

The Impact of Supply Chain Partnership on Firm Performance: an Empirical Study Based on Listed Manufacturing Companies in China

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Abstract. Today, Supply Chain Management (SCM) is regarded as an essential strategic factor, which has a great deal of influence on earning competitiveness in global business environment. There are conflicts among all members of the SCM. In order to maximize the total profit of the SCM, negotiation among all members is necessary. For enterprise in the supply chain, the supply chain partnership has become a significant factor affecting firm performance. In this paper, I examine the impact of cooperation between enterprise and its supply chain partners. Specifically, I collect survey data from Chinese manufacturing firms about their relations with partners and use regression analysis to test hypotheses about the associations between firm performance and supply chain partnership. My results support that superior supplier partnership has a positive impact on reducing transaction costs and improving financial and market performance. In additional test, I establish a series of models with interactive terms. The results of additional test indicate that the impact is enhanced if the competition of each sub industry of the manufacturing industry is different. Above all, I put forward the following suggestions. Enterprise managers could establish an evaluation mechanism of suppliers and retailers, which select high-quality cooperative partners and reduce low-quality transaction costs for enterprises. When participating in business operation, shareholders could comprehensively understand the business conditions of various supply partners and choose reliable supply chain partners for investment. Also, the government can guide the realization of resource sharing and information exchange among supply chain enterprises, which is beneficial to create a more competitive supply chain to promote economic development.

Keywords: Supply chain partnership; Firm performance; Transaction cost; Supply chain management; Principal-agent theory.

1. Introduction

The 21st century economic landscape is characterized by the development of a New Economic Order (NEO) of globalization (Tanada et al, 1997). The tendency of global economy and Internet technology make a huge impact on development of industries involving supply chain. In the context of globalization, it is required to take into account the complexity of configuration and integration of supply chain (Ya.Kononenko, 2012). Manufacturing firms cannot compete successfully in the extended world market without an effective and operational supply chain network. Therefore, Supply chain management idea has begun to attract the attention of the academic and business community. Hauser (2003) suggested that enterprises should place a high priority on developing adequate supply chain management strategies to improve financial performance and to achieve competitive advantage considering today's increasingly complex environment of business. The enterprise's strategy should meet current market requirements and ensure success of the enterprise in the future. By reason that supply chain is composed of the relative upstream and downstream companies, the managers need not only to focus on a single company but also to consider cooperative relationship between them to promote supply chain performance totally (Tian, 2018). The process of globalization, together with the ever-growing competition, affect suppliers, manufacturers and distributors to integrate its activities through appropriate management of material flow and information flow (Sebastian Kot et al, 2014). Today's global marketplace offers tremendous opportunities for manufacturing companies in achieving strategic competitiveness through effective supply chain management (SCM). The current environment, in which organizations operate, has changed drastically with the growth in

collaboration between competitors, supply chain partners, outsourcing, integrated supply chain systems and advancement in technology and innovation. As global competition increases, manufacturing companies should be more involved in how their suppliers and customers conduct business (Arawati, 2021). Supply chain management is a set of approaches used to efficiently integrate suppliers, manufacturers, warehouses, and customers so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time in order to minimize system wise costs while satisfying service level requirements (Mohammad Zubair Khan et al., 2010). Supply chain management (SCM) can then be seen as the active management and effective coordination of supply chain activities to leverage strategic positioning by increasing customer value and achieving a competitive advantage. SCM is needed for various reasons: improving operations, better outsourcing, increasing profits, enhancing customer satisfaction, generating quality outcomes, tackling competitive pressures, increasing globalization, increasing importance of E-commerce, and growing complexity of supply chain. Supply chain are relatively easy to define for manufacturing industries, where each participant in the chain receives inputs from a set of suppliers, processes those inputs, and delivers them to a different set of customers. The objective of SCM is to incorporate activities across and within organizations for providing the customer value SCM assists the business organization to compete in the dynamic international market (Mamun Habib, 2014).

Some studies on supply chain present that the overall management effect of supply chain determines supply chain performance (Francisco et al.2013; Ahmad Javan Jafari et al.2012; Wright and Datskovska 2012). supply chain flexibility, supply chain concentration and supply chain integration all have a great impact on supply chain performance (Arawati 2011; Feng 2016; Luo et al.2019). In addition, many scholars believe that improving supply chain performance can enhance the competitiveness of enterprises. On the one hand, the value of the whole supply chain is related to the profits generated by the enterprise. Strong profitability can enhance the competitiveness of the enterprise (Wang and Cai 2017; Danuta pluta et al.2014; Sun and Sui 2019; Jin 2019). On the other hand, supply chain cooperation risk will reduce enterprise performance and lead to the decline of competitiveness. (Sherif et al.2020; Colicchia and Strozzi 2012; Malhotra and Lumineau, 2011). Many scholars have done a lot of research on supply chain management, but the evaluation and selection of partnership in supply chain management is still one of the bottlenecks of supply chain construction. The supply chain management committee (2009) asserted that supply chain management (SCM) refers to the planning, management and coordination of all business-related activities among supply chain members to improve operational efficiency. Therefore, the partnership between supply chain members will affect enterprise performance. In order to further explore the supply chain partnership, this paper selects the empirical research method to explore the impact of supply chain partnership on enterprise performance.

