

The Effect of Sustainable Supply Chain Management on Firm Performance Mediated by Logistics Capacity

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Abstract: This study aims to examine the effect of sustainable supply chain management on firm performance mediated by logistics capacity; the subjects of this study were the actors of the China's Auto Manufacturing Industry. This type of research is quantitative research with descriptive research and causal research using questionnaires distributed directly or indirectly to the Auto Manufacturing Industry actors as many as 382 respondents. Moreover, Structural Equation Model (SEM) Software was used for data analysis. The results of the study found that sustainable supply chain management affects logistics capacity, firm performance was also observed to be influenced by sustainable supply chain management and logistics capacity while firm performance was also found to be affected by sustainable supply chain management through the mediating effect of logistics capacity. The significant implication of this study is for managers to enhance logistics capacity in the process of implementing sustainability supply chain to improve firm performance, while providing recommendations to the government and automobile Manufacturers in conducting the assistance process to Auto Manufacturing MSMEs.

Keywords: Sustainable Supply Chain Management; Logistics Capacity; Firm Performance; Structural Equation Model.

1. Introduction

Automobile manufacturing is a strategic and pillar industry of China's economy. In 2023, China's automobile manufacturing industry realized an operating income of 100,975.8 billion yuan, an increase of 11.9% year-on-year, accounting for 7.6% of the total operating income of industrial enterprises above designated size. The profit of the automobile manufacturing industry was 508.63 billion yuan, an increase of 5.9% year-on-year, accounting for 6.6% of the total profit of industrial enterprises above designated size. Synchronized with the industry's profit growth, in 2023, China's auto production and sales also showed strong resilience. China Association of Automobile Manufacturers data show that in 2023, China's automobile production and sales were completed 30.161 million units and 30.094million units, an increase of 11.6% and 12%.In addition, in 2023, China's auto exports will approach 5 million units, surpassing Japan to become the world's top auto exporter. In the post-epidemic era, although the automobile manufacturing industry has promoted China's social and economic recovery, as an energy and resource-intensive industry has also brought a lot of environmental and social pressure to China as well.

With the rapid development of economic globalization and industrialization, the problems of resource and energy constraints and ecological deterioration are intensifying. sustainable development is receiving more and more widespread attention. While supply chain enterprises are making profits, they must also undertake corresponding social and environmental responsibilities. The concern of supply chain management on enterprise performance is no longer only pursues single economic performance, but developing to emphasize the performance level of economic, environmental, and social aspects, which requires enterprises to establish reasonable operation mechanisms and management methods in supply chain management. Sustainable supply chain management (SSCM)has received extensive attention in academic and business circles.

Furthermore, modern developments in theory and practice have indicated that sustainability should cover economic, operational, and environmental aspects, as well as society at large. Those aspects of sustainability are widely studied in the manufacturing industry literature throughout its supply chain. However, due to the complex heterogeneous nature of the industry, the majority of studies in the first decade of the 21st century did not widely cover all industries, especially the auto manufacturing sector and their sustainable supply chain management practices [1]. The increasing risk of supply chain disruptions since the beginning of the COVID-19 pandemic. It was one of the hardest hit sectors, and it underwent drastic challenge. Further, few holistic approaches covering sustainability dimensions in supply chain management practices and performance, and the mediating role of logistics capacity (LC) have been proposed and investigated in the context of automotive manufacturing.

Therefore, this study is novel and important in that it considers the role of sustainable supply chain management (SSCM) and logistics capacity(LC), and their impacts on firm performance (FP). The objectives of this research are to:

(1)Review and identify the variables, develop the constructs, and propose the scale for assessing SSCM, FP and LC.

(2)Test the scale for validity and reliability.

(3)Investigate the causal effects of SSCM on FP.

(4)Examine the moderating effects of LC between SSCM and SP.

To address these questions, we adopted a structural equation modeling to quantitatively analyze the correlation between SSCM and FP, using 382 independent samples in the automotive manufacturing industry.

Firstly, we give a more comprehensive conceptual framework of SSCM and FP. Our study is an empirical generalization of previous research that can broaden the knowledge of the relationship between SSCM and FP, such as relevant variables, structure, and mediating effects. Secondly, unlike previous studies, our study is the first to synthesize the

contribution of SSCM to FP, providing researchers with some inspiration on the role of SSCM in LC. Finally, the results of the mediator analysis demonstrate the conditions that can make SSCM practices more beneficial to firm performance. In particular, the mediating role of the supply chain hierarchy can help managers to trade off SSCM in the face of insufficient resources.

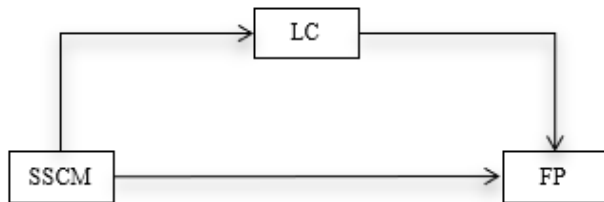


Figure 1. Theoretical Framework. (SSCM—sustainable supply chain management, LC—logistics capacity, FP— firm performance).

The theoretical background of the constructs and their causal relationship, as per the conceptual diagram in Figure 1, are presented in the next section. Further, hypothesis development, research methodology, data analysis, interpretation, findings, discussion, implications, limitations,

directions for future research, and concluding remarks are presented in the following sections.

2. The Theoretical Background of SSCM, LC, and FP

2.1. Sustainable Supply Chain Management (SSCM)

Scholars have focused on supply chain management(SCM) since 1994[2]. Supply chain management is defined as the management of order fulfillment processes, organizations and activities. It creates efficient value systems through actions, such as collaboration and information sharing ,to achieve sustainable competitive advantage[3].Elkington (1988) proposed the triple bottom line theory, which states that companies consider environmental and social factors in their operations and integrate the concept of sustainability into their supply chains[4].SSCM has made it important for companies to ensure sustainable practices in their business processes. In the literature, there are different definitions of SSCM which indicates the different perspectives of the scholars in this new field . Some important definitions of SSCM are presented in Table 1 below.

Table 1. SSCM Definition.

Author	Definition
Seuring et al. (2008)	SSCM was described as the management of the flow of materials, information, and capital in the supply chain and the cooperation of all entities. Especially, they claimed that SSCM should be consistent with economic, environmental, and social sustainability[5].
Carter et al. (2008)	Strategic, transparent integration to achieve the social, environmental, and economic objectives of organizations in the systemic coordination of business processes between organizations primarily to improve the long-term economic performance of each company and its supply chain [6].
Haake et al.(2009)	A sustainable supply chain from a product life cycle perspective is proposed as a relationship between the environmental, social and economic issues involved in a series of activities of supply chain enterprises in dealing with product design, procurement, production, distribution and recycling[7].
Gupta et al.(2011)	Consider integrating sustainable development into the design, procurement, production and distribution processes throughout the supply chain in approaches to mitigating environmental degradation[8].
Zailani et al. (2012)	Supply chain management and sustainable development can be integrated to produce three dimensions which include the economic, environmental, and social issues associated with the development of humans and which are related to the strategies and activities of a company[9].
Ahi et al.(2013)	Sustainable supply chain management from a strategic perspective as being the effective management of logistics, information and financial flows in the design, procurement, production, distribution and other activities of a product or service, taking into account the needs of stakeholders in an integrated manner, coordinating environmental, social and economic benefits among supply chain enterprises, and improving the long-term profitability of enterprises[10].
Beske et al.(2014)	The fundamental concept of sustainability can be mentioned as the presence of three critical elements social, environmental, and financial elements for product manufacturing that affect the corporate strategy[11].
Marshall et al.(2015)	Companies and organizations are required to contribute to social welfare and decrease their environmental impact while being profitable[12].
Das et al. (2017)	Sustainable Supply Chain Management (SSCM) blends the goals of both CSR and GSCM, which in turn, helps organizations achieve its economic goals, environmental goals, and societal goals at a micro level and ultimately improve the image of the firms in the eyes of the stakeholders.[13].
Narimissa et al. (2020)	SSCM is the revision of traditional supply chain management that includes environment, social, and profit measurement. It is strongly recommended that organizations link all activities of the supply chain related to environmental, social, and economic aims to produce sus-tainable outcomes[14].

