Areas	Composite Mean	VI	Rank
Promotion Subsidies	3.21	Agree	3
R&D Subsidies	3.28	Agree	2
Marketing Subsidies	3.35	Agree	1
Grand Composite Mean	3.28	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 15 presents the assessment of Summary Table on Government Subsidies. As observed the respondents agree on the cited indicators with a Grand Composite Mean of 3.28. Topped in the list was Marketing Subsidies with a Composite Mean of 3.35. This indicates that the most effective government subsidy for new energy vehicles in Shaanxi Province is marketing subsidies, which can directly affect the market and stimulate consumers' purchasing desire and demand. Starting from 2009, the Chinese government began to formulate consumer car purchase policies, clearly proposing marketing subsidies for new energy vehicles, including car purchase subsidies. With the increase of national support, the new energy vehicle industry has received a good development environment. Hardman (2016) directly proposed through research that the government should increase marketing subsidies to stimulate consumer demand and improve the competitiveness of new energy vehicle companies. Xu Ruike (2022) believes that if the government can provide certain marketing subsidies when consumers choose new energy vehicles, it can enhance their purchasing power, stimulate consumption, and provide a favorable environment for the development of new energy vehicles.

Next is R&D Subsidies, ranking second with a weighted average score of 3.28. This indicates that research and development subsidies have also played a very important role in the sustainable development of the new energy vehicle industry in Shaanxi Province. Wen Xingqi's (2018) study found that R&D subsidies can to some extent stimulate the R&D enthusiasm of some enterprises, thereby improving their competitiveness. Song Yanqiu (2021) found through various research and analysis that government R&D subsidies can significantly improve the quality and competitiveness of enterprises' products.

The promotion subsidy ranked last, with a weighted average score of 3.21. This proves that in the sustainable development of the new energy vehicle industry in Shaanxi Province, the impact of promotion subsidies is not as significant as marketing subsidies and research and development subsidies. Chen Penghao's (2022) research suggests that the methods of government subsidies are diverse, and the income of new energy vehicles is affected by government research and development subsidies, but more importantly, they require government promotion subsidies. There are many limiting factors for the development of new energy vehicles in Shaanxi Province. The government should increase the promotion of new energy vehicle products, expand the influence of new energy vehicles, stimulate consumer demand and desire, and provide a good market environment for the sustainable development of new energy vehicles.

Table 16

Relationship Between Innovation System and Green Supply Chain Management

Variables	rho	p-value	Interpretation
Target System			
Green Design	0.687**	0.000	Highly Significant
Green Production	0.641**	0.000	Highly Significant
Green Logistics	0.670**	0.000	Highly Significant
Green Marketing	0.710**	0.000	Highly Significant
Green Recycling	0.640**	0.000	Highly Significant
Policy System			
Green Design	0.765**	0.000	Highly Significant
Green Production	0.709**	0.000	Highly Significant
Green Logistics	0.703**	0.000	Highly Significant
Green Marketing	0.731**	0.000	Highly Significant
Green Recycling	0.695**	0.000	Highly Significant

Technical System			
Green Design	0.723**	0.000	Highly Significant
Green Production	0.759**	0.000	Highly Significant
Green Logistics	0.668**	0.000	Highly Significant
Green Marketing	0.737**	0.000	Highly Significant
Green Recycling	0.645**	0.000	Highly Significant

**. Correlation is significant at the 0.01 level

As shown in the table, the rho values calculated in Table 16 range from 0.640 to 0.765，indicate a strong direct relationship among the sub variables of innovation system and green supply chain management. There was a statistically significant relationship between innovation system and green supply chain management because the obtained p-values were less than 0.01. In the development process of the new energy vehicle industry in Shaanxi Province, the innovation system has significantly affected green supply chain management. That is to say, the target system, policy system, and technical system in the innovation system can have a significant impact on the factors of green supply chain management such as green, design, green production, green logistics, green marketing, and green recycling.