The influence of supply chain partnership on enterprise is significant. Supply chain will provide corporate information with all stakeholders in the coordination process. Cooperation between enterprises and supply chain partners can maximize benefits. Also, supply chain collaboration has a directly positive influence on firm performance. (Vanessa Fathia Baba et al., 2021). The logistics, business flow, information flow and capital flow of the whole supply chain have a significant impact on the operation of enterprises. On the basis of win-win cooperation, its diversified, personalized combination of good and harmonious supply chain partnership, can make the enterprise in a favorable market competition position, make the enterprise equity maximization and cost minimization. Qi (2014) analyzed the theory model about how the relationship between supply chain members can influence innovation performance. It is found that inter-firm trust and learning can help to promote relationship governance, and further enhance the innovation performance of the enterprises. Anil Kumar et al. (2012) consider the influence of combination of the three degrees of supplier and manufacturer flexibility on supply chain performance. Assefa Balda and Rajwinder Singh (2020) investigated the level of integration among supply chain members in moving towards the adoption of sustainable supply chain management (SSCM). Joon-Sok Kim and Nina Shin (2019) proved that blockchain will affect the efficiency and growth of supply chain partnerships and supply chain

performance. Petros leromonachou et al. (2015) identified the supply chain collaboration models and its correspondent advantages on pharmaceutical supply chain. In the process of supply chain management, enterprises can achieve collaborative operation and coordinated operation under the overall management. Superior supply chain partnership greatly enhances the overall advantage of the supply chain in the large market environment. Therefore, the supply chain partnership is closely related to firm performance. The purpose of this study is to provide substantive basis for manufacturing enterprises, and give useful suggestions for enterprise supply chain management and performance improvement.

The rest of this paper is organized as follows. Section 2 provides a brief literature review and develops testable hypotheses. Section 3 outlines the data and methodology. Section 4 analyses test results. Section 5 has an additional test. Section 6 concludes.

2. Literature Review and Hypothesis Development

2.1 Literature Review

The Operations Management Association dictionary defines supply chain as a global network for delivering products and services from raw materials to end customers through engineered information flow, logistics and cash flow (Blackstone 2008). Chain is the mechanism by which products are transferred from raw material stage to final consumers through a series of transformation processes (Crandall et al., 2010). Some customers do not ask about the product development process; They look at the properties of the final product, while others verify the process and the components or parts of the product when purchasing the product. For example, KFC pays attention to the supply chain of birds and birds to ensure that their growth, capture, transportation, holding, stun, slaughter and delivery comply with its meat procurement standards and specifications (KFC 2011). The interdependence among participants in the supply chain (such as manufacturers, transportation companies, distributors, retailers and customers) forms a network. Supply chain management has an indelible impact on the internal operation and external development of enterprises. High quality, efficiency and customer satisfaction are some of the benefits a firm reaps if its supply relationship management is effective (Ndubisi et al., 2005; Foerstl et al., 2016). Within the enterprise, supply chain management includes all activities related to procurement, transformation and the whole logistics activities. It integrates supply and demand management into the enterprise. When enterprises implement the supply chain strategy based on their unique resources, capabilities and core competitiveness, sustainable competitive advantage will be realized (Hitt et al., 2001; Sheila and Yang, 2020). In addition, if enterprises want to develop externally, they can coordinate and cooperate with channel partners, which can be suppliers, intermediaries, third-party service providers and customers (CSCMP 2011). As long as the interdependence within an industry continues, the whole supply chain will maintain its functions in orders composed of different businesses. Companies with a strong supply chain can make use of the resources or capabilities of the supply chain in the industry, so as to enjoy the sustainable competitive advantage of low cost. A single specific advantage does not guarantee sustainability, but the relevant activities, relationships and capability systems that run through all components and parts of its operation provide the basis for Sustainability (Johnson et al., 2008). In the supply chain structure of manufacturing enterprises, the important strategy for enterprises to maintain sustainable competitive advantage is to strengthen and adjust effective supply chain relationship management. Companies such as Dell use SCM to create more integration with their suppliers to reduce distribution costs, enhance supplier relationships superior, and enhance the overall business performance (Dmaithan et al., 2016). Supply chain partnership refers to a coordination relationship formed between two or more independent members within the supply chain. Supply chain relations are considered critical firm assets that can be leveraged to enhance firms' competitive position (Anderson and Dekker, 2009). supply chain partnership is positively correlated with supply chain performance. (Fynes et al.,2005; Vereecke and Muylle,2005). Forming a supply chain strategic partnership is a shortcut to achieve a win-win situation between logistics enterprises

and customers. the long-term dynamic cooperation between the two sides can bring future business benefits to logistics enterprises. (Bloom, 2013; Cao,2013; Dai.et al.,2015). In order to improve the overall operation performance of the supply chain, it is necessary to consider the overall supply chain cooperation relationship. Verecke and Muylee (2006) indicates that strategic partnerships between manufacturers and suppliers have a significant impact on supply chain performance and competitive advantage. Li and Zhou, (2011). In addition, recent studies find that by reducing concerns about a partner's trustworthiness and competence, the choice of partner to collaborate with can contribute significantly to mitigating perceived risks, while it can also contribute to enhanced contract and control design (Dekker, 2008; Dekker and Van den Abbeele, 2010; Li et al., 2008).

Firm performance refers to the extent to which an enterprise achieves its market, operation, growth and financial objectives within a certain period of time under a certain internal and external environment (Daugherty et al.,2009). It is the external expression of enterprise competitive advantage, core competence and innovation ability. It is an important index to evaluate the effect of supply chain integration (Feng et al.,2016). A complete performance management system can formulate the objectives of each function, team and employee according to the company's strategic objectives, and combine them with the external market conditions of the industry. Firm performance management is related to the financial supervision and operation management of enterprises, and leads the high-quality development of enterprises. Whether the current performance evaluation method can comply with the tide of the double cycle era and help enterprises play an important role in the global industrial chain value chain is becoming more and more critical (Zhu,2021). The influencing factors of enterprise performance are divided into external factors and internal factors. Among them, the industry situation constitutes the core of external factors, while the key elements of internal factors include: capital structure, ownership structure, corporate governance structure, human capital and other factors (Liu, 2011). There are various factors affecting enterprise performance. The level of firm performance is mainly reflected in profitability, asset operation level, solvency and follow-up development ability. Effective enterprise performance management has made achievements and contributions to the operation, growth and development of enterprises. There are different financial measures that can be used in order to evaluate the performance of a company that uses subjective and objective measures. Some of the objective financial measures are: revenue, return on equity, return on assets, profit margin, sales growth, capital adequacy, liquidity ratio, and stock prices (Shariff, Peou and Ali, 2010). Subjective measures may include employee commitment and satisfaction, customer satisfaction and loyalty and minimal customer complaints help create sustainable shareholders value (Cumby and Conrod, 2001). Firm performance assessment is not only based on capabilities and outcomes but also from a competitive market perspective. The measures for performance comprise: return on asset, market share, return on investment, net profit, growth in net profit, sales, gross margin, quality performance, productivity ratio, inventory, market performance, financial liquidity, etc. and other non-financial measures such as the present value of the firm, market share, and innovation performance (Vanessa et al., 2021). Over the years, the essence of competition among firm performance is no longer the traditional quality competition, but how to effectively connect enterprise operation with supply chain network. Establishing market relations with suppliers, customers and other strategic partners based on trust and commitment has become a key competitive parameter (Vanessa et al., 2021). therefore, the enterprise's supply chain network has become a necessary agenda to accelerate senior management decision-making. The goal of every supply chain practice is to improve firm performance while meeting customer service level needs. in a typical supply chain system, suppliers and customers are conjoined into one collective business process that traverses the entire chain from the primary source to the final consumer (Nazifa and Ramachandran, 2019). It implies that every single firm depends on other firms to deliver its goods or services to customers (Seggie et al., 2006). It is evident firms benefit from the information sharing of supply chain.

