ISSN 2616-5902 Vol. 6, Issue 5: 40-48, DOI: 10.25236/AJBM.2024.060506

# Empirical study on influencing factors of supply chain resilience of Chinese automobile enterprises

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***Abstract:*** *At present, the global automobile industry supply chain has been formed, but with the occurrence of some unpredictable natural disasters and man-made factors, the supply chain of automobile enterprises will receive relevant interference, and even the chain will break off in serious cases. Therefore, this paper explores the influencing factors of the Supply chain resilience of Chinese automobile enterprises and conducts empirical research on Geely Auto related enterprises. Firstly, the research context of Supply chain resilience and the current situation of Supply chain resilience of various industries are summarized. Secondly, the relevant research on the Supply chain resilience of the automotive industry is summarized. In addition, the influencing factors that can affect the resilience of the automotive supply chain are summarized and the model construction and data analysis are conducted using SmartPLS3.0. Finally, the impact of Agility, Information sharing and synergy on the Supply chain resilience of Geely Auto related enterprises is obtained to put forward targeted suggestions and conduct research and prospect.*

***Keywords:*** *Supply chain resilience; Agility; collaboration; Information sharing*

## 1. Introduction

Against the backdrop of uncertainty in the global environment and technological innovation, the Party's 20th CPC report clearly stated that efforts should be made to improve the resilience and security of industrial and supply chains[1]. Therefore, it is the need of automobile enterprises to build the Supply chain resilience of The Times and is an inevitable requirement.

In 2019, the automobile industry has experienced a "cold winter" of the industry. The overall revenue of the automobile industry was 8 trillion yuan, down by nearly 2% compared with the previous year. The cost of the main business decreased by 1.4% compared with the same period, and the total profit decreased by 16%. Since February 2020, the auto market has fallen off a cliff, declining by as much as 90%[2], Cause huge losses to the upstream and downstream enterprises in the automotive supply chain. Because the relevant enterprises related to the automobile supply chain cannot operate normally, the costs and benefits of the enterprises at each node of the automobile supply chain cannot reach the ideal state, so the production pressure and cash flow difficulties increase. At the same time, the smaller enterprises in the upstream of the automobile supply chain are facing the risk of bankruptcy.

To sum up, what is urgently needed in the automobile industry is to combine the upstream and downstream enterprises of the supply chain of automobile enterprises to create a resilient supply chain, which can actively help enterprises to recover their steady state and even thriving ability.

## 2. Review of the literature

### *2.1 Research context on the concept of Supply chain resilience*

Supply chain resilience as an emerging concept is studied by many people, but so far there is not a unified definition. Sheffi That Supply chain resilience is the ability and speed of enterprises to return to normal work efficiency after disruptions occur[3]. The definition of Supply chain resilience proposed by Christopher et al. is widely used, pointing out that Supply chain resilience can enable the organization system to return to the initial state after being disturbed, and even reach a better and more ideal state[4]. Liu said Supply chain resilience still has the ability to maintain continuous supply and can quickly return to normal supply in a short period of time[5].Serhiy Y. Ponomarov and Mary C. Holcomb were the first to propose that supply chain resilience refers to the capacity of a supply chain to adapt, prepare

ISSN 2616-5902 Vol. 6, Issue 5: 40-48, DOI: 10.25236/AJBM.2024.060506

for unforeseen events, respond to disruptions, maintain operational continuity, control structure and function during disruptions, and recover from them in order to meet expected performance levels[6]. Pettit They propose that Supply chain resilience refers to the ability of enterprises in the supply chain to survive, adapt and grow in the face of changes and uncertainties[7]. Tordecilla et al. suggest that the resilience of the supply chain has the ability to return to its original state or a new and more ideal state after being disturbed[8].

### *2.2 Research status of Supply chain resilience in various industries*

With the rapid development of the global economy and the deep cooperation between global enterprises, enterprises are gradually entering the era of uncertainty, and the instability of the enterprise supply chain is facing increasing also. Therefore, domestic and foreign scholars from all walks of life began to study the influencing factors that can improve the resilience of the enterprise supply chain.