Firstly, the target system has a significant correlation with the green design, green production, green logistics, green marketing, and green recycling of products, with rank correlation coefficients of 0.687, 0.641, 0.670, 0.710, and 0.640, respectively, with a significance level of 0.01. Long Guicheng's (2022) study found that clear goals are more effective in promoting green and sustainable development of enterprises than simply demanding higher performance. Sheng Yongshi (2017) believes that China's new energy vehicle industry is a rapidly nationalized industry, so it is necessary to consider recent comparative advantages and long-term competitive advantages in the target system. Li Ting (2016) found through research that an important challenge in the development process of China's new energy vehicle industry is the goal system in the independent innovation system. The establishment of the goal system can ensure the coordinated development of the green supply chain management level of the new energy vehicle industry.

Secondly, the policy system has a significant correlation with the green design, green production, green logistics, green marketing, and green recycling of products, with rank correlation coefficients of 0.765, 0.709, 0.703, 0.731, and 0.695, respectively, with a significance level of 0.01. Zhang Zhihe (2006), as a supporter of the entire policy system, has introduced many policy systems to support the development of the new energy vehicle industry in the country and various regions. Enterprises will also develop their own policy systems based on the policies of the national and regional governments, which will effectively promote the green and sustainable development of the new energy vehicle industry in enterprises. Xu Xiaoqin (2019) believes that according to the current development status of the new energy vehicle industry, enterprises need to use their own policy system to guide their innovation system, in order to strengthen the sustainable development ability of the new energy vehicle industry in the future.

The technical system has a significant correlation with the green design, green production, green logistics, green marketing, and green recycling of products, with rank correlation coefficients of 0.723, 0.759, 0.668, 0.737, and 0.645, respectively, with a significance level of 0.01. Hu Dengfeng (2010) believes that in China, with the rapid rise of new energy vehicles, the support of technology is clearly insufficient. Therefore, technological innovation is a key way to obtain future comparative advantages in the industry. Sheng Yongshi (2017) compared the differences between the new energy vehicle industry and traditional fuel vehicles. He believes that the key technologies in the new energy vehicle industry can promote the competitiveness of the new energy vehicle industry. Therefore, the establishment of a technological system in the new energy vehicle industry is the core competitiveness of enterprise development, which can promote the development of green supply chain management and ensure the long-term sustainable development of enterprises. Zhang Guozheng (2007) also believes that the technology system of the new energy vehicle industry is significantly different from the traditional fuel vehicle industry technology system. The establishment of the new energy vehicle technology system is led by key core technologies to guide the green and sustainable development of the new energy vehicle industry.

Table 17

Relationship Between Innovation System and Government Subsidies

Variables	rho	p-value	Interpretation
Target System			
Promotion Subsidies	0.574**	0.000	Highly Significant
R&D Subsidies	0.602**	0.000	Highly Significant
Marketing Subsidies	0.620**	0.000	Highly Significant
Policy System			
Promotion Subsidies	0.672**	0.000	Highly Significant
R&D Subsidies	0.657**	0.000	Highly Significant
Marketing Subsidies	0.632**	0.000	Highly Significant
Technical System			
Promotion Subsidies	0.567**	0.000	Highly Significant
R&D Subsidies	0.607**	0.000	Highly Significant
Marketing Subsidies	0.643**	0.000	Highly Significant

**. Correlation is significant at the 0.01 level

As seen in the table 17, the computed rho-values ranging from 0.574 to 0.672 indicate a moderate to strong direct relationship among the sub variables of innovation system and government subsidies. There was a statistically significant relationship between innovation system and government subsidies because the obtained p-values were less than 0.01. This indicates that the innovation system has significantly affected government subsidies in the development process of the new energy vehicle industry in Shaanxi Province. That is to say, the target system, policy system, and technical system in the innovation system can have a significant impact on the promotion subsidies, R&D Subsidies, and marketing subsidies of the new energy vehicle industry.