2.2. Dimensions of SSCM

There is no uniform conclusion about the delineation of sustainable supply chain management dimensions, but numerous scholars at home and abroad have conducted relevant studies. These researchers have provided a more detailed description of SSCM in terms of dimensions [15-17],such as sustainable procurement, sustainable product

design, sustainable manufacturing, sustainable distribution and packaging, sustainable customer collaboration, reverse logistics, and employee social practices. Other dimensions such as sustainable marketing, socially sustainable practices and internal sustainable management[18-19].Environmental management, socially responsible management (focusing on employees and communities), operations management and supply chain integration are considered as the four

dimensions of sustainable supply chain management practices [13]. In addition, other researchers have defined sustainable supply chain management in terms of internal sustainable management and sustainable cooperation with downstream customers [20-21]. Researchers are beginning to focus on the extent to which customers value the environment, emphasizing the important role of customer management in sustainable supply chain management [22-23]. Customer-level SSCM emphasizes sustainable collaboration and focuses on customer attitudes toward sustainability [24].

Although SSCM has attracted a lot of research in recent years, its conceptual and theoretical frameworks remain unclear. In general, the dimensioning of sustainable supply chain management based on the product life cycle theory as well as the internal environmental management and social responsibility management of enterprises is a more extensive study by current scholars. Therefore, in this study, we developed a new SSCM framework in which we explored the multidimensional structure of SSCM and clarified the interaction among these internal dimensions. In our SSCM framework, we supplemented two dimensions, such as sustainable supplier selection [25-26] and customers environmental orientation [22,24]. SSCM is divided into internal sustainable supply chain management ("ISSCM") and external sustainable supply chain management ("ESSCM") based on the organizational boundaries of enterprises. ISSCM focuses on sustainable procurement, sustainable design, sustainable manufacturing, sustainable distribution, and investment recovery. ESSCM focuses on supplier management and customer management, which compensates for the fact that only a single internal management cannot improve the efficiency of the whole supply chain [27-29].

2.3. Logistics Capability

Existing literature has not yet had a consistent definition of logistics capability, this paper, in combing domestic and international related literature found that different scholars have interpreted logistics capability from different research perspectives and fields.

From a resource allocation perspective, logistics capacity is part of an enterprise's resources, including all technologies, input capital, capabilities, information, and knowledge, such as service capabilities as well as information and warehouse management capabilities [30]. Logistics competence is also recognized as the ability of a company to operate and manage logistics in the process of innovating or improving the quality of customer service [31]. From the perspectives of logistics services, costs and customer satisfaction, the ability of a manufacturing company to provide high-quality services to its customers while controlling costs is considered to be the company's logistics capability [32]. The ability to provide customer service in terms of cost, service efficiency, flexibility and information technology can all be defined as a firm's logistics capabilities [33]. Of course, there are scholars who support that logistics capability should be from the whole process of receiving information, processing information, sorting products, transportation, distribution, and after-sale returns, which can reflect the timeliness of order processing and the quality of distribution services [34]. Starting from the six logistics capability elements of logistics distribution speed, cost, after-sales service, response speed, service quality, and information sharing, it enhances consumer value and enterprise value [35-37]. Establishing logistics operation

capability, integrated management capability, flexibility capability, and information capability is essential for improving business operations, management, and customer service [38-39]. Combined with the existing literature on the definition of logistics capacity, We followed [38-39], who structured logistics capacity (LC) into logistics operation capacity (LOC) and logistics information capacity (LIC).

Automobile manufacturing industry as a complex network structure of the supply chain system, enterprises need to have certain logistics facilities technology, information technology means and professional logistics personnel. Through the enterprise and even the entire upstream and downstream enterprises of parts and components products, transportation services, customer after-sales terminal services and information resource sharing and other functional activities to manage, so as to quickly, safely and efficiently realize the spatial movement of the product, prompting the various upstream and downstream enterprises can real-time follow up, query and understanding of the product's inventory status, sales dynamics and transportation status. At the same time, the enterprise can adjust the inventory and procurement plan according to the changes in market demand, and with the help of the information technology system platform to the supplier to issue replenishment plan instructions, reduce the loss caused by out-of-stock, and then enhance the automobile manufacturing enterprises to meet customer demand and respond to market changes in the ability, as well as to reduce the entire cost of transportation, inventory, circulation and time, to create a high-quality logistics services. Therefore, the logistics capability of automobile manufacturing enterprises refers to the ability of enterprises to create a networked, intelligent, shared and green logistics system through the optimization and integration of internal and external logistics resources, technology, knowledge and information in the supply chain, as well as the ability of managers to regulate and control the flow of basic elements of logistics.

2.4. Firm Performance

Performance evaluation has been increasingly emphasized by enterprises as an important basis for improving management activities and guiding the healthy operation of enterprises. Research scholars have constructed and selected different measurement indicators according to different research contents.

Scholars measure the performance of traditional firms by constructing four first-level indicators, namely current ratio, risk indicator, growth opportunity indicator and asset management capability, and second-level indicators such as net liquidity, asset-liability ratio, net sales and accounts receivable turnover [40]. Market value added, working capital, right debt capital, product cost and net profit margin can also measure the company's EVA performance [41]. Using the balanced scorecard methodology, a performance evaluation system for lean production was established and an indicator system with four dimensions of customers, shareholders, production and continuous improvement was proposed [42]. Empirical analysis of listed white goods companies in terms of profitability, adaptability, solvency and expansion using BP neural network techniques [43].

With the increasing attention of the government and the public to environmental protection and social issues, more scholars have paid attention to the social and environmental aspects of performance measurement, calling for the design and construction of performance evaluation frameworks for

environmental and social aspects. The environmental performance of companies is classified into three aspects: reducing the emission of "three wastes" and toxic substances, reducing the frequency of environmental accidents, and improving the environmental status of the company[44]. The environmental performance of the Palestinian manufacturing sector was measured in terms of reducing the emission of toxic chemicals, reducing the waste of materials, increasing the use of renewable energy and sustainable fuels, improving the environmental condition of the firm, and reducing the frequency of environmental accidents[45].

Social performance represents indicators that improve the overall level of stakeholder welfare, community health and worker safety, and product quality, such as improving the company's image and social reputation, increasing employee job satisfaction, improving employee health and safety, improving product quality, increasing customer satisfaction, and raising the awareness of people in the community to protect their rights and demands [46-47]. [14] developed a system for assessing economic, social and environmental sustainable performance based on stakeholder theory and used the Delphi method to identify sustainable performance indicators of Iranian oil companies .

Following scholars [48], we categorise firm performance (FP) into economic performance(EP), environmental performance (EnP) and social performance(SP), where economic performance (EP) includes cost reduction (reduction of costs due to resource procurement, energy consumption, environmental and environmental protection accidents, etc.), increase in sales, market share and the company's ability to achieve the required profit. Environmental performance(EnP) includes reduction of the "three wastes" pollution, avoidance or reduction of the use of harmful and toxic substances, increase in the frequency of environmental accidents, energy saving, etc. Environmental performance includes reducing the "three wastes" of pollution, avoiding or reducing the use of harmful and toxic substances, reducing the frequency of environmental accidents, saving energy, etc. Social performance(SP) includes employees' access to minimum wages and benefits such as medical care, annual leave and safe workplaces.

3. Hypothesis Development

3.1. Sustainable Supply Chain Management and Firm's Performance

The evidence regarding the impact of SSCM on firm performance is inconclusive. On the one hand, some researchers argue that the two are negatively or irrelevantly correlated[49-51] . While SSCM improves firms' ability to meet environmental and social expectations, it is accompanied by higher initial investment and direct operating costs, which may increase firms' costs in the short term. The relationship between sustainable cooperation with customers in waste investment recovery and environmental performance is positive, whereas the relationship with economic performance is not [52]. Scholars [53] investigated the existence of a negative or non-significant relationship between sustainable product design, sustainable distribution, reverse logistics and social performance, utilizing Malaysia as an illustrative example. Consequently, the business benefits from SSCM are uncertain or even negatively correlated at this level[54-55].

Conversely, other researchers have proposed a positive

correlation between them[56-57] . SSCM integrates sustainability throughout all stages of business operations, which is beneficial to the long-term development of a company and helps to improve its profitability and competitive advantage[58]. The implementation of SSCM practices within an enterprise can result in a reduction of production and transaction costs, an increase in sales opportunities in the market, and the generation of superior economic benefits[28]. Furthermore, the implementation of SSCM practices in an organisation can enhance the reputation of the organisation and reduce the cost of managing operations, thereby improving supply chain performance and gaining competitive advantage[59-60].