This paper uses empirical data to study the impact of supply chain on enterprise performance. The financial and operating data of domestic manufacturing listed companies are collected. The proportion of the purchase amount of the top five suppliers and the proportion of the sales amount of

the top five retailers are respectively used to measure the supply chain partnership between enterprises and suppliers and retailers. The return on assets and Tobin's Q value are used to measure the financial performance and market performance of enterprises, and in paper, the current situation of supply chain partnership of domestic manufacturing enterprises is analyzed.

2.2 Hypothesis Development

Game theory mainly studies how to achieve the optimal decision-making under rational conditions when the decision-making behavior of the players influences each other. The game theory is also one of the basic theories of the supply chain concept. In the supply chain theory, there is a strong game behavior between enterprises and suppliers because of business contacts and interests. Supplier partnership deeply affects enterprise performance. Based on game theory, Wang and Liu (2010) proposed in the study of food supply chain that the more suppliers tend to adopt cooperative strategies, the more likely the pareto optimal equilibrium is to be realized. Giunipero (2008) reviewed the literature on supply chain management in the past decade and believed that the relationship between enterprises and suppliers has changed from confrontational to cooperative. This cooperative relationship is characterized by a long-term contractual or strategic cooperative relationship, the two sides jointly game and cooperate with each other. Enterprises can improve their performance by improving the relationship between suppliers related to supply chain performance. When Zhang et al. (2015) studied the optimal emission reduction of the supply chain, through the game analysis of supply chain cooperative R & D, they found that the supply chain decision-making was optimal when suppliers and manufacturers cooperated in R & D of emission reduction. Enterprises can use the ideas and methods of game theory to manage the supplier relationship, achieve the best game, make the enterprise get the optimal decision, and improve enterprise performance.

Transaction cost theory (also called transaction cost theory) was proposed by Coase (1937). Transaction cost refers to the voluntary association and cooperation of social members in certain social relations to reach a certain. In essence, as long as there are human exchange activities, it will produce transaction costs. Under the natural control of transaction costs, various industries have formed a special system like supply chain. And with the intensification of industry competition, people pursue the driving force of transaction cost reduction is also more and more strong. Yang et al.(2006)based on transaction cost theory, studied the supply and demand equilibrium problem of supply chain network formed by suppliers and manufacturers in two stages of transaction. The study shows that the establishment of long-term cooperative supplier relationship can reduce costs. Li et al(2006)believed that the functional departments of the cooperative company collaborated with each other in the evaluation of inventory, processing and equipment utilization, which helped to reduce operating costs. Peteren (2008) found that buyer companies that are highly dependent on suppliers take on social activities (such as establishing communication guidelines, teams, joint discussions, etc.), thus bringing their relationship costs. The impact of supplier selection on enterprise performance is reflected by the direct impact on product cost and product quality. Supplier selection directly affects the cost of enterprises and product quality, and then indirectly affects financial performance and market performance. Tsai, JF (2007) found that strategic supplier partnership can also make the organization produce financial performance, and Carr et al. (2008) pointed out that cooperation is directly related to financial performance. TStanley and Wisner (2001) found that collaborative relationships can improve market performance. Yang (2016) pointed out the lack of quality suppliers. Carr et al. (2008) found that supplier dependence on the buyer helped F suppliers to participate in the activities of the buyer's company, and supplier training and participation would significantly contribute to improving market performance. Ying (2016) pointed out that in a cooperative supplier relationship, it does not emphasize the use of dominant position in the relationship for price squeeze, but seeks to improve market performance and financial performance through effective cooperation between the two sides. From the perspective of transaction costs, enterprises can establish a good supplier partnership, which means that most of the transactions are concentrated in a few high-quality suppliers, which will greatly reduce the cost of finding new

suppliers. At the same time, because of the long-term trust and cooperation, the information transparency and intimacy between the two sides are strengthened, and the risk of inferior cooperation is avoided. The quality of market products can also be guaranteed, and the enterprise performance is greatly improved.