Brian Squire et al. argue that supply chain resilience can be improved from the perspectives of supply chain connectivity and information sharing [9]. Saurabh Ambulkar et al. conclude that enterprises can enhance supply chain resilience by either possessing the ability to reconfigure resources or having risk management infrastructure. Enterprises of different sizes choose different ways[10]. Hokey Min et al. believe that the Supply chain resilience can be improved by reducing the risk of intermediary intervention[11]. Singh et al. believe that Agility is a key factor affecting the resilience of supply chains[12]. Dubey Rameshwa et al. believe that improving Supply chain resilience can use data analysis capabilities and organizational flexibility to improve the competitive advantage of enterprises[13]. Based on the chain breaking process, Zhu Zuxing et al. built a Supply chain resilience evaluation system from four dimensions of reliability, adaptation, recovery and renewal capability[14].

### *2.3 Research status of Supply chain resilience of the automotive industry*

In recent years, the automotive industry has faced global challenges, increased supply chain complexity, emergency shocks, overall transformation of the industry, rising raw material prices and chip shortages, policy and market changes, and rapid development of technology and innovation, all highlight the importance of studying the resilience of automotive supply chains. Under the combined action of these factors, automobile enterprises must improve the stability of their supply chain to ensure a stable and sustainable development in the face of uncertainties and external shocks.

The "resilience" of the automobile supply chain refers to the certain stability and flexibility ability in the face of impact, so as to rush and respond flexibly and ensure the stable operation of production configuration. In order to achieve stability capability, it is necessary to realize the overall localization of the industrial chain and supply chain, controllable core components and controllable key facilities; in order to achieve flexibility, it is necessary to have plans and enhance substitutability[15].

More and more scholars are constantly exploring the factors affecting the resilience of the automotive supply chain, as shown in Table 1. Therefore, the influencing factors of this paper select the Agility, Information sharing and synergy mentioned above to study the impact on the resilience of the supply chain of Geely Auto enterprises in China.

*Table 1: Summary of the factors affecting the resilience of the automotive supply chain*

| Scholar | Year | Influencing Factor |
|---|---|---|
| Fan Xuemei and Lu Mengyuan[16] | 2020 | Prediction,Adaptation, Agility, Synergy, Recovery,Learning ability |
| WANG Xuan[17] | 2022 | Collaborative cooperation mechanism |
| WANG Yaqi[18] | 2023 | Information sharing |
| FAN Sicheng[19] | 2023 | Supply capacity guarantee mechanism, demand elasticity response mechanism, trust and Information sharing |
| YIN Caolin[20] | 2023 | Demand, supply, environment, financial risk |
| LI Baolong[21] | 2023 | To coordinate cooperation and Information sharing |
| HUANG Sichen[22] | 2023 | Information sharing, Agility, enterprise cooperation, forecasting, monitoring and recovery |

## 3. Conceptual models and research hypotheses

### *3.1 Study hypothesis*

The theory of dynamic competence begins with the concept of dynamic competence proposed by

ISSN 2616-5902 Vol. 6, Issue 5: 40-48, DOI: 10.25236/AJBM.2024.060506

Teece et al. (1997). Dynamic capability theory refers to the ability of enterprises to adapt to changing environmental changes and maintain sustainable competitive advantage by identifying, integrating and reorganizing internal and external resources and capabilities in a changing external environment[23]. Mandal Based on the dynamic capability theory, et al. believe that in an uncertain market environment, Agility ability and adaptability ability play a more significant role in improving the resilience of the supply chain[24]. According to this theory, hypothesis 1 is postulated.

$H_1$: Agility has a significant positive impact on automotive Supply chain resilience.

Based on the theory of resource foundation, enterprises can only have irreplaceable resources to obtain the competitive advantage. Wernerfelt (1984) Based on the endogenous growth theory and the assumption of enterprise heterogeneity, resources are divided into tangible assets and intangible assets, and a theoretical framework is established around resources and competitive advantages[25]. As an important intangible asset, information plays a vital role in today's era of ambiguity. Especially in the face of emergencies, the speed and quality of real-time information transmission between enterprises are particularly important. Liu Yuying concluded that Information sharing positively and significantly affects the relationship between trust and Supply chain resilience、reciprocity and Supply chain resilience[26]. Wei Wenhai analyzed the mechanism of collaborative management from the three main mechanisms such as Information sharing, and mentioned the Agility of supply chain[27]. Moreover, the high level of information technology facilitates the real-time sharing and integration of information resources. An effective information technology integration process improves the coordination ability between enterprises and partners to respond to changing market demands, thus ensuring an accurate and rapid response to external demands. Therefore, hypotheses 2,3 and 4 are proposed in this paper.