Other scholars have highlighted that performance gains can be achieved not only through the utilisation of resources that are owned or controlled by the firm, but also through inter-firm collaboration. The implementation of SSCM requires not only internal practices within the enterprise, but also external SSCM between the enterprise and external supply chain members. This necessitates a significant investment of expertise, capabilities, capital, technology, and other resources. Enterprises that are able to react promptly and effectively to external market forces and to cultivate productive relationships with suppliers and customers will be better positioned to identify and seize market opportunities[14]. The strengthening of cooperation with supply chain partners can assist companies in significantly reducing material waste in the production and distribution process, which in turn reduces production and manufacturing costs. Furthermore, collaboration in the recycling of valuable components or products during the production and manufacturing process can also facilitate improvements in economic and environmental performance [61]. The adoption of cooperation with suppliers or customers to obtain valuable resources allows companies to reduce production and transaction costs, maximize their sales opportunities in the market, increase market share and profitability, and obtain better economic benefits [13,62].

Based on the above analyses, the researcher puts forth the following hypotheses:

Hypothesis 1(H1): Internal SSCM(ISSCM) has a significant positive effect on firm performance (a economic, b environmental, c social).

Hypothesis 2(H2): External SSCM(ESSCM) has a significant positive effect on firm performance (a economic, b environmental, c social).

3.2. Sustainable Supply Chain Management and Logistics Capability

Logistics, as one of the important links in the sustainable supply chain management activities of enterprises, is one of the largest sources of energy consumption as well as emission of large amounts of harmful gases and wastes into the environment. This not only adversely affects the sustainable development of enterprises, but also threatens the sustainable development of the society and the survival of human beings. Logistics management capability is one of the dynamic capabilities of the supply chain, and effective management of logistics in the supply chain can improve the responsiveness of the entire supply chain to products or services and reduce transaction costs[63]. Multi-objective integrated procurement and logistics plan for sustainable supply chain aims to reduce the total cost of carbon emissions and promote the maximization of the efficiency of transport vehicles and

personnel[64]. Logistics activities, if not properly managed, are likely to bring tragedy to human society by increasing waste and energy consumption and greenhouse gas emissions. Introducing environmental management and social responsibility practices in logistics activities can save energy and resources, improve logistics capabilities, reduce negative environmental and social impacts, and significantly improve business performance[65]. Sustainable logistics activities may not be implemented effectively if employees are not well motivated and remunerated, which calls for the development of sustainable employee incentive programmes and skills training in the logistics function to develop the sustainable innovation capabilities required by the organisation[66].

Based on the above analyses, the following hypotheses were formulated:

Hypothesis 3(H3): Internal SSCM(ISSCM) has a significant positive effect on logistics capacity (a operations, b information).

Hypothesis 4(H4): External SSCM(ESSCM) has a significant positive effect on logistics capacity (a operations, b information).

3.3. Logistics Capability and Firm's Performance

Logistics capability, as a dynamic capability, is one of the core resources of an enterprise. Supply chain enterprises strengthen the integration of internal and external logistics resources, and efficiently manage all aspects of logistics functional activities, so as to bring a rich source of profit for the enterprise and enhance the competitive advantage.

Scholars [67] constructed the "capability-performance" framework and empirically analysed 268 questionnaires using structural equation modelling, pointing out that non-financial performance mediates between third-party logistics service capability and financial performance.[39] analysed 390 data from Chinese enterprises and found that logistics operation capability, flexibility capability, and comprehensive management capability have a significant positive impact on social performance.[68] empirically investigated the relationship between logistics capability and logistics performance and the moderating effect of firm size on this relationship based on the resource base view perspective. The introduction of environmental management and social practices in logistics activities can save resources, reduce negative impacts on the environment and society, and improve firm performance [65]. Logistics activities include activities such as warehouse management, inventory management, transport and information processing, but in recent years, due to the growing demand for logistics activities and their own complexity, companies have begun to pay attention to how to improve the management of logistics operations, reduce the pollution of the environment from logistics activities, and ensure environmental and social benefits.

Based on the above analysis, the following hypotheses are proposed:

Hypothesis 5(H5): Logistics operation capacity(LOC) has a significant positive impact on enterprise performance (a economic, b environmental, c social).

Hypothesis 6(H6): Logistics information capacity (LIC) has a significant positive effect on business performance (a economic, b environmental, c social).

4. Methods

The focus of this study is to determine the relationship between sustainable supply chain management as an explanatory variable, logistics capacity as an intervening variable and firm performance as an explanatory variable and to examine the mediating effect of the intervening variable (logistics capacity) as well as the relationship between the intervening variable (logistics capacity) and the explanatory variable (firm performance), whose results are expected to generate new research findings. The research design used a quantitative research model, which is a method of analyzing certain theories between the variables of interest. The results of the questionnaire survey were calculated and tabulated in numerical form through a statistical procedure that was derived from the raw data obtained from the results of the questionnaire survey.

4.1. Survey Instrument

All theoretical constructs were measured using indicators adapted from existing SSCM, LC, and FP literature. All SSCM, LC, and FP variables were measured using a 5-point Likert scale with anchors of "very much not met" and "very much met." Since the original survey instrument was designed in English and eventually translated into Chinese, we used a rigorous translation/back-translation process to ensure consistency of the scales. In addition, we held face-to-face discussions with supply chain academic researchers and practitioners in China to review the questionnaire and provide feedback. Subsequently, we made minor changes to the questionnaire to improve the clarity and appropriateness of the measurements.

4.2. Variable Operational

Definition Research variables and operationalization in this study are poured into indicators that can sharpen the focus of the research. Furthermore, from each of these indicators made research instruments in the form of questionnaires to acquire primary data. There are three variables developed in the research, namely sustainable supply chain as exogenous variable, logistics capability as variable mediating, and firm performance as endogenous variable.

4.2.1. Sustainable Supply Chain Management

Variables Sustainable supply chain management variables adopted from previous research [16,28,62] consist of 2 indicators, such as Internal Sustainable Supply Chain Management (ISSCM), Covers sustainable sourcing, sustainable design, sustainable manufacturing, sustainable distribution, investment recovery. External Sustainable Supply Chain Management (ESSCM), Covers vendor management, customer management.

4.2.2. Logistics Capability

Logistics Capability Variables Logistics Capability indicators adopted from previous research[38-39]. The construct "Logistics Capacity" was measured by logistics operation capacity(LOC), logistics information capacity(LIC).

4.2.3. Company Performance

Variables Company performance indicators adopted from previous research [13,16,28,] consist of Economic performance (EP), Environmental performance (EnP), Social performance (SP).

4.3. Data Collection

Top and middle managers, logisticians, and finance staff

executives in supply chain companies in the automotive manufacturing industry were selected as potential respondents for our survey. We surveyed an initial sample of 498 Chinese automotive manufacturing firms, sending out questionnaires via face-to-face and e-mail. We received a total of 382 responses, or 76.71%, which is comparable to recent studies in the broad field of supply chain management.

5. Data Analysis and Interpretation

5.1. Demographic Profile

The demographic details of our final sample, including nature of the firms, company size, job level, and department type, are shown in Table 2.

Table 2. Demographic Profile (n = 382).

Characteristics	Types	Frequency	Percent
Nature of enterprise	State-owned enterprise	103	27
	Foreign-invested enterprises	110	28.8
	Sino-foreign joint venture	89	23.3
	Private enterprise	80	20.9
Scale	50-100	83	21.7
	101-500	113	29.6
	501-1000	89	23.3
	1001-2000	78	20.4
	2000above	19	5
Profession	Senior managers	39	10.2
	Middle managers	56	14.7
	Junior managers	176	46.1
	Staff	79	20.7
	Others	32	8.3
Department	Technical R&D department	54	14.1
	Personnel	59	15.4
	Procurement	63	16.5
	Production	54	14.1
	Logistics	60	15.7
	Sales	40	10.5
	Financial	48	12.6
	Others	4	1

5.2. Reliability Analysis

In order to test the consistency and validity of the questionnaire's measurement factor items, the reliability of the questionnaire is analyzed by using Cronbach's α . Its value greater than 0.8 indicates that the consistency and validity of the questionnaire is very high; if the α coefficient value is between 0.7-0.8, it indicates that the questionnaire's validity is high; if the α coefficient value is between 0.6-0.7, it indicates that the consistency of the questionnaire is within the acceptable range. , it indicates that the consistency of the questionnaire is in the range of still acceptable. In this paper, the reliability of the variables in the questionnaire was tested using SPSS 26.0 software. The results from Table 3 infer that

all items were reliable.