Based on the above theory, hypothesis 1-1 and hypothesis 1-2 are proposed:

Hypothesis 1-1: Supplier partnership is positively correlated with enterprise financial performance

Hypothesis 1-2: Supplier partnership is positively correlated with enterprise market performance

The principal-agent theory believes that the enterprise consists of a series of contracts, the capital providers and operators, enterprises and lenders, enterprises and customers, enterprises and employees have contractual relationship. In the supply chain, there is a contractual relationship of risk sharing and benefit sharing between enterprises and retailers. Because of the asymmetry of information, there is a complex principal-agent relationship between enterprises and retailers in the supply chain, and retailers have more information about sales cost market sales and market forecasting. Xu (2000) analyzed in detail the important role of principal-agent relationship in supply chain cooperative enterprises. Based on principal-agent theory, Zhu and You (2011) established a principal-agent model under asymmetric information conditions, and studied how to carry out quality signal transmission between supply chain node enterprises under asymmetric information conditions. Liu (2019) pointed out that in the manufacturing supply chain, manufacturing enterprises are in the position of principals and retailers are in the position of agents. Because the latter has private information which is difficult to grasp by manufacturing enterprises, after the construction of supply chain, enterprises may encounter cooperation risk and reduce enterprise performance. Chen et al. (2014) studied the incentive problem of sales agents and the influence of prediction accuracy of sales agents on enterprise performance. Khanjari et al. (2014) analyzed the influence of efficiency of sales agents on supply chain performance. Zhao (2010) found that the retailer's partnership and business performance and financial performance are positively correlated. Therefore, enterprises could establish long-term superior partnership with retailers to avoid the impact of cooperation risk on enterprise performance.

Stakeholder theory believes that enterprises should be stakeholders. American scholar Ansoff believed that in order to formulate an ideal enterprise goal, it is necessary to comprehensively balance and consider the conflicting claim rights among many stakeholders of the enterprise. These stakeholders have injected a certain amount of investment into the survival and development of enterprises, paid for the operating activities of enterprises, and also shared certain risks of enterprises. Based on stakeholder theory, enterprises and retailers are inseparable stakeholders. Gu and Peng (2012) indicated that the current marketing ability can ensure long-term sustainable growth of enterprise performance, product profit is related to the interests of enterprises. Therefore, the retailer's partnership will affect enterprise performance. Xu and Ma (2001) use the concept of supply chain strategic partnership to describe the partnership between enterprises and retailers, partnership is formed between enterprises with consistent objectives and interests, which indicates that the concept of partnership must be based on interest linkages. There is a strong interest relationship between enterprises and retailers. Only by dealing with the interest relationship can we further improve enterprise performance.

Based on the above theory, hypothesis 2-1 and hypothesis 2-2 are proposed:

Hypothesis 2-1: Retailer partnership is positively correlated with enterprise financial performance

Hypothesis 2-2: Retailer partnership is positively correlated with enterprise market performance

3. Methodology

3.1 Sample and Data

According to previous research experience (Vanessay et al., 2019; Luo et al., 2019), the supply chain characteristics of manufacturing enterprises are the most obvious. At the same time, in order to avoid the impact of accounting policy changes on the research, this paper selects relevant 12601 data

of China manufacturing industry from 2014 to 2020 as the research object. The data used are from CSMAR database, including the top five suppliers. The percentage share of customers comes from CSMAR China Listed Companies' notes to financial statements database. On this basis, the following treatments are made: (1) Referring to the practice of Luo et al. (2019), the companies named "ST" during the study period are excluded. If a listed company loses money for three consecutive years, it will be marked with "ST" shares, indicating vigilance and may face delisting risk. (2) Delete companies listed after 2000 (Mamun et al., 2014; Assefa, 2020). (3) Delete companies with missing data. Finally, 12601 data were obtained. Statistical software Stata 16.0 was used for descriptive statistics and regression analysis.

3.2 Research Design

3.2.1 variable definition

To complete the study, I select the following variables.

1. Explained variable. Firm Performance. The existing literature mostly uses financial indicators to measure enterprise performance, but financial indicators only can reflect the short-term performance of enterprises, and not fully reflect the long-term development of enterprises (Cui, 2019). Therefore, this paper measures enterprise performance from two aspects: market performance and financial performance. I select return on assets (Roa) as the index to describe enterprise financial performance; Tobin Q value is selected as the market performance index to reflect the market value of enterprises (Birger Wernerfelt, 2018; Cynthia A. Montgomery, 2020).

2. Explanatory variables. Supplier Partnership and Retailer Partnership. Like many scholars (Sheila, 2020; Vanessay, 2021; Zhao, 2010), I use the proportion of the annual purchase amount of the top five suppliers to the total annual purchase amount of the enterprise to measure the enterprise performance and supplier partnership, and use the proportion of the annual sales of the top five retailers to the total sales of the enterprise to measure the enterprise performance and seller partnership.

3. Control variables. Based on the practice of similar literature, 8 control variables are selected: (Delmas and Burbano, 2011; Yang, 2015; Innes and Sam, 2008; Herbohn et al.).

Asset Liability Ratio: The calculation method of asset liability ratio is the total liabilities divided by total assets. The difference of asset liability ratio will lead to different enterprise performance. Therefore, this variable needs to be controlled in the research process.

Company Size: company size is the classification of enterprises according to production and operation capacity. It can measure the production capacity of enterprises.

Total Asset Turnover: The total asset turnover rate is the ratio of the net sales revenue of the enterprise to the average total assets in a certain period. It is an important index to investigate the operation efficiency of an enterprise's assets, which can reflect the operation efficiency and changes of the enterprise's total assets in this year and previous years.

Growth Rate of Sales Revenue: Usually, the higher the growth rate of sales revenue, it means that the sales volume of the company's products increases, the market share expands, and the more optimistic the future growth is.

Enterprise Age: In the face of environmental changes brought about by supply chain integration, enterprises face greater risks. The length of enterprise listing time represents the difference of enterprise qualifications and the difference of enterprise risk control ability. Therefore, the difference of enterprise listing age will also lead to the difference of effect.

Cash All Recovery Rate of All Assets: The cash recovery rate of all assets is the ratio of net operating cash flow to all assets. The more cash inflows created by assets, the stronger the ability of the whole enterprise to obtain cash and the higher the level of operation and management.

Investment Opportunities: The company's investment opportunities are relative to the objective environment. Different investment opportunities of each enterprise will lead to different experimental results, so I should control this variable.

Year: Year is a dummy variable.