$H_2$: Information sharing has a significant positive effect on Agility.

$H_3$: Information sharing has a significant positive effect on synergism.

$H_4$: Information sharing has a significant and positive impact on Supply chain resilience.

Based on synergy theory and systems science, the concept of synergy is used in the supply chain field. In today's era of globalization and uncertainty, only through cooperation with communities of mutual interests can enterprises jointly cope with risk shocks. In addition, supply chains extend around the world, greatly increasing the risk of their disruption, and also suggesting that supply chain vulnerability is a problem that needs to be addressed at the network level. Therefore, the risk management in the supply chain should be studied from the perspective of the network. However, risks in a highly interconnected supply chain cannot be diagnosed and identified by traditional risk identification methods, which requires a high level of collaboration, cooperation and partnership between enterprises in the supply chain. Faisal et al. believe that collaboration is the glue for the supply chain to bring the organization together in a crisis. Collaboration reduces uncertainty by spreading risk and helps to better manage risk in the supply chain[28]. Therefore, hypothesis 5 is proposed in this paper.

$H_5$: Collaboration has a significant positive impact on Supply chain resilience.

### *3.2 Variable measurement item setting*

On the basis of a systematic review of relevant research at home and abroad, the mature scales in the existing literature are moderately modified to measure Agility, Information sharing, synergy, external environment and Supply chain resilience. The details of the specific measurement indicators are as follows.

The measurement items of agility (AGI) mainly refer to the scales of Swafford[29] et al. (2006), Jain[30] et al. (2017) and Singh[12] et al. (2019). The items mainly include the production speed and response speed of the enterprise itself. The specific items are shown in Table 2.

*Table 2: Agility measurement items*

| Variable | Item Number | Item Content | Item Source |
|---|---|---|---|
| Agility (AGI) | AGI1 | Our company shortens the production cycle, production setting and conversion time very quickly | Swafford, et al. (2006) Jain, et al. (2017) Singh, et al. (2019) |
| | AGI2 | Our company is shortening the product development cycle very quickly | |
| | AGI3 | Our company is very quick to improve its ability to respond to changing market demand | |
| | AGI4 | Our business is shortening lead times | |

The Information sharing mentioned in this paper covers the Information sharing technology and the

ISSN 2616-5902 Vol. 6, Issue 5: 40-48, DOI: 10.25236/AJBM.2024.060506

degree of Information sharing. Information sharing technology refers to the technical support that can realize timely and efficient Information sharing, such as the construction of Information sharing platform and the use of data prediction and analysis technology. The degree of Information sharing refers to the willingness, speed and quality of Information sharing between enterprises and partners. In terms of information technology level, the scale examines the use of information technology, the risk management of the information system and the mastery of the enterprise personnel to the information system. In terms of the Information sharing degree, it mainly includes the Information sharing willingness, the Information sharing frequency and the quality of the shared information. The information-sharing scale used in this study consists of seven question items, as shown in Table 3.

*Table 3: Information sharing of measurement items*

| Variable | Item Number | Item Content | Item Source |
|---|---|---|---|
| Information sharing (ISL) | ISL1 | Our enterprise uses information technology to process procurement and other related information | Wu[31]Etc. (2014) Prajog[32]Etc (2012) FENG Hua[33]Etc. (2018) |
| | ISL2 | Our enterprise uses electronic means to exchange purchase orders and other information | |
| | ISL3 | Our enterprise has an information system troubleshooting program | |
| | ISL4 | Our employees are familiar with the information system process | |
| | ISL5 | Our enterprises often and timely exchange information with the upstream and downstream enterprises | |
| | ISL6 | Our enterprises and upstream and accurate information can exchange complete and downstream enterprises | |
| | ISL7 | We have a clear understanding of the inventory, supply capacity and consumer demand of upstream and downstream enterprises | |

The synergy scale reflects the degree of collaboration between enterprises and upstream and downstream enterprises in the face of emergencies. The items in the scale include two aspects: cooperation planning and cooperative problem solving between enterprises and upstream and downstream enterprises. In terms of collaboration planning, the scale includes the production and type of products for the next stage of enterprise and upstream and downstream enterprises, predicting risks and problems, making emergency plan and long-term strategic plan. In terms of collaborative problem solving, the scale includes the ability to provide technology to complete tasks and share responsibilities. The synergy scale consists of eight questions, as shown in Table 4.