5.3. Validity Analysis

5.3.1. Exploratory Factor Analysis

For exploratory factor analysis, the principal component approach to factor extraction was used, following the extraction rule based on eigenvalues greater than 1. The factor rotation method used the maximum variance method to output the rotated solution, with a maximum number of convergent iterations of 25. The analysis results shown in Tables 4 are the factor loading matrices for which the rotation converged after 6 iterations.

Table 3. Item Reliability Statistics

Item	Corrected Item-Total Correlation	Cronbach's α
Internal sustainable supply chain Management(ISSCM)		0.907
ISSCM1	0.646	
ISSCM2	0.798	
ISSCM3	0.708	
ISSCM4	0.653	
ISSCM5	0.641	
ISSCM6	0.695	
ISSCM7	0.701	
ISSCM8	0.665	
ISSCM9	0.652	
External sustainable supply chain Management(ESSCM)		0.906
ESSCM1	0.596	
ESSCM2	0.814	
ESSCM3	0.707	
ESSCM4	0.723	
ESSCM5	0.691	
ESSCM6	0.68	
ESSCM7	0.823	
ESSCM8	0.599	
Logistics operation capability(LOC)		
LOC1	0.758	
LOC2	0.725	
LOC3	0.749	0.879
LOC4	0.734	
Logistics information capability(LIC)		
LIC1	0.676	
LIC2	0.731	0.868
LIC3	0.711	
LIC4	0.773	
Economic performance(EP)		
EP1	0.685	0.863
EP2	0.772	
EP3	0.673	
EP4	0.718	
Environmental performance(ENP)		
ENP1	0.781	0.852
ENP2	0.688	
ENP3	0.713	
Social performance(SP)		
SP1	0.721	0.826
SP2	0.664	
SP3	0.678	

Tables 4. Factor Loadings.

Item	Factor Loadings						
	sustainable supply chain Management(SSCM)		Logistics capability (LC)		Company Performance(CP)		
	ISSCM	ESSCM	LOC	LIC	EP	ENP	SP
ISSCM1	0.684						
ISSCM2	0.815						
ISSCM3	0.782						
ISSCM4	0.696						
ISSCM5	0.667						
ISSCM6	0.758						
ISSCM7	0.737						
ISSCM8	0.701						
ISSCM9	0.705						
ESSCM1		0.638					
ESSCM2		0.804					
ESSCM3		0.719					
ESSCM4		0.789					
ESSCM5		0.682					
ESSCM6		0.733					
ESSCM7		0.84					
ESSCM8		0.562					
LOC1			0.755				
LOC2			0.741				
LOC3			0.732				
LOC4			0.724				
LIC1				0.751			
LIC2				0.793			
LIC3				0.755			
LIC4				0.832			
EP1					0.737		
EP2					0.8		
EP3					0.75		
EP4					0.747		
ENP1						0.816	
ENP2						0.7	
ENP3						0.797	
SP1							0.694
SP2							0.731
SP3							0.665

5.3.2. Confirmatory Factor Analysis

By applying the maximum likelihood method of analysis

using AMOS 23.0, the results of the fit indicators of the factor model show that the chi-square degrees of freedom ratio is

(CMIN/DF) is 1.311, which is between 1.000-3.000, indicating that the assumed level of model fit is acceptable. Around the CFI, GFI, IFI, NFI, PNFI, RMR, and RMSEA indicators of model fit, it can be seen from Table 5 below that the values of each criterion meet the fit indicators. Overall,

the model fit is good, indicating an acceptable level of fit between the theoretical model and the actual data, and proving that the model results have met the criteria that can be accepted.

Table 5. Results of Fitting Degree of Confirmatory Factor Analysis Model.

indicators	Standards	Results
CMIN/DF	1-3	1.311
CFI	>0.90	0.978
GFI	>0.90	0.906
IFI	>0.90	0.978
NFI	>0.90	0.913
PNFI	>0.50	0.827
RMR	<0.08	0.045
RMSEA	<0.05	0.029

5.3.3. Discriminant Validity

Discriminant validities were used to understand the difference between the concept of each latent variable in comparison with the others. A model is confirmed to have a good discriminant validity when the AVE square for each of the exogenous construct was found to exceed its correlation with the other constructs. The results of discriminant validity testing are obtained as follows. Table 6 the data from the average variance extracted analysis illustrates that the entire construct has an AVE above 0.5, meaning the entire construct has met good convergent validity.

6. Hypothesis Testing

6.1. Hypothesis Testing through Inner Model

Hypothesis testing describes the measure of significance of a hypothesis support specified at the beginning by looking at the probability value (p-value) and the t-statistical value (t-count) compared to the t-table. With an alpha of 5%, the probability value (p-value) is less than 0.05 and the t-table value was discovered to be higher than 1.96, thereby, indicating the acceptance of the hypothesis since the t-statistics is higher than t-table and p-value <0.05 and vice versa. Hypothesis testing in this study was conducted by t-statistical values obtained from Amos 23.0 program. The findings are presented in the following Table7.

The results obtained from the analysis are highlighted as follows:

1. Based on the data processing results on the path coefficients table, the standardised path impact coefficient of internal-sustainable supply chain management(ISSCM) on economic performance(EP) is 0.166 and the t-value (C.R.) is 2.986>1.96, which reaches the significant level ($P<0.001$), indicating that there is a significant positive impact of internal SSCM on economic performance and hypothesis H1a is accepted. The standardised path impact coefficient of ISSCM on environmental performance (EnP) is 0.214 and the t-value (C.R.) is 3.773>1.96, which reaches the significant level ($P<0.001$), indicating that there is a significant positive impact of ISSCM on EnP and hypothesis H1b is accepted.

The standardised path impact coefficient of ISSCM on social performance(SP) is 0.137 and the t-value (C.R.) is 2.611>1.96, which reaches the significant level ($P<0.001$), indicating that there is a significant positive impact of ISSCM on SP and hypothesis H1c is accepted. Therefore, this means that the hypothesis proposed to show that there is a significant positive relationship between internal sustainable supply chain management (ISSCM) and firm performance (FP) is accepted.

The standard path impact coefficient of external-sustainable supply chain management(ESSCM) on economic performance (EP) is 0.014, and the t-value (C.R.) is 0.217<1.96, reaching a significant level ($P\text{-value}>0.05$), which indicates that there is no significant positive impact of ESSCM on EP, and it can be known that the hypothesis H2a is not valid. the standard path impact coefficient of ESSCM on environmental performance(EnP) is 0.208, and the t-value (C.R.) is 3.06>1.96, which reaches the significant level ($P<0.001$), indicating that ESSCM has a significant positive effect on EnP, and it can be seen that hypothesis H2b is valid. The standard path impact coefficient of ESSCM on social performance(SP) is 0.134, and the t-value (C.R.) is 2.115>1.96, which reaches the significant level ($P<0.001$), indicating that ESSCM has a significant positive effect on SP has a significant positive impact and it can be seen that hypothesis H2c is valid.

2.Based on the data processing results on the path coefficients table, the standardised path impact coefficient of Internal Sustainable Supply Chain Management (ISSCM) on Logistics Operations Capability (LOC) is 0.343, and the t-value (C.R.) is 6.222 >1.96, which reaches a significant level ($P<0.001$), indicating that there is a significant positive impact of Internal Sustainable Supply Chain Management (ISSCM) on Logistics Operations Capability (LOC), and hypothesis H3a is accepted. The standardised path impact coefficient of ISSCM on Logistics Information Capability (LIC) is 0.045, t-value (C.R.) is 0.825<1.96, significant level $P\text{-value}>0.05$, indicating that there is no significant positive impact of internal SSCM on Logistics Information Capability. (C.R.) is 0.825<1.96 with significant level $P\text{-value}>0.05$

indicating that there is no significant positive effect of ISSCM on logistics information capability and hypothesis H3b is not accepted.