Firstly, the target system has a significant correlation with promotion subsidies, R&D Subsidies, and marketing subsidies for the new energy vehicle industry, with rank correlation coefficients of 0.574, 0.602, and 0.620, respectively, with a significance level of 0.01. Hu Dengfeng (2010) believes that the innovation goal of the new energy vehicle industry is to develop hydrogen fuel cell vehicle technology and corresponding infrastructure, which relies on government support, including marketing subsidies and promotion subsidies. Through this policy support and subsidies, the industry is separated from complex affairs management, thereby enhancing its own industrial upgrading and development, and through industrial development, the achievements will be reversed to support the government's promotion. Sheng Yongshi (2017) believes that the establishment and development of an energy vehicle innovation system require the cooperation of various participants, including government support. Government research and development subsidies and marketing subsidies can promote more updated research results in the new energy vehicle industry for enterprises, and promote these results through government support in the market.

Secondly, the policy system has a significant correlation with promotion subsidies, R&D Subsidies, and marketing subsidies for the new energy vehicle industry, with rank correlation coefficients of 0.672, 0.657, and 0.632, respectively, with a significance level of 0.01. Ye Qiang and Wang Hewu (2012) believe that the new energy vehicle industry is a huge industry that includes multiple factors such as supply chain, information, and capital. The development of the entire industry needs to be established in a "government led, subsidy centered" business development model. Enterprises can establish their own policy system according to government policies to promote sustainable development of the industry. Yue Yunfan (2016) believes that regional government support is an essential link in the development of the new energy vehicle industry, and Tesla also benefits from promotion support and research and development subsidies from federal and state governments. The methods of government support vary in different regions. Currently, the main forms of government support in Shaanxi Province are promotion subsidies, research and development subsidies, and marketing subsidies to reduce consumer usage costs and achieve the purpose of promotion.

Thirdly, the technology system has a significant correlation with the promotion subsidies, R&D Subsidies, and marketing subsidies of the new energy vehicle industry, with rank correlation coefficients of 0.567, 0.607, and 0.643, respectively, with a significant level of 0.01. Zhang Leping et al. (2012) conducted a study on

government policies for the development of new energy vehicle industries in developed countries in Europe and America, and found that government preferential and subsidy policies can have a positive impact on technological innovation of charging modes. Angel (2020) believes that optimizing government support policies can truly improve the development of high-tech in the new energy vehicle industry, thereby stimulating the vitality and improvement of energy technology innovation and optimized configuration, and is conducive to encouraging the establishment of a technological innovation system in the new energy vehicle industry. Foxon (2005) pointed out that innovation in new energy technologies requires maintaining the stability and consistency of government policy support. Reichman (2011) believes that policy support, promotion, and research and development support for technology-intensive enterprises can stimulate the initiative of enterprises to initiate innovation.

Table 18

Relationship Between Green Supply Chain Management and Government Subsidies

Variables	rho	p-value	Interpretation
Green Design			
Promotion Subsidies	0.644**	0.000	Highly Significant
R&D Subsidies	0.636**	0.000	Highly Significant
Marketing Subsidies	0.658**	0.000	Highly Significant
Green Production			
Promotion Subsidies	0.573**	0.000	Highly Significant
R&D Subsidies	0.618**	0.000	Highly Significant
Marketing Subsidies	0.670**	0.000	Highly Significant
Green Logistics			
Promotion Subsidies	0.666**	0.000	Highly Significant
R&D Subsidies	0.669**	0.000	Highly Significant
Marketing Subsidies	0.668**	0.000	Highly Significant
Green Marketing			
Promotion Subsidies	0.658**	0.000	Highly Significant
R&D Subsidies	0.703**	0.000	Highly Significant
Marketing Subsidies	0.725**	0.000	Highly Significant
Green Recycling			
Promotion Subsidies	0.699**	0.000	Highly Significant
R&D Subsidies	0.681**	0.000	Highly Significant
Marketing Subsidies	0.703**	0.000	Highly Significant

***. Correlation is significant at the 0.01 level*

As seen in the table 18, the computed rho-values ranging from 0.573 to 0.725 indicate a moderate to strong direct relationship among the sub variables of green supply chain management and government subsidies. There was a statistically significant relationship between green supply chain management and government subsidies because the obtained p-values were less than 0.01. This indicates that green supply chain management has significantly affected government subsidies in the development process of the new energy vehicle industry in Shaanxi Province. That is to say, the green design, green production, green logistics, green marketing, and green recycling in the green supply chain management of the new energy vehicle industry in Shaanxi Province can have a significant impact on the government's promotion subsidies, R&D Subsidies, and marketing subsidies.