Table 1. Variable Definition Table

Variable Type	Variable Name	Variable Code	Variable Definition
Explained Variables	Return on Assets	Roa	Net Profit / Average Total Assets
	Tobin Q Value	Tqv	Equity Market Value + Net Debt Market Value / Total Assets at the End of the Period
Explanatory Variables	Supplier Partnership	Sp	Proportion of Annual Purchase Amount of Top five Suppliers in Total Annual Purchase Amount of Enterprise
	Retailer Partnership	Rp	Proportion of Annual Sales of the Top five Sellers in the Total Sales of the Enterprise
Control Variables	Asset Liability Ratio	Alr	(Ending Total Liabilities / Ending Total Assets) * 100
	Company Size	Cs	Ln Total Assets at the End of the Period
	Total Asset Turnover	Tat	Operating Income / Average Total Assets
	Growth Rate of Sales Revenue	Grosr	Proportion of Increased Sales Revenue to Original Sales
	Enterprise Age	Ea	Age since the Establishment of the Enterprise
	Cash All Recovery Rate of All Assets	Carroaa	Net Operating Cash Flow / Total Assets
	Investment Opportunities	Io	(Total Assets at the end of the period - total Assets at the Beginning of the Period) / Total Assets at the Beginning of the Period * 100

This table provides definitions of all variables.

3.2.2 Descriptive statistics of main variables

Statistical software stata.16.0 was used for descriptive statistical analysis of the data, and the results are as follows:

Table 2. Descriptive statistics of Main Variables

Code	Number	Average	Std.dev	Min	Max	25th Percentile	Median	75th Percentile
Roa	12601	0.0409	0.1278	-9.11692	1.5315	0.0152	0.0437	0.0811
Tqv	12601	2.5033	3.2994	0.00695	126.4984	1.0150	1.7689	3.0362
Sp	12601	0.3444	0.1881	0.00130	1.0000	0.2059	0.3013	0.4447
Rq	12601	0.3288	0.2137	0.00250	1.0000	0.1625	0.2750	0.4525
Alr	12601	0.4110	1.6255	0.00836	178.3455	0.2316	0.3768	0.5271
Cs	12601	22.0153	1.1957	16.41232	27.5470	21.1678	21.8790	22.6785
Tat	12601	0.6474	0.4191	0.00026	8.4548	0.4047	0.5683	0.7876
Grosr	12601	0.2032	2.6646	-0.98823	263.2713	-0.0242	0.0998	0.2501
Ea	12601	18.7261	5.5035	10.20000	62.7000	15.0000	18.4000	22.3000
Carroaa	12601	0.0508	0.0803	-1.68630	2.2216	0.0126	0.0500	0.0911
Io	12601	0.2188	0.7685	-0.97247	45.4604	0.0117	0.0947	0.2462

This table reports the descriptive statistics of key variables.

1. There is little difference in the extreme value of supply chain partnership in manufacturing industry of China, and most of supplier partnerships are at the average level. The minimum value of supplier partnership is 0.0013, the maximum value is 1, and the average value is about 0.34. The

minimum value of retailer partnership is 0.0025, the maximum value is 1, and the average value is about 0.33.

2. The overall performance of manufacturing enterprises in China is quite different. The Maximum value of return on assets is about 1.53, and the minimum value is about -9.12, indicating that some enterprises have losses and negative net profit. Tobin Q value of the minimum value of about 0.01, the maximum value of about 126.5, 50% of the enterprise market performance below the average.

3. The minimum asset liability ratio is about 0.01, the maximum is about 178.35, the average is about 0.41, the maximum of the company investment opportunities is about 45.46, the minimum is about -0.97. The maximum value of total asset turnover is about 8.45, and the minimum value is 0.00026. The scale gap of manufacturing enterprises is also obvious, with the maximum value of about 27.55, and the minimum value of about 16.41, 50% of the enterprise scale below the average level.

3.3 Model description

Based on prior research (e.g., Qi, 2014; Mukesh, 2019; Sherif, 2020; Aswin, 2016; Zhao, 2019), I use the following empirical models to test the association between firm performance and supply partnership. The models are as follows.

$$\text{Model 1-1: } Roa = \alpha + \beta_1 * Sp + \beta_2 * Alr + \beta_3 * Cs + \beta_4 * Tat + \beta_5 * Grosr + \beta_6 * Ea + \beta_7 * Carroaa + \beta_8 * Year + \beta_9 * Io + \varepsilon$$

$$\text{Model 1-2: } Tqv = \alpha + \beta_1 * Sp + \beta_2 * Alr + \beta_3 * Cs + \beta_4 * Tat + \beta_5 * Grosr + \beta_6 * Ea + \beta_7 * Carroaa + \beta_8 * Year + \beta_9 * Io + \varepsilon$$

In the above two models, I use return on assets (Roa) and Tobin Q value (Tqv) to judge whether there is a positive correlation between supplier partnership (Sp) and firm performance. In Model 1-1, Roa is used to measure financial performance. Roa is an indicator used to measure how much net profit is created per unit of assets. Roa can reflect the profit margin generated by the joint funds of shareholders and creditors. If the Roa level of a company is good and its debt level is within a reasonable range, it indicates that the company operates well as a whole. Therefore, I use Roa to measure the company's financial performance. In Model 1-2, Tqv is used to measure market performance. Tobin Q value is often used as an important indicator to measure corporate performance or corporate growth. It refers to the ratio of the enterprise market value of capital to its replacement cost. The economic meaning of Tobin Q value is to compare whether the market value of an enterprise is greater than the cost of assets that bring cash flow to the enterprise. It can be used to measure whether the market value created by an enterprise using resources is greater than the cost of investment. Therefore, I use Tqv to measure the market performance of enterprises. I also added control variables and dummy variable.

$$\text{Model 2-1 : } Roa = \alpha + \beta_1 * Rp + \beta_2 * Alr + \beta_3 * Cs + \beta_4 * Tat + \beta_5 * Grosr + \beta_6 * Ea + \beta_7 * Carroaa + \beta_8 * Year + \beta_9 * Io + \varepsilon$$

$$\text{Model 2-2 : } Tqv = \alpha + \beta_1 * Rp + \beta_2 * Alr + \beta_3 * Cs + \beta_4 * Tat + \beta_5 * Grosr + \beta_6 * Ea + \beta_7 * Carroaa + \beta_8 * Year + \beta_9 * Io + \varepsilon$$

Taking Model 1-1 and Model 1-2 as a reference, I replace supplier partnership (Sp) with retailer partnership (Rp), adopt the same method to establish Model 2-1 and Model 2-2, and test whether retailer partnership is positively correlated with firm performance. In Model 2-1, Roa is used to measure financial performance. In Model 2-2, Tqv is used to measure market performance. I also added control variables and dummy variable.