*Table 4: Collaboration measurement items*

| Variable | Item Number | Item Content | Item Source |
|---|---|---|---|
| Collaboration (COL) | COL1 | The company frequently discusses with the supplier the production volume and product type of the next stage | Wu[31]Etc. (2014) McevilyB[34]Etc. (2005) Riley[35]Etc. (2016) |
| | COL2 | The enterprise conducts joint planning with the upstream and downstream enterprises to predict the risks and problems in the operation | |
| | COL3 | The company often discusses with the upstream and downstream enterprises the emergency plan for product development and production | |
| | COL4 | The enterprise and the upstream and downstream enterprises together to predict the product demand | |
| | COL5 | The enterprise shares its long-term strategic plan for production with the upstream and downstream enterprises | |
| | COL6 | The enterprise and the upstream and downstream enterprises together to solve the business problems and conflicts | |
| | COL7 | The enterprise can provide professional knowledge or technology to complete the tasks together with the upstream and downstream enterprises | |
| | COL8 | The enterprise can share the responsibility with the upstream and downstream enterprises | |

### *3.3 Study design*

Based on the dynamic capability theory, information processing theory and resource base theory, the key influencing factors affecting the resilience of the automobile supply chain are proposed, and the theoretical model between Agility, Information sharing, collaboration and Supply chain resilience is constructed and the relationship hypothesis is made. The model diagram is shown in Figure 1.

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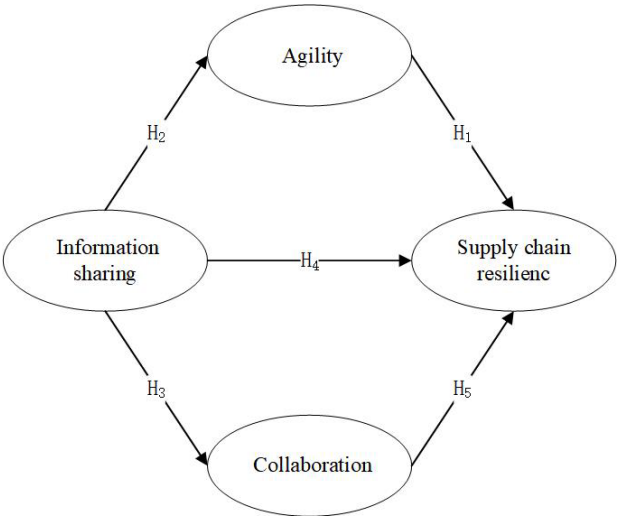


*Figure 1. The conceptual model*

## 4. Data analysis and model testing

### *4.1 Credit and validity analysis*

Credit validity analysis of the data was performed using SmarPLS3.0. As shown in Table 5, the overall Cronbach'sαvalues of the selected items in this study were greater than 0.8, so the data are of high confidence.

*Table 5: Table of the Cronbach'sαvalues*

| Variable | Number of questions | Cronbach's α |
|---|---|---|
| AGI | 4 | 0.874 |
| ISL | 6 | 0.901 |
| COL | 7 | 0.926 |
| SCR | 5 | 0.878 |