Firstly, green design has a significant correlation with government promotion subsidies, R&D Subsidies, and marketing subsidies, and marketing subsidies, with rank correlation coefficients of 0.644, 0.636, and 0.658, respectively, with a significance level of 0.01. Jiang Xiaohong (2017) believes that strengthening the green design awareness of high-tech enterprises can increase government financial support, thereby increasing green production capacity. Liu Jie (2018) believes that the focus of the high-tech industry should be on strengthening green design, which can help increase research investment, attract government research and development subsidies, build a green development platform, and achieve long-term sustainable development.

Secondly, green production has a significant correlation with promotion subsidies, R&D Subsidies, and marketing subsidies, with rank correlation coefficients of 0.573, 0.618, and 0.670, respectively, with a significance level of 0.01. Green packaging is not a way for businesses to profit from policies, but rather a way to convey a green and environmentally friendly concept to consumers. This can to some extent stimulate the

design responsibility of enterprises and improve brand awareness. Enterprises should also consider comprehensive considerations such as green storage and green recycling. Hu Zhijun (2009) studied the development status of important industries since the reform and opening up. He believes that in order to improve the environment, the government has been advocating green design and packaging in Dali. Under the advocacy of national policies, enterprises are also using more and more environmentally friendly packaging materials.

Thirdly, green logistics has a significant correlation with government promotion subsidies, R&D Subsidies, and marketing subsidies, with rank correlation coefficients of 0.666, 0.669, and 0.668, respectively, with a significant level of 0.01. The new energy vehicle industry in Shaanxi Province is facing fierce competition. Currently, as well as the national policy of green environmental protection, it is necessary to systematically manage the green logistics of enterprises. Joseph Sarkis (2003) found through his research on green supply chain management in high-tech industries that green supply chains can enhance a company's core competitiveness, reduce environmental pollution, and further obtain government support and subsidies. Zhulan and Hu Dawei (2018) believe that establishing a green logistics network can promote the sustainable development of enterprise supply chain management. Zhang Yunxia (2018) believes that the concept of green logistics not only caters to national and government policies, but also further controls the logistics cost management of enterprises and promotes their sustainable development.

Fourthly, green marketing has a significant correlation with government promotion subsidies, R&D Subsidies, and marketing subsidies, with rank correlation coefficients of 0.658, 0.703, and 0.725, respectively, with a significant level of 0.01. For the new energy vehicle industry, the links of green marketing and green recycling are directly related to customers, which can affect customer satisfaction and demand. Papadas, Avlonitis, et al. (2017) found through their research on green industry marketing activities in the new energy vehicle industry that green marketing orientation can better receive government support. At the same time, strategic and tactical green marketing orientation can also promote the development of enterprises themselves. Lao Huangping (2019) conducted an in-depth analysis of the development status of the new energy vehicle industry both domestically and internationally, and believed that green marketing methods can effectively promote the market promotion of new energy vehicles. Maharmuni's (2014) study found that government subsidies can guide the green marketing of new energy vehicle companies towards a friendly direction.

Finally, green recycling has a significant correlation with government promotion subsidies, R&D Subsidies, and marketing subsidies, with rank correlation coefficients of 0.699, 0.681, and 0.703, respectively, with a significance level of 0.01. Lu Chao (2021) found through his research on the green recycling process of enterprises that the purpose of government subsidies is to maintain a balanced development of the entire industry. The concept of green recycling can help enterprises achieve stable and balanced development with government support.