4. Main Result

4.1 Results of hypothesis 1-1 and hypothesis 1-2

Model 1-1 and Model 1-2 are the empirical tests on the hypothesis that supplier partnership is positively correlated with corporate performance. The regression results are shown in Table 3.

Table 3. Supplier partnership and firm performance

	model 1-1		model 1-2	
	Coefficient		Coefficient	
Sp	1.352	***	1.069	***
Alr	1.860	***	1.774	***
Cs	0.008	**	0.704	***
Tat	0.041	***	-0.082	**
Grosr	0.034	***	0.391	***
Ea	-2.681	***	-1.253	**
Carroaa	0.328	***	3.717	***
Io	0.044	***	0.572	***
Year	yes		yes	

This table reports the regression results of the association between supplier partnership (Sp) and firm performance. The table reports coefficient values of the variables of model 1-1 and model 1-2. Model 1-1 tests the relationship between supplier partnership (Sp) and firm financial performance. Model 1-2 tests the relationship between supplier partnership (Sp) and firm market performance.

* Significance at the 10% level (two-tailed test if the sign is not predicted).

** Significance at the 5% level (two-tailed test if the sign is not predicted).

*** Significance at the 1% level (two-tailed test if the sign is not predicted).

From Table 3, we can see that the coefficient value of Sp is 1.352 (Model 1-1), this result is significant at the 1% level. Hypothesis 1-1 is verified. This result is consistent with Ma's research. (2010). The partnership between enterprises and suppliers affects their trust. The higher the trust, the better the quality of raw materials provided by suppliers, which greatly reduces the cost caused by inferior raw materials. Based on game theory, there is a long-term contractual or strategic cooperative relationship between enterprises and suppliers. (Giunipero et al., 2008) Therefore, enterprises and suppliers can form long-term cooperation to avoid the cost of finding new suppliers, so as to improve financial performance. Additionally, from the results of control variables, asset liability ratio (Alr), company size (Cs), total asset turnover (Tat), growth rate of sales revenue (Grosr), cash all recovery rate of all assets (Carroaa) and investment opportunities (Io) have a significant positive impact on the enterprises' financial performance, enterprise age (Ea) is negatively correlated with financial and market performance.

From Table 3, we can see that the coefficient value of Sp is 1.069 (Model 1-2), this result is significant at the 1% level. Hypothesis 1-2 is verified. This shows that the better the supplier partnership, the better the market performance. This result is consistent with the results of some scholars (Ying 2016; Car 2008). The choice of suppliers directly affects the cost and product quality of enterprises, which determines the market sales of products and the market performance of enterprises (Peteren 2018; Tsai, JF 2007;). The raw materials provided by suppliers indirectly determine the product quality, which is closely related to the market share. Enterprises develop good supplier partnership, can obtain high-quality raw material supply and produce high-quality products. Good products can help enterprises win customers' favor and occupy market share. In addition, from the perspective of control variables, the asset liability ratio (Alr), company size (Cs), growth rate of sales revenue (Grosr), cash all recovery rate of all assets (Carroaa) and the investment opportunities (Io) have a positive effect on market performance, and asset liability ratio (Alr) and investment opportunities (Io) have the greatest positive effect on market performance. The total asset turnover (Tat) and enterprise age (Ea) are negatively correlated with financial and market performance.

4.2 Results of hypothesis 2-1 and hypothesis 2-2

Model 2-1 and Model 2-2 are the empirical tests on the hypothesis that supplier partnership is positively correlated with corporate performance. The regression results are shown in Table 4.

Table 4. Retailer partnership and firm performance

	model 2-1		model 2-2	
	Coefficient		Coefficient	
Rp	1.002	**	0.956	***
Alr	1.150	***	1.900	***
Cs	0.008	***	0.704	***
Tat	0.040	***	0.171	***
Grosr	0.034	***	0.365	***
Ea	-2.090	***	-1.025	**
Carroaa	0.329	***	3.772	***
Io	0.044	***	0.538	***
Year	yes		yes	

This table reports the regression results of the association between retailer partnership (Rp) and firm performance. The table reports coefficient values of the variables of model 2-1 and model 2-2. Model 2-1 tests the relationship between retailer partnership (Rp) and firm financial performance. Model 2-2 tests the relationship between retailer partnership (Rp) and firm market performance.

* Significance at the 10% level (two-tailed test if the sign is not predicted).

** Significance at the 5% level (two-tailed test if the sign is not predicted).

*** Significance at the 1% level (two-tailed test if the sign is not predicted).

From Table 4, we can see that the coefficient value of Rp is 1.002 (Model 2-1), this result is significant at the 5% level. Hypothesis 2-1 is verified. Retailer partnership is conducive to the improvement of enterprise financial performance. Based on the principal-agent theory, the enterprise is the principal and the seller is the agent (Liu, 2019). the agency efficiency of sellers has a significant impact on the financial performance of enterprises (Khanjari, 2014). the marketing ability of retailers can ensure the long-term sustainable growth of enterprise performance, and the strong sales ability can maximize the enterprise profits, so as to improve financial performance. In addition, enterprises and sellers are inseparable stakeholders. The partnership between the two must be based on the relationship of interests (Xu and Ma, 2001; Gu and Peng, 2012). From the results of control variables, asset liability ratio (Alr), company size (Cs), total asset turnover (Tat), growth rate of sales revenue (Grosr), cash all recovery rate of all assets (Carroaa) and investment opportunities (Io) have a significant positive impact on the enterprises' financial performance. enterprise age (Ea) is negatively correlated with firm financial performance.