Table 6. Discriminant Validity

Item	Outer Loading Indicator Value	Combinatorial reliability(CR)	Average Variance Extracted (AVE)
Internal sustainable supply chain Management(ISSCM)			
ISSCM1	0.680	0.908	0.524
ISSCM2	0.847		
ISSCM3	0.746		
ISSCM4	0.686		
ISSCM5	0.680		
ISSCM6	0.727		
ISSCM7	0.741		
ISSCM8	0.704		
ISSCM9	0.685		
External sustainable supply chain Management (ESSCM)			
ESSCM1	0.628	0.910	0.562
ESSCM2	0.839		
ESSCM3	0.748		
ESSCM4	0.775		
ESSCM5	0.737		
ESSCM6	0.730		
ESSCM7	0.868		
ESSCM8	0.641		
Logistics operation capability(LOC)			
LOC1	0.824		
LOC2	0.782		
LOC3	0.821	0.881	0.650
LOC4	0.797		
Logistics information capability(LIC)			
LIC1	0.733		
LIC2	0.812	0.872	0.631
LIC3	0.781		
LIC4	0.846		
Economic performance(EP)			
EP1	0.730	0.865	0.617
EP2	0.870		
EP3	0.710		
EP4	0.822		
Environmental performance(ENP)			
ENP1	0.870	0.857	0.667
ENP2	0.786		
ENP3	0.791		
Social performance(SP)			
SP1	0.824	0.831	0.622
SP2	0.757		
SP3	0.783		

Table 7. Research Hipotesys.

Construct	Standard Path Coefficient	Standard Deviation	T Statistics	p-Values	Description
ISSCM→EP	0.166	0.055	2.986	0.000	Significant: H1a Accepted
ISSCM→EnP	0.214	0.077	3.773	0.000	Significant: H1b Accepted
ISSCM→SP	0.137	0.052	2.611	0.000	Significant: H1c Accepted
ESSCM→EP	0.014	0.068	0.217	0.828	Significant: H2a Not Accepted
ESSCM→EnP	0.208	0.097	3.06	0.000	Significant: H2b Accepted
ESSCM→SP	0.134	0.065	2.115	0.000	Significant: H2c Accepted
ISSCM→LOC	0.343	0.066	6.222	0.000	Significant: H3a Accepted
ISSCM→LIC	0.045	0.064	0.825	0.409	Significant: H3b Not Accepted
ESSCM→LOC	0.432	0.075	7.309	0.000	Significant: H4a Accepted
ESSCM→LIC	0.523	0.085	7.651	0.000	Significant: H4b Accepted
LOC→EP	0.41	0.056	6.03	0.000	Significant: H5a Accepted
IOC→EnP	0.36	0.075	5.429	0.000	Significant: H5b Accepted
LOC→SP	0.4	0.052	6.306	0.000	Significant: H5c Accepted
LIC→EP	0.298	0.05	4.949	0.000	Significant: H6a Accepted
LIC→EnP	0.053	0.066	0.922	0.356	Significant: H6b Not Accepted
LIC→SP	0.335	0.048	5.823	0.000	Significant: H6c Accepted

The standardised path impact coefficient of external sustainable supply chain management (ESSCM) on logistics operation capability (LOC) is 0.432, and the t-value (C.R.) is 7.309 > 1.96, which reaches the significant level ($P < 0.001$), indicating that ESSCM has a significant positive impact on LOC, and hypothesis H4a is accepted. the standardized path impact coefficient of ESSCM on logistics information capability (LIC) is 0.523 < 1.96, with a significant level P value > 0.05, indicating that ISSCM has no significant positive impact on LOC, and hypothesis H3b is not accepted. path influence coefficient is 0.523 and t-value (C.R.) is 7.651 > 1.96, which reaches the significant level ($P < 0.001$), indicating that ESSCM has a significant positive influence on LIC and hypothesis H4b is accepted.

3. Based on the data processing results on the path coefficients table, the standard path influence coefficient of LOC on EP is 0.41, and the t-value (C.R.) is 6.03 > 1.96, which reaches the significant level ($P < 0.001$), indicating that LOC has a significant positive influence on EP, and it can be seen that the hypothesis H5a is founded is accepted. the standard path influence coefficient of LOC on EnP is 0.36, and the t-value (C.R.) is 5.429 > 1.96, which reaches the significant level ($P < 0.001$), which indicates that the hypothesis H5a is established is accepted. value (C.R.) is 5.429 > 1.96, reaching a significant level ($P < 0.001$), indicating that LOC has a significant positive impact on EnP, it can be seen that hypothesis H5b is established. The standard path influence coefficient of LOC on SP is 0.4, and the t-value (C.R.) is 6.306 > 1.96, which reaches the significant level

($P < 0.001$), indicating that LOC has a significant positive influence on SP, and hypothesis H5c is accepted.

The standard path impact coefficient of LIC on EP is 0.298, and the t-value (C.R.) is 4.494 > 1.96, which reaches the significant level ($P < 0.001$), indicating that LIC has a significant positive impact on EP, and it can be seen that the hypothesis H6a is accepted. The standard path impact coefficient of LIC on EnP is 0.053, and the t-value (C.R.) is 0.922 < 1.96, significant level P-value > 0.05, which indicates that LIC has no significant positive impact on EnP, and hypothesis H6b is not accepted. The standardised path impact coefficient of LIC on SP is 0.335 and the t-value (C.R.) is 5.823 > 1.96 at significant level ($P < 0.001$), indicating that LIC has a significant positive impact on SP, and hypothesis H6c is accepted.

6.2. Mediation Effects of Logistics Capability

Logistics capability has been identified as a factor for sustainable firm performance. The mediating effects of Logistics capability between the sustainable supply chain management practices and firm performance in the Manufacturing industry has not been tested. In this study, Bootstrap test was utilized to verify the mediation effect by repeating the sampling number 5000 times and its 95% confidence interval contains 0, which indicates that there is no mediation, if it does not, it indicates that there is a mediation effect. The results of the test data are shown in Table 8.

Table 8. Mediation Effects

Path	Effect	S.E.	95% Bootstrap CI Boot.CI.Type = Perc
ISSCM→LOC→EP	0.0829	0.019	0.0485 to 0.1229
ISSCM→LOC→EnP	0.087	0.0228	0.0474 to 0.1358
ISSCM→LOC→SP	0.0918	0.0194	0.0567 to 0.1322
ESSCM→LOC→EP	0.1108	0.0229	0.0687 to 0.1587
ESSCM→LOC→EnP	0.1163	0.027	0.0664 to 0.1718
ESSCM→LOC→SP	0.1227	0.0233	0.0805 to 0.1731
ISSCM→LIC→EP	0.0129	0.0097	-0.0048 to 0.0337
ISSCM→LIC→EnP	0.0014	0.0043	-0.007 to 0.0112
ISSCM→LIC→SP	0.0163	0.0117	-0.0064 to 0.0393
ESSCM→LIC→EP	0.0977	0.0242	0.0525 to 0.1479
ESSCM→LIC→EnP	0.0105	0.0265	-0.0414 to 0.0628
ESSCM→LIC→SP	0.1235	0.0257	0.0781 to 0.1778

1. Based on the data processing results on the path coefficients table, the confidence interval of ISSCM having an indirect effect on EP through influencing LOC is [0.0485, 0.1229], in which the absence of " indicates that the indirect effect is significant, which also proves that LOC plays a partial mediating role between ISSCM and EP. The confidence interval of ISSCM having an indirect effect on EnP through LOC is [0.0474, 0.1358], where the absence of " indicates a significant indirect effect, which also proves that LOC plays a partial mediating role between ISSCM and EnP. The confidence interval of ISSCM indirect effect on SP through LOC is [0.0567, 0.1322], where the absence of " indicates a significant indirect effect, which also proves that LOC plays a partial mediating role between ISSCM and EP. The confidence interval of ISSCM indirect effect on SP through LOC is [0.0567, 0.1322], where the absence of " indicates a significant indirect effect, which also proves that LOC plays a partial mediating role between ISSCM and SP.

The confidence interval for ESSCM to have an indirect effect on EP by influencing LOC is [0.0687, 0.1587], where excluding " indicates that the indirect effect is significant, which also proves that LOC acts as a partial mediator between ESSCM and EP. The confidence interval for ESSCM to have an indirect effect on EnP by influencing LOC is [0.0664, 0.1718], where the exclusion of " indicates a significant indirect effect, which also proves that LOC plays a partially mediating role between ESSCM and EnP. The confidence interval of ESSCM having an indirect effect on SP by influencing LOC is [0.0805, 0.1731], where the exclusion of " indicates a significant indirect effect, which also proves that LOC plays a partially mediating role. This can also be explained by the fact that the higher the value of sustainable supply chain management (SSCM), the higher the firm performance (FP) through logistics operations capability (LOC).