### *4.2 Validity analysis*

*Table 6: Convergent validity*

| Variable | Question Item | Factor Load | Initial Sample | Standard Deviation | T-Value | P-Value | Combination Reliability | Average Variation Extraction |
|---|---|---|---|---|---|---|---|---|
| | | | O | STDEV | O/STDEV | | CR | AVE |
| AGI | AGI1 | 0.842 | 0.842 | 0.02 | 42.685 | 0 | 0.914 | 0.726 |
| | AGI2 | 0.864 | 0.864 | 0.015 | 56.841 | 0 | | |
| | AGI3 | 0.847 | 0.847 | 0.019 | 45.035 | 0 | | |
| | AGI4 | 0.855 | 0.855 | 0.015 | 57.871 | 0 | | |
| ISL | ISL1 | 0.808 | 0.808 | 0.024 | 33.492 | 0 | 0.924 | 0.67 |
| | ISL2 | 0.769 | 0.769 | 0.03 | 25.566 | 0 | | |
| | ISL3 | 0.831 | 0.831 | 0.02 | 42.608 | 0 | | |
| | ISL4 | 0.835 | 0.835 | 0.019 | 44.128 | 0 | | |
| | ISL5 | 0.853 | 0.853 | 0.015 | 57.946 | 0 | | |
| | ISL6 | 0.811 | 0.811 | 0.022 | 36.633 | 0 | | |
| COL | COL1 | 0.829 | 0.829 | 0.019 | 42.927 | 0 | 0.94 | 0.692 |
| | COL2 | 0.858 | 0.858 | 0.016 | 53.761 | 0 | | |
| | COL3 | 0.828 | 0.828 | 0.018 | 45.637 | 0 | | |
| | COL4 | 0.85 | 0.85 | 0.018 | 46.563 | 0 | | |
| | COL5 | 0.838 | 0.838 | 0.017 | 49.435 | 0 | | |
| | COL6 | 0.835 | 0.835 | 0.02 | 41.755 | 0 | | |
| | COL7 | 0.783 | 0.783 | 0.025 | 30.741 | 0 | | |
| SCR | SCR1 | 0.823 | 0.823 | 0.019 | 44.428 | 0 | 0.911 | 0.672 |
| | SCR2 | 0.845 | 0.845 | 0.02 | 43.317 | 0 | | |
| | SCR3 | 0.803 | 0.803 | 0.023 | 34.349 | 0 | | |
| | SCR4 | 0.837 | 0.837 | 0.02 | 42.795 | 0 | | |
| | SCR5 | 0.788 | 0.788 | 0.024 | 32.381 | 0 | | |

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This study conducted the data validity analysis including convergent validity and discriminative validity analysis. Convergent validity is mainly measured by the factor load number, the Combined Reliability (CR), and the Average Variation Extraction (AVE) of the measurement item. The required factor load should be greater than 0.6, CR should be greater than 0.8, and AVE should be greater than 0.5. As shown in Table 6, this sample data meets the above requirements and therefore has good convergent validity.

Differential validity is the degree to which a latent variable differs from the others. Two criteria were selected to measure in this study. One is the cross load requirement, and the load requirement of each item on its own variable is greater than the load requirement of this item on other variables. As shown in Table 7, each item in this study meets this requirement. The other is the Fornell-Larcker criterion, which requires that the results on the diagonal are greater than the correlation coefficient between the variables. As shown in Table 8, the data meet the requirements. Therefore, the differential validity of this study was relatively good.

*Table 7: Cross-load scale*

| | SCR | ISL | COL | AGI |
|---|---|---|---|---|
| AGI1 | 0.46 | 0.383 | 0.38 | **0.842** |
| AGI2 | 0.483 | 0.4 | 0.389 | **0.864** |
| AGI3 | 0.465 | 0.395 | 0.375 | **0.847** |
| AGI4 | 0.498 | 0.407 | 0.352 | **0.855** |
| COL1 | 0.46 | 0.446 | **0.829** | 0.369 |
| COL2 | 0.488 | 0.508 | **0.858** | 0.36 |
| COL3 | 0.466 | 0.463 | **0.828** | 0.353 |
| COL4 | 0.495 | 0.447 | **0.85** | 0.363 |
| COL5 | 0.504 | 0.468 | **0.838** | 0.393 |
| COL6 | 0.5 | 0.439 | **0.835** | 0.369 |
| COL7 | 0.474 | 0.406 | **0.783** | 0.346 |
| ISL1 | 0.459 | **0.808** | 0.466 | 0.354 |
| ISL2 | 0.438 | **0.769** | 0.405 | 0.357 |
| ISL3 | 0.46 | **0.831** | 0.483 | 0.39 |
| ISL4 | 0.466 | **0.835** | 0.459 | 0.412 |
| ISL5 | 0.492 | **0.853** | 0.455 | 0.393 |
| ISL6 | 0.461 | **0.811** | 0.411 | 0.378 |
| SCR1 | **0.823** | 0.487 | 0.486 | 0.492 |
| SCR2 | **0.845** | 0.494 | 0.491 | 0.465 |
| SCR3 | **0.803** | 0.477 | 0.476 | 0.433 |
| SCR4 | **0.837** | 0.432 | 0.472 | 0.452 |
| SCR5 | **0.788** | 0.423 | 0.457 | 0.447 |