From Table 4, the coefficient value of Rp is 0.956 (Model 2-2), this result is significant at the 1% level, Hypothesis 2-2 is verified. This shows that the better the retailer partnership is, the better the market performance is. Establishing great seller partnership and creating high quality sales performance will help enterprises win customer repuTation, stabilize market position and improve market performance.(Chen, 2014; Khanjari, 2014; Zhao 2010) Additionally, from the results of control variables, asset liability ratio (Alr), company size (Cs), total asset turnover (Tat), growth rate of sales revenue (Grosr), cash all recovery rate of all assets (Carroaa) and investment opportunities (Io) have a significant positive impact on the enterprises' market performance. enterprise age (Ea) is negatively correlated with firm market performance.

4.3 Additional Test

4.3.1 The model of additional test

Herfindahl index (Hi) is the sum of the squares of the percentage of the total revenue of each market competitor in an industry, which is used to measure the change of market share. In additional test, I use the Herfindahl index (Hi) to measure the competition of each sub industry of the manufacturing industry and make further regression analysis. I establish the following models with interactive terms. In following models, Hi*Sp is an interactive term. If the result of interaction term test is significant, it indicates that when competition of sub manufacturing industries is different, the impact of supply chain partnership on firm performance is more significant. Otherwise, competition

of sub manufacturing industries is indifferent for the impact of supply chain partnership on firm performance.

Model 3-1: $Roa = \alpha + \beta_1 * Sp + \beta_2 * Hi + \beta_3 * (Sp * Hi) + \beta_4 * Alr + \beta_5 * Cs + \beta_6 * Tat + \beta_7 * Grosr + \beta_8 * Ea + \beta_9 * Carroaa + \beta_{10} * Year + \beta_{11} * Io + \varepsilon$

Model 3-2: $Tqv = \alpha + \beta_1 * Sp + \beta_2 * Hi + \beta_3 * (Sp * Hi) + \beta_4 * Alr + \beta_5 * Cs + \beta_6 * Tat + \beta_7 * Grosr + \beta_8 * Ea + \beta_9 * Carroaa + \beta_{10} * Year + \beta_{11} * Io + \varepsilon$

Model 4-1: $Roa = \alpha + \beta_1 * Rp + \beta_2 * Hi + \beta_3 * (Rp * Hi) + \beta_4 * Alr + \beta_5 * Cs + \beta_6 * Tat + \beta_7 * Grosr + \beta_8 * Ea + \beta_9 * Carroaa + \beta_{10} * Year + \beta_{11} * Io + \varepsilon$

Model 4-2: $Tqv = \alpha + \beta_1 * Rp + \beta_2 * Hi + \beta_3 * (Rp * Hi) + \beta_4 * Alr + \beta_5 * Cs + \beta_6 * Tat + \beta_7 * Grosr + \beta_8 * Ea + \beta_9 * Carroaa + \beta_{10} * Year + \beta_{11} * Io + \varepsilon$

4.3.2 The results of additional test

Table 5 reports the additional test results. we can see that the coefficient value of Sp is 1.310 (Model 3-1) and 1.633 (Model 3-2), the coefficient value of Rp is 0.245 (Model 4-1) and 1.246 (Model 3-2), they are all significant at the 1% level, The results indicate that when sub manufacturing industries are different, the impact of supply partnership on firm performance is more significant. When the industry is different, the relative environment of the enterprise will also change, and the supply chain resources owned by the enterprise will affect the decision-making behavior (Hu, 2021). Therefore, the intensity of industry competition has a certain moderating effect between supplier partnership and enterprise performance.

Table 5. Additional test of Model 3-1 and Model 3-2

	model 3-1		model 3-2	
	Coefficient		Coefficient	
Sp	1.310	***	1.633	***
Hi	2.597	***	1.933	***
Sp*Hi	1.021	***	1.145	***
Alr	1.189	***	0.903	***
Cs	1.015	***	0.946	***
Tat	1.400	***	0.958	***
Grosr	2.796	***	1.012	***
Ea	-0.004	***	-1.007	**
Carroaa	0.745	**	2.979	***
Io	0.017	***	0.167	***
Year	yes		yes	

This table reports the additional test results of the hypothesis 1-1 and hypothesis 1-2. The table reports coefficient values of the variables of additional test.

* Significance at the 10% level (two-tailed test if the sign is not predicted).

** Significance at the 5% level (two-tailed test if the sign is not predicted).

*** Significance at the 1% level (two-tailed test if the sign is not predicted).

Table 6. Additional test of Model 4-1 and Model 4-2

	model 4-1		model 4-2	
	Coefficient		Coefficient	
Rp	0.245	***	1.246	***
Hi	0.089	***	2.725	***
Rp*Hi	0.082	***	1.504	***
Alr	1.189	***	1.056	***
Cs	0.012	***	0.952	***
Tat	0.044	***	1.065	***
Grosr	1.96	***	0.011	**
Ea	-0.048	**	-0.011	***
Carroaa	0.336	***	3.036	***
Io	0.016	***	0.157	***
Year	yes		yes	

This table reports the additional test results of the hypothesis 2-1 and hypothesis 2-2. The table reports coefficient values of the variables of additional test.

- * Significance at the 10% level (two-tailed test if the sign is not predicted).
- ** Significance at the 5% level (two-tailed test if the sign is not predicted).
- *** Significance at the 1% level (two-tailed test if the sign is not predicted).