2. Based on the data processing results on the path coefficients table, the confidence interval of the indirect effect of ISSCM on EP through the influence of LIC is [-0.0048, 0.0337], which contains " indicating that the indirect effect is insignificant, which proves that the mediating effect of LIC between ISSCM and EP is not significant. the confidence

interval of the indirect effect of ISSCM on EnP through the influence of LIC is [-0.007, 0.0112], where the inclusion of " indicates that the indirect effect is significant, which also proves that the mediating role of LIC between ISSCM and EnP is not significant. The confidence interval for the indirect effect of ISSCM on SP through the influence of LIC is [-0.0064, 0.0628], where the inclusion of " indicates that the indirect effect is not significant, which also proves that the mediating effect of LIC between ISSCM and SP is not significant.

The confidence interval for the indirect effect of ESSCM on EnP through influencing LIC is [0.0525, 0.1479], which does not contain " indicating that the indirect effect is significant, which also proves that LIC plays a partial mediating role between ESSCM and EnP. The confidence interval for the indirect effect of ESSCM on EnP through the influence of LIC is [-0.0414, 0.0628], where the inclusion of " indicates that the indirect effect is not significant, which also proves that LIC plays a non-significant mediating role between ESSCM and EnP. The confidence interval for the indirect effect of ESSCM on SP by influencing LIC is [0.0781, 0.1778], excluding " indicates that the indirect effect is significant, which also proves that LIC plays a partial mediating role between ESSCM and SP.

7. Findings and Discussion

Focusing on China's automobile manufacturing industry, this paper investigates the role of sustainable supply chain management in influencing corporate performance and the mediating effect of logistics capability. On the basis of previous scholars' studies, research hypotheses are proposed and conceptual models are constructed, questionnaire scales are designed to carry out the research, and reliability and consistency of the sample data are examined using reliability tests, descriptive statistics and correlation analyses, and then structural equation modelling is used to test the proposed hypotheses to arrive at the following relevant research conclusions:

1. Sustainable supply chain management (SSCM) significantly affects firm performance (FP), and ISSCM has a significant positive effect on FP (H1a, H1b, H1c). This suggests that Chinese automotive manufacturers can effectively reduce the "three wastes" generated during the procurement, production, sales and consumption of parts and products by designing recycled parts and products, improving production technologies and processes, and establishing waste management systems. At the same time, supply chain enterprises will recycle and remanufacture waste and scrap products to achieve resource recycling and improve the comprehensive utilisation rate of resources, thereby reducing pollution to the environment, lowering production and distribution costs, and increasing environmental and economic benefits. Secondly, the enterprise ensures the quality and safety of parts and products in the process of manufacturing, production, storage and transport by carrying out training for employees on environmental protection and social responsibility, setting up a reasonable employee incentive mechanism, and improving the enthusiasm of employee participation. In addition, the enterprise is committed to meet the customer's pursuit of product performance and safety and quality, which can significantly enhance customer satisfaction and loyalty, and help the enterprise to establish a good image of environmental protection and social responsibility, thus expanding the market share share, increasing the enterprise's additional income and creating more economic benefits.

There is a significant positive effect of ESSCM on EnP and SP (H2b, H2c). This indicates that the material design, selection, procurement and recycling of most of the current automobile manufacturing enterprises is an important link for sustainable manufacturing, and the cooperation and sharing of technology, management and information between upstream and downstream enterprises through green procurement, green packaging, and green logistics can help supply chain enterprises to significantly reduce the environmental hazards and negative social impacts of the products in the process of production, manufacturing and transport, and thus enhance the environmental and social reputation. In addition, ESSCM does not have a significant positive effect on EP (H2a). When designing, purchasing, manufacturing, and producing products that meet environmental standards and are recyclable, joint decision-making is required between other departments such as R&D, production, sales, logistics, and finance or between upstream and downstream enterprises. However, due to the lack of technology, capital and talent of most automobile manufacturing enterprises at this stage, it leads to a certain degree of increased labour costs, management costs and time costs. At the same time, some enterprises have not formed a long-term cooperative relationship with upstream and downstream enterprises, and the uncertainty of the partnership has also increased the corresponding economic costs to a certain extent, thus affecting the improvement of economic efficiency.

2. Sustainable supply chain management (SSCM) significantly affects Logistics capability (LC). ISSCM has a significant positive effect on LOC (H3a), but there is no significant positive effect on LIC (H3b). On the one hand, logistics basic operation is an important support for automobile manufacturing enterprises to implement sustainable supply chain management, including logistics infrastructure equipment, logistics distribution system

construction, and logistics professional personnel training. Automobile manufacturing enterprises need specialised logistics facilities and equipment and logistics talents when carrying out internal design, R&D, product and production technology improvement, which has a certain promotion and catalytic effect on logistics operation capability. On the other hand, logistics information capability is generally closely related to the application of logistics electronic information system platform, intelligent network system, Internet of Things, big data and artificial intelligence. The construction of logistics information system platform requires strong financial support, and for some automobile manufacturing enterprises, they may not be able to build a powerful platform on their own due to the limitations of capital, technology and talents, and this cannot bring about the enhancement of benefits in the short term, which leads to the fact that some automobile manufacturing enterprises neglect the construction of logistics information capability, which is detrimental to the enhancement of logistics information capability.

ESSCM has a significant positive effect on LOC and LIC (H4a, H4b). This indicates that automobile manufacturing enterprises and upstream and downstream partners rely on modern network technology platforms to rationally plan and select the transport vehicles and routes for products in order to reduce the consumption of resources and energy, reduce carbon emissions, and achieve green transport. In addition, enterprises use customer information management systems to strengthen communication with customers and understand their personalised needs, so as to improve customer satisfaction and loyalty, thus enhancing the competitiveness of the enterprise and even the entire supply chain. At the same time, the enterprise establishes a waste recycling management system, and relies on advanced information technology to realise the optimal combination and efficient connection of various logistics links in the process of sorting and recycling of waste materials and products, remanufacturing and other activities involving the operation of reverse logistics, which, to a certain extent, enhances the logistical operation capability and logistical information capability of the automobile manufacturing enterprise.

3. Logistics capability (LC) significantly affects firm performance (FP). LOC has a significant positive effect on FP (H5a, H5b, H5c). China's automobile manufacturing industry is orientated to sustainable development, and integrates the concept of "green and low-carbon" into the basic elements of logistics and logistics functional activities, so as to reduce the environmental carrying capacity and environmental costs. In addition, Guangxi automobile manufacturing enterprises have introduced advanced intelligent logistics technologies such as RGV and AGV in the process of warehousing, handling, transporting, processing and distribution of materials or products, which have largely improved the logistics efficiency and reduced the operation, circulation and logistics costs. LIC has a significant positive effect on EP and SP (H6a, H6c). This indicates that enterprises rely on big data, IoT, cloud computing and other technologies to build logistics basic information systems and logistics intelligence platforms, which enhances the degree of information sharing between enterprise departments and throughout the upstream and downstream. This can help enterprises understand the inventory situation of suppliers, but also quickly understand the needs of users and improve customer satisfaction, thus promoting the improvement of economic efficiency. At the

same time, enterprises respond to changes in market supply and demand in a timely manner with the help of electronic traceability and information feedback systems in order to avoid the bullwhip effect and reduce inventory costs. However, there is no significant effect of LIC on EnP (H6b), which is inconsistent with the findings of previous scholars [38]. This is mainly due to the fact that the environmental hazards brought about by automobile manufacturing companies are generated in the basic logistics operations such as manufacturing, production, transport, processing and distribution, and there is a strong relationship with the logistics operation capability, while there is no relevant link with the construction of logistics information system.