*Table 8: Fornell-Larcker criterion table*

| | SCR | ISL | COL | AGI |
|---|---|---|---|---|
| SCR | **0.82** | | | |
| ISL | 0.565 | **0.818** | | |
| COL | 0.582 | 0.546 | **0.832** | |
| AGI | 0.559 | 0.465 | 0.439 | **0.852** |

### *4.3 Model analysis of the structural equations*

In this paper, questionnaires were distributed to the staff of the related enterprises in the upper, middle and downstream supply chain of Geely Auto. A total of 470 questionnaires were distributed. The invalid samples with incomplete and consistent answers were removed, and a total of 437 valid samples were obtained, with an effective recovery rate of 92.97%. Analysis of the structural models with SmartPLS3.0 yielded Table 9. This table shows that the T-value of the path AGI->SCR is 7.574 and the P-value is 0, so that Agility has a significant positive impact on the resilience of the automotive supply chain, assuming $H_1$. The pathway ISL->AGI has a T -value of 13.044 and a P value of 0, so that Information sharing has a significant positive effect on Agility, assuming $H_2$ holds. The pathway ISL->COL has a T-value of 17.201 and a P-value of 0, so that Information sharing has a significant positive effect on collaboration, assuming $H_3$ holds. The path ISL->SCR is 5.623 and the P-value is 0, so Information sharing has a significant positive impact on the resilience of the automotive supply chain, assuming $H_4$ is true. The path COL->SCR is 6.861 and the P-value is 0, so the collaboration has a significant positive impact on the resilience of the automotive supply chain, assuming $H_5$ is true.

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*Table 9: Path coefficient table*

| Hypothesis | Path | Standardized Path Coefficient | Standard Deviation | T-value | P-value | Conspicuousness |
|---|---|---|---|---|---|---|
| $H_1$ | AGI->SCR | 0.306 | 0.04 | 7.574 | 0 | notable |
| $H_2$ | ISL->AGI | 0.465 | 0.036 | 13.044 | 0 | notable |
| $H_3$ | ISL->COL | 0.546 | 0.032 | 17.201 | 0 | notable |
| $H_4$ | ISL->SCR | 0.254 | 0.045 | 5.623 | 0 | notable |
| $H_5$ | COL->SCR | 0.309 | 0.045 | 6.861 | 0 | notable |

### *4.4 Mediation effect analysis*

In this study, the total indirect effect path was first obtained by the bootstrap method in SmartPLS3.0 to determine whether all indirect effects in this model exist. As shown in Table 10, there is a significant mediation effect between Information sharing ISL->Supply chain resilience SCR.

*Table 10: Total indirect effect pathways*

| Path | Total Indirect Effect Size | Standard Deviation | T-value | P -value | Error Correction Interval | | Whether Significant |
|---|---|---|---|---|---|---|---|
| | | | | | 2.5% | 97.5% | |
| ISL->SCR | 0.311 | 0.028 | 11.148 | 0 | 0.258 | 0.367 | notable |
| ISL->COL | | | | | | | |
| ISL->AGI | | | | | | | |
| COL->SCR | | | | | | | |
| AGI->SCR | | | | | | | |

Second, the present study examined the significance of this effect by specific indirect effect data, requiring the data T-value greater than 1.96 and P-value less than 0.05. As shown in Table 11, all specific indirect effect pathways in this study were significant.