As shown in Figure 1, the innovation system, green supply chain management, and government subsidies are important influencing factors for the sustainable development of the new energy vehicle industry in Shaanxi Province. The article conducts market research on enterprises and personnel related to the new energy vehicle industry in Shaanxi Province, and uses SPSS tool analysis to obtain empirical research results.

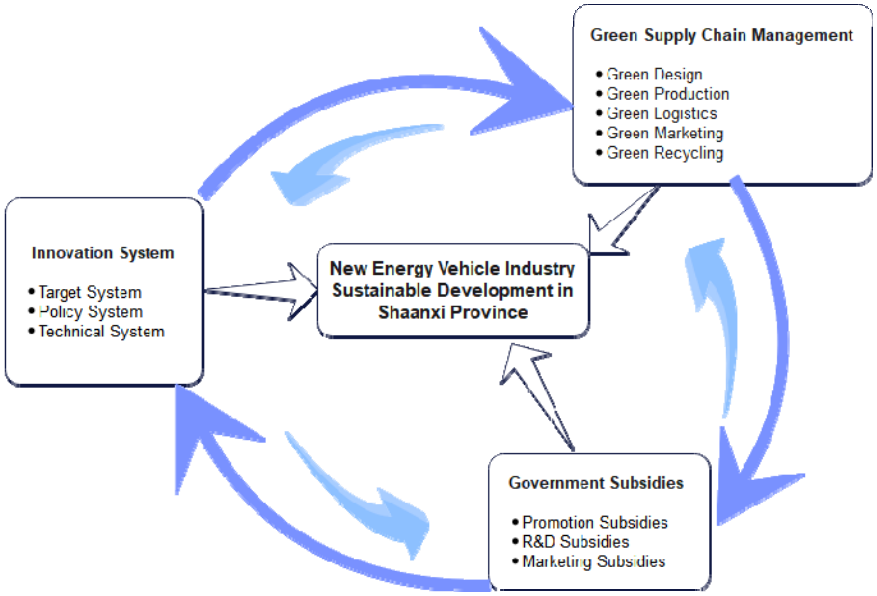

Figure 1
Establishing a Sustainable Development Model for the New Energy Vehicle Industry in Shaanxi Province

The results indicate that the innovation system has a positive impact on green supply chain management and government subsidies, respectively; Green supply chain management also has a positive impact on government subsidies. The article provides a good development model and framework for the sustainable development of the new energy vehicle industry in Shaanxi Province by analyzing the mutual influence and interaction among the three factors.

4. Results and Conclusion

Respondents revealed moderate agreement on the innovation system particularly the target system, policy system, and technical system adopted by the new energy vehicle industry. The respondents have moderate regard on the green supply chain management practices of the new vehicle industry in terms of green design, green production, green logistics, green marketing, and green recycling. In the aspect of government subsidies for the new energy vehicle industry respondents expressed moderate agreement with promotion subsidies, R&D subsidies, and marketing subsidies. Result shows that there is high significant relationship between innovation system, green supply chain management and promotion subsidies. Proposed a framework that can meet the sustainable development of the new energy vehicle industry in Shaanxi.

4.1 Recommendations

Shaanxi Province's new energy vehicle related enterprises should promote the establishment of their innovation system by improving the development level of their core technology system and combining it with government research and development subsidies. Enterprises should promote the development of green supply chain management by improving the development of green production and marketing within the enterprise, thereby promoting the green and sustainable development of the new energy vehicle industry. Enterprises can promote their products through government marketing subsidies, which can effectively alleviate the cost of using new energy vehicles and reduce the purchasing pressure on enterprises and consumers. A framework and model suitable for the sustainable development of the new energy vehicle industry in Shaanxi Province have been established through research on three factors: innovation system, green supply chain management, and government subsidies. Meanwhile, this sustainable development framework may be applied to other new energy or automotive fields. Finally, future researchers can explore and analyze solutions to study the sustainable

development drivers of the new energy industry by investigating factors such as market segmentation and positioning.

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