4. Analysis of the mediating role of logistics capability (LC). The empirical study concludes that the logistics capacity of automobile manufacturing supply chain enterprises plays an intermediary effect between sustainable supply chain management and enterprise performance. LOC plays a partial intermediary role in the impact of SSCM on FP, which is also more in line with the actual situation of the development of current Chinese automobile manufacturing enterprises. As an important pillar industry in China, in recent years, both the government and the enterprises themselves have been vigorously promoting the automobile manufacturing enterprises to accelerate the transformation and upgrading, increase the investment in eco-design, waste recycling management system, product quality and safety management, and relying on the logistic network system to scientifically and timely collect, transport, remanufacture, and reuse waste gas, waste water, waste residue, and waste materials generated in the production and manufacturing process. The company also relies on the logistics network system to collect, transport, remanufacture and reuse waste gas, waste water, waste residue and end-of-life materials generated in the production and manufacturing process in a scientific and timely manner. In the context of the development of modern supply chain, for the automobile manufacturing industry, sustainable supply chain management requires that the entire logistics operation of the supply chain enterprises should be high-quality, low-carbon, because the improvement of logistics efficiency and the development of green logistics can further help automobile manufacturing enterprises to reduce energy consumption, establish a good green image, so as to obtain the green recognition of the majority of consumers, and improve the performance of enterprises.

LIC does not have a significant indirect mediating role in the effect of ISSCM on FP. This is mainly due to the enterprise to carry out internal eco-design, sustainable manufacturing process, total quality management are direct significant enhancement of enterprise performance, part of the automobile manufacturing enterprises did not establish a professional logistics information platform, resulting in the role of the logistics information platform in the internal enterprise information transfer is relatively weak compared to the degree of information sharing between external partners. Secondly, playing a mediating effect in the impact of ESSCM on EP indicates that ESSCM has a greater role in promoting LIC. Supply chain enterprises carry out real-time deployment and monitoring of the status of inventory, warehousing, transport and distribution among themselves through the built logistics electronic information traceability platform, and rely on the information sharing platform to carry out suppliers' environmental and social responsibility assessment, green purchasing and green distribution, in order to arrange for

reasonable purchasing and shorten the intermediate sales process. At the same time, Chinese automobile manufacturers use customer service management systems to strengthen communication with customers in a timely manner, respond quickly to consumer demand, and use them to promote the concept of low carbon and environmental protection, advocate green consumption, and stimulate consumer demand, thereby reducing resource waste, saving management costs, creating profit margins, and thus significantly improving economic performance.

8. Implications

This paper combines sustainable supply chain management, logistics capability and enterprise performance in China's automobile manufacturing industry to further promote the implementation of sustainable supply chain management and improve logistics capability of China's automobile manufacturing industry supply chain enterprises for the purpose of empirical research, and the results show that different sustainable supply chain management has different impacts on enterprise performance and logistics capability. Therefore, based on the actual development of China's automobile manufacturing industry, this paper puts forward feasible countermeasures on the implementation of sustainable supply chain management to improve enterprise performance and logistics capacity, accelerates the transformation and upgrading of China's automobile industry, promotes the construction of automobile "intelligence, network connectivity, electrification, and sharing", and helps China's automobile manufacturing industry to achieve sustainable development. The conference will help China's automobile manufacturing industry to achieve sustainable development.

1. Actively practice internal sustainable supply chain management, and continuously enhance the role of internal sustainable supply chain management on the improvement of enterprise performance and logistics information capacity.

Firstly, enterprises should change the traditional concept of development and establish the awareness of sustainable development. Firstly, Chinese automobile manufacturing enterprises should change the traditional manufacturing concepts in the past, correctly understand the connotation of sustainable supply chain management, and integrate it into their business strategies. As the mode of sustainable supply chain management is a kind of after-the-fact end governance into the source control beforehand, from the internal product design, business processes to the management of the organisational structure to always implement the sustainable supply chain management mode, so to a large extent can improve the efficiency of the enterprise's resource utilisation, reduce energy consumption, so as to reduce the cost of environmental governance, save the cost of pollution and increase the recycling of products. Benefits. Nowadays

Currently the world is vigorously advocating the green sustainable development strategy, the world's countries to many imported automotive products for the strict green environmental standards identified. This means that China's automobile manufacturing industry, which mainly exports to the Middle East, Southeast Asia and South America, is not only facing the serious challenge of green trade barriers, but also the rise of a large number of outstanding domestic automobile manufacturing enterprises has added tremendous pressure to the development of China's automobile industry. Therefore, in the current new situation, China's automobile

manufacturing enterprises in order to obtain an advantageous position in the fierce market competition, we must change the traditional production and manufacturing mode, to achieve the integration of economic, environmental and social benefits, and ultimately achieve sustainable and stable development.

Secondly, the enterprise should speed up the research and development design and enhance the independent innovation ability. On the one hand, as far as enterprises are concerned, Chinese automobile manufacturing enterprises should accelerate innovative research and development, vigorously cultivate and introduce professional research and development talents, and carry out collaborative research and development in cooperation with colleges, universities and research institutes, so as to enhance the ability of eco-design, clean production and environmental pollution control. Enterprises should carry the concept of "eco-design" throughout the entire process of production, manufacturing, logistics, consumption and recycling of products or parts. For example, key enterprises such as SAIC-GM-Wuling, China Yuchai, Dongfeng Liuzhou Automobile, China Fangsheng, Guilin Fuda, etc. are promoting the innovative research and development of key components, key raw materials, chips, sensors, voltage regulators, and core components, and setting up enterprise laboratories and data centres for the New Four Harmonisation, to push forward the development of the New Four Harmonisation of Automobiles. Especially in recent years, China's new energy vehicle manufacturing and development momentum, sales soared, so we need to vigorously promote the new energy vehicle power lithium batteries, hydrogen and fuel cell R&D, to crack the technical difficulties and bottlenecks, so as to drive the enterprise environment, social and even economic benefits. On the other hand, the government should improve the incentives and support policies for innovation and R&D, and increase the subsidies for enterprise R&D funds. For R & D technology to achieve major breakthroughs in the enterprise to give incentives or tax incentives to support enterprise R & D innovation, to promote the improvement of enterprise performance. In addition, the government should vigorously guide and encourage insurance, consumer credit and other more private funds, venture capital, financial institutions on key projects within the enterprise to develop and implement preferential interest rate policies for the new energy automobile industry and even the development of the automobile manufacturing industry to provide financial support. Through the government investment guide fund, financial funds and other means of support to encourage key automotive enterprises to speed up the transformation of production lines, the successful completion of the National VI standard transformation, reduce the pollution of the environment, reduce the cost of pollution control.

Thirdly, the enterprise should continuously improve the staff protection mechanism, provide innovative development platform. In the development of automobile manufacturing industry, talents are the main body of enterprise innovation and competition, and the level of education of employees largely reflects the logic and innovative thinking. Due to the limitations of geographic location and salary treatment, Chinese automobile manufacturing enterprises want to break through technical problems and gain competitive advantages in the fierce competition, not only need to vigorously cultivate and introduce high-end innovation technology talents and logistics technology talents, but also need to retain talents.

First of all, to ensure the safety and health of employees is the basic guideline for the production and operation of supply chain enterprises, and practice scientific and humane management with human core in order to make the supply chain healthy, stable and sustainable development. Supply chain enterprises should put forward new personnel management methods to guarantee the work continuity, welfare treatment, on-the-job training and emotional appeal of employees, while actively undertaking social responsibility, improving the working environment of employees, and enhancing the importance of employees to logistics technology innovation and various operation links of logistics by carrying out regular vocational skills training, so as to improve the logistics operation capability of enterprises and meet the development of internal sustainable supply chain management. needs. Secondly, to help employees correctly understand the connotation of sustainable supply chain management, vigorously promote the green and ecological corporate culture in the internal operation of the enterprise, and establish the green image of the enterprise. At the same time, we strongly strengthen the training of environmental protection and social responsibility awareness for the employees of the enterprise, so that the green sustainable concept of the enterprise can become the conscious behaviour of each employee, form a common value of sustainable development, and let the employees practice the environmental protection and social responsibility awareness into the specific work of the enterprise, so as to improve the social performance of the enterprise.

2. Dynamically implement external sustainable supply chain management, and stimulate the enhancement mechanism of external sustainable supply chain management on environment and social benefits as well as perfecting logistics capacity.

From the perspective of external sustainable supply chain management, Chinese automobile manufacturing enterprises should strengthen cooperation with upstream and downstream enterprises in the fields of eco-design, green procurement, reverse logistics, information sharing, etc., enhance the supervision and synergy of environmental and social responsibility among various upstream and downstream enterprises, and build a cooperative information sharing platform, so as to strengthen the strategic partnership and trust of the entire supply chain, and thus promote the environmental and social benefits as well as the logistics capacity. and logistics capacity.