*Table 11: Specific indirect effect pathways*

| Path | Specific Indirect Effect Size | Standard Deviation | T-Value | P-Value | Error Correction Interval | | Whether Significant |
|---|---|---|---|---|---|---|---|
| | | | | | 2.5% | 97.5% | |
| ISL->COL->SCR | 0.169 | 0.026 | 6.504 | 0 | 0.12 | 0.22 | notable |
| ISL->AGI->SCR | 0.142 | 0.022 | 6.541 | 0 | 0.103 | 0.187 | notable |

When the model is tested for mediating effects, there are five possible outcomes: when P1·P2 (specific indirect effect) is significant, P3 (direct effect) is significant, and P1·P2 and P3 symbols are consistent, it is called a complementary partial mediating effect; When P1·P2 (specific indirect effect) is significant, P3 (direct effect) is significant, and P1·P2 and P3 symbols are inconsistent, it is called a competitive partial mediation effect. When P1·P2 (specific indirect effect) is significant and P3 (direct effect) is not significant, there is only an indirect effect, which is called a fully mediated effect. When P1·P2 (specific indirect effect) is not significant and P3 (direct effect) is significant, there is only a direct effect and no intermediary effect. When P1·P2 (specific indirect effect) is not significant, and P3 (direct effect) is not significant, there is no effect effect, so there is no intermediary effect. As mentioned above, only if the specific indirect effect of the pathway is significant can there be a possible mediation effect. Therefore, the pathway of the significant specific indirect effect is analyzed as follows. As shown in Table 12, the direct effect of Information sharing ISL->Supply chain resilience SCR is significant, the indirect effect of ISL->COL->SCR and ISL->AGI->SCR is significant and the direct effect is consistent with the sign of the indirect effect path coefficient. Therefore, synergy and Agility are complementary on Information sharing and Supply chain resilience.

*Table 12: Summary table of mediation effects*

| Path | Intermediary Path | Conspicuousness | Intermediary Inspection |
|---|---|---|---|
| ISL ->SCR | ISL->COL->SCR | notable | Complementary type of partial mediation Effect |
| ISL->SCR | ISL->AGI->SCR | notable | Complementary type of partial mediation effect |

## 5. Conclusion and outlook

Through the investigation of the upstream and downstream enterprises of Geely Auto supply chain, according to the standardized path coefficient of Table 9, it can be concluded that the collaboration between the upstream and downstream enterprises of the automotive supply chain has the greatest impact on the resilience of the supply chain, followed by Agility, and finally, Information sharing has the greatest impact on the resilience of the supply chain. According to the impact of the importance of Geely Auto:

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(1) Establishing a collaborative operation platform: In order to further promote the high-quality development of the automobile manufacturing industry, it is necessary to establish an integrated collaborative operation platform. At present, enterprise business platforms mostly integrate internal business systems such as OA, PLM, WMS, ERP, etc., and should try to establish a unified collaboration channel with external suppliers. In this way, enterprises can optimize the supply chain ecosystem and improve the overall operational efficiency and risk control capabilities.

(2) Improve the efficiency of the emergency supply guarantee team: During the epidemic period, Geely Auto established an emergency supply guarantee team to be responsible for flexibly adjusting the production plan. Now most of the teams are formal and rarely play a substantial role. The team needs to strengthen its sensitivity to market conditions and fully ensure that companies can predict and respond to all force majeure risks.

(3) Establish a diversified supply system: In order to improve the flexibility of the supply chain and the ability to resist risks, Geely Auto should find more diversified sources of parts supply and implement special management to ensure the flexibility and stability of supply.

(4) Establish a joint supply chain management information system: the current supply chain management information system established by enterprises has simple functions, and can only view the work plan and other information received by the enterprise for simple processing operations. Enterprises can achieve highly streamlined, integrated and platform-based management by upgrading the information platform. At the same time, strengthen supplier collaboration and realize the electronic management of the whole life cycle from supplier access to elimination, so as to improve the efficiency and quality of the supply chain.

Due to the limitation of objective conditions and the limited knowledge and theoretical level of the author, the paper still has shortcomings, which is urgent to continuously improve and improve in the future study and research:

This paper mainly discusses the impact of agility, information sharing and collaboration on the resilience of the automotive supply chain. However, in reality, due to the complexity and high uncertainty of the situation, there are often multiple situations. Future studies can consider how to improve the resilience of the supply chain more specifically by combining the two influencing factors based on the findings of this study. This paper only studies the factors affecting the supply chain resilience of automobile enterprises. Today's uncertainties and emergencies will inevitably affect all walks of life. In the future, the research field of supply chain resilience will also spread from the automobile industry to different industries.

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