Firstly, some of the current Chinese automobile manufacturing industry relies heavily on imported or out-of-region automobile enterprises for core components, so to break through bottlenecks and gain competitive advantages, it is necessary to strengthen cooperation in research and development with upstream and downstream enterprises, carry out school-enterprise co-operation by setting up R&D organisations, put in more funds and resources to support technological innovations, design core components in line with the concept of sustainable development as well as new materials that cause less pollution to the social and environmental environment, and invest more funds and resources to support technological innovation. We should invest more funds and resources to support technological innovation, design core components in line with the concept of sustainable development and new materials with less pollution to the social environment, and stimulate the enthusiasm of upstream and downstream enterprises for R&D

and technological innovation through the establishment of a common patent pool. At the same time, Chinese automobile manufacturers should strictly implement the green procurement mechanism, clarify the procurement standards, carry out supplier evaluation based on environmental and social responsibility standards, establish a dynamic evaluation system for green procurement, ensure that suppliers meet the requirements of green raw materials, promote the establishment of long-term cooperative relationships between enterprises and suppliers, and make the products of the entire supply chain meet the standards of environmental protection technology, so as to reduce the waste of resources, energy and environmental pollution. Secondly, on the one hand, China's automobile manufacturing enterprises have been able to reduce the waste of resources, energy and environmental pollution.

Secondly, on the one hand, Chinese automobile manufacturing enterprises should learn from the practice of Japanese and American automobile enterprises and carry out reverse logistics and recycling co-operation with upstream and downstream enterprises. Transportation and warehousing are important links in the recycling process of automobile manufacturing enterprises. Enterprises should consciously strengthen the promotion of efficient docking between the transport and warehousing links and the collection, classification, remanufacturing, reprocessing and utilisation of waste parts or products in reverse recycling, so as to promote the recycling of waste resources and reduce the operating costs of enterprises, thereby improving the environment and enhancing social benefits. On the other hand, China's regional government should speed up the establishment of sound laws and regulations on reverse recycling logistics and the practice of low-carbon economy, formulate implementation rules that clarify the responsibilities and obligations of automobile manufacturing enterprises for environmental protection and resource recycling and utilisation, and promote the institutionalised development of green recycling of automobile end-of-life materials and products. At the same time, the government should provide financial support, tax incentives and other policy support to enterprises that establish recycling logistics to encourage automobile manufacturing enterprises to cooperate in establishing a reverse recycling system to promote the recycling, remanufacturing and reuse of materials or parts, so as to reduce the environmental hazards and lower the enterprise's purchasing costs, thus improving the resource utilisation rate. In addition, for automobile manufacturing enterprises that do not comply with the provisions of environmental standards and damage the environment, the government should strictly implement a system of accountability for environmental pollution, improve supervision and complaint channels, and establish a system of environmental information disclosure and social responsibility disclosure. At the same time, the government should not only strengthen the punitive measures for polluting the environment, such as raising the market access threshold, testing standards, and high fines; it should also raise the charges for carbon emissions of automobile manufacturing enterprises, provide enterprises with financial support for pollution control technology, and incentivise automobile manufacturing enterprises to consciously carry out pollution control.

Thirdly, on the one hand, automobile manufacturing enterprises can make use of new media, advertisements, as

well as exhibitions and trade fairs, fairs and other forms to publicise the value and advantages of green materials to the public, and to help the public build up an awareness of green consumption. Enterprises should also regularly communicate with downstream customers to guide customers to establish green consumption concepts, practice green consumption behaviour, so as to shape a good corporate social responsibility and environmental protection image. On the other hand, the government and automobile manufacturers should vigorously advocate the new consumer concepts of "paid environmental use", "polluter pays", "low-carbon manufacturing" and "green consumption". Green consumption" new consumer concept. Nowadays, the public is becoming more and more aware of environmental protection, and is more and more inclined to choose green products, but the current level of sustainable supply chain management determines the high price of the products, which leads to many consumers are willing to green consumption is not a strong desire. Therefore, the government and enterprises can increase public opinion on green consumption through radio, television, networks and other platforms, so that enterprises and the public are aware of the seriousness of the current social and environmental crisis, to enhance the awareness of the majority of consumers and enterprises on the importance of environmental protection and sustainable development, and to advocate the enterprise "low-carbon manufacturing", consumer "green consumption". "Green consumption", thus promoting the sustainable development of automobile manufacturing enterprises.

3. Enhance the logistics ability, enhance the competitive advantage. Logistics capability is one of the dynamic core competitive capabilities of automobile manufacturing enterprises. On the one hand, China's automobile manufacturing enterprises should accelerate the introduction of advanced logistics technology, logistics personnel, promote the green, automated, intelligent and intelligent process of logistics facilities and equipment, improve the logistics basic business process reengineering, and coordinate the planning and management of the entire logistics network system, in order to improve the efficiency of the positions in the logistics operation system, reduce the cost of operation and maintenance, and reduce the waste of resources and environmental pollution. At the same time, Chinese automobile manufacturing enterprises should also take advantage of Internet technology, Internet of Things, big data, cloud computing, blockchain and other advanced technologies to strengthen cooperation with upstream and downstream enterprises in the construction of logistics information platforms, and standardise the construction of logistics information platforms in order to reasonably plan transport routes, reduce environmental carrying capacity, and ensure the matching of supply and demand in logistics, so as to increase the degree of sharing of logistics information, reduce logistics costs, and enhance economic benefits. On the other hand, China's automobile manufacturing enterprises can cooperate with large-scale professional logistics companies that have nationwide logistics transport and distribution networks, and use third-party or fourth-party logistics enterprises to solve the logistics transport and distribution problems of parts or products between supply chain enterprises, so that the supply chain enterprises can obtain a wide coverage of geographic distribution, the flexibility of warehousing services, and the rapid response of customer service. In addition, for the performance of raw materials and

products and their flow direction in the supply chain, China's automobile manufacturing industry can optimise the logistics operation capacity of the whole supply chain and reduce the supply chain logistics costs by designing logistics and transportation modes, transportation batches and transportation time windows that conform to the characteristics of the products, in order to improve the performance of the supply chain and promote sustainable development.

9. Limitations and Future Research

9.1. Limitations

This paper mainly investigates the role of sustainable supply chain management in China's automobile manufacturing industry on enterprise performance by means of empirical analyses, and explores the mediating role of logistics capability. However, due to personal ability and time constraints, there are still several deficiencies in the relationship between sustainable supply chain management, logistics capability and enterprise performance in China's automobile manufacturing industry, as follows:

First, with the promotion of the concept of "sustainable manufacturing", sustainable supply chain management, as a modern business sustainable management model, has been gradually applied to various industries, but this paper limits the scope of the study to China's automobile manufacturing industry, so whether the conclusions of the empirical study are applicable to other regions or industries remains to be investigated, which will reduce the applicability of the study's conclusions to a certain extent. This will, to some extent, reduce the applicability of the research findings.

Secondly, this paper combines the actual situation of China's automobile manufacturing industry with the final questionnaire on the basis of reference and reference to previous mature scales, but due to the limitations of research time, data availability and other factors, and mainly focusing on online questionnaire collection, which may lead to obvious deficiencies in the quantity and quality of the samples, and the conclusions of the study may have a certain degree of bias.

Thirdly, this paper only investigates the mediating role played by logistics capability in the impact of sustainable supply chain management on enterprise performance, but whether there are other mediating or moderating variables between sustainable supply chain management and enterprise performance remains to be investigated.

9.2. Future Research

First, the current research results of foreign scholars on sustainable supply chain management are relatively more, in the future research can be introduced into the textile industry, pharmaceutical industry, paper industry and other implementation of sustainable supply chain management research, whether there is a consistency of research conclusions with the automobile manufacturing industry, to expand the universality of the research conclusions.

Second, expand the scope and object of the research, increase a variety of research methods, extend the research time, and design measurement questions that are more in line with the current development of China's automobile manufacturing industry, in order to improve the quality of the sample data, whereby to verify the role of the impact of sustainable supply chain management on enterprise performance, thereby improving the reliability of the research

conclusions.

Third, we will further explore other mediating variables in Chinese automobile manufacturing enterprises that may play a role in the relationship between sustainable supply chain management and enterprise performance, such as resource integration capability, technological innovation capability, dynamic capability, collaborative innovation and process innovation, etc., so as to provide a more targeted and reliable theoretical basis for automobile manufacturers to strengthen the practice of sustainable supply chain and to improve enterprise performance.

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