5. Robustness Test

5.1 The model of robustness test

In order to further ensure the reliability of the research results, the following robustness tests are carried out (Luo et al., 2019). I replace return on assets (Roa) with return on equity (Roe) to measure firm financial performance and replace Tobin Q value (Tqv) with market value adding (Mva) to measure firm market performance. The established models are as follows. Roa measures the return on total assets, which represents the company's ability to make money with all assets. It is the profit rate generated by the common funds of shareholders and creditors. Roa measures the company's previous asset value rather than the current, and Roa in different industries is not comparable. Roe measures the ability of shareholders to make money, which is the interest rate profit generated by shareholder funds. Moreover, Roe can be compared horizontally between different industries and different enterprises. In order to truly understand the operational capability of a company, it is accurate to use Roa and Roe at the same time. Therefore, I use Roe to measure financial performance in robustness test. The market value adding of an enterprise is the present value of future economic value increment. Most enterprises maximize shareholder wealth by maximizing market value adding. Market adding value is the cumulative total amount of a company's increase or decrease in shareholder wealth. Also, it is the best way to external evaluation of corporate management performance. Market value adding can be used to directly compare companies in different industries. Therefore, I use market value adding to measure broader corporate market performance.

$$\text{Model 5-1: } \text{Roe} = \alpha + \beta_1 * \text{Sp} + \beta_2 * \text{Alr} + \beta_3 * \text{Cs} + \beta_4 * \text{Tat} + \beta_5 * \text{Grosr} + \beta_6 * \text{Ea} + \beta_7 * \text{Carroaa} + \beta_8 * \text{Year} + \beta_9 * \text{Io} + \varepsilon$$

$$\text{Model 5-2: } \text{Mva} = \alpha + \beta_1 * \text{Sp} + \beta_2 * \text{Alr} + \beta_3 * \text{Cs} + \beta_4 * \text{Tat} + \beta_5 * \text{Grosr} + \beta_6 * \text{Ea} + \beta_7 * \text{Carroaa} + \beta_8 * \text{Year} + \beta_9 * \text{Io} + \varepsilon$$

$$\text{Model 6-1: } \text{Roe} = \alpha + \beta_1 * \text{Rp} + \beta_2 * \text{Alr} + \beta_3 * \text{Cs} + \beta_4 * \text{Tat} + \beta_5 * \text{Grosr} + \beta_6 * \text{Ea} + \beta_7 * \text{Carroaa} + \beta_8 * \text{Year} + \beta_9 * \text{Io} + \varepsilon$$

$$\text{Model 6-2: } \text{Mva} = \alpha + \beta_1 * \text{Rp} + \beta_2 * \text{Alr} + \beta_3 * \text{Cs} + \beta_4 * \text{Tat} + \beta_5 * \text{Grosr} + \beta_6 * \text{Ea} + \beta_7 * \text{Carroaa} + \beta_8 * \text{Year} + \beta_9 * \text{Io} + \varepsilon$$

5.2 The result of robustness test

Table 7 and Table 8 show the robustness test results. we can see that the coefficient value of Sp is 1.038 (Model 5-1) and 7.420 (Model 5-2), the coefficient value of Rp is 2.430 (Model 6-1) and 3.074 (Model 6-2), they are all significant at the 1% level. After replacing the index, the experimental results are still significant. This further ensures the reliability of the experimental results.

Table 7. Robustness test of Model 5-1 and Model 5-2

	model 5-1		model 5-2	
	Coefficient		Coefficient	
Sp	1.038	***	7.420	***
Alr	0.274	***	4.403	***
Cs	0.022	***	3.518	***
Tat	0.093	***	3.290	***
Grosr	1.080	***	6.430	***
Ea	-0.015	**	-2.850	***
Carroaa	2.505	***	2.003	***
Io	0.076	***	6.490	***
Year	yes		yes	

This table reports the robustness test results of the hypothesis 1-1 and hypothesis 1-2. The table reports coefficient values of the variables of robustness test.

* Significance at the 10% level (two-tailed test if the sign is not predicted).

** Significance at the 5% level (two-tailed test if the sign is not predicted).

*** Significance at the 1% level (two-tailed test if the sign is not predicted).

Table 8. Robustness test of Model 6-1 and Model 6-2

	model 6-1		model 6-2	
	Coefficient		Coefficient	
Rp	2.430	***	3.074	***
Alr	8.260	***	4.566	***
Cs	0.500	***	4.600	***
Tat	7.290	***	4.320	***
Grosr	1.200	***	6.100	***
Ea	-0.550	**	-2.41	***
Carroaa	7.780	***	2.400	***
Io	1.570	***	5.972	***
Year	yes		yes	

This table reports the robustness test results of the hypothesis 2-1 and hypothesis 2-2. The table reports coefficient values of the variables of robustness test.

* Significance at the 10% level (two-tailed test if the sign is not predicted).

** Significance at the 5% level (two-tailed test if the sign is not predicted).

*** Significance at the 1% level (two-tailed test if the sign is not predicted).

6. Conclusion

Based on relevant data of China manufacturing industry from 2014 to 2020, this paper uses regression analysis to explore the impact between enterprises and supply chain partnership. Superior supply chain partnership enhances the overall advantage of enterprises in the market. Therefore, supply chain partnership is important to enterprises. Based on the principal-agent theory, agents occupy a dominant position and have more market information. For enterprises in the supply chain, suppliers and sellers have more market information than enterprises, and enterprises are the party lacking information. This information asymmetry is not conducive to the development of enterprises. Therefore, it is very important to establish high-quality supplier partnership and retailer partnership to obtain market information for enterprises. Transaction cost theory points out that if most transactions are concentrated in a few high-quality partners, which will greatly reduce the cost of finding new partners. At the same time, because of long-term trust and cooperation, the information transparency and intimacy between the two sides have been strengthened, and the risks brought by

inferior cooperation have been avoided. I analyze the impact of supply chain partnership on firm performance by establishing a series of regression models. Experimental results show that the establishment of good supply chain partnership can help enterprises to develop the market, reduce transaction costs, improve sales performance, increase profits, and have a positive impact on financial performance and market performance. The results support principal agent theory based on information asymmetry and transaction cost theory based on supply chain cooperation. In the additional test, I build a series of models with interactive terms. From the results of additional test, I concluded that when sub manufacturing industries are different, the impact of supply partnership on firm performance is more significant. Finally, I conducted a robustness test. The results are still robust when I replace variables, so my research results are reliable and scientific. These study results not only provide relative theory basis for supply chain management research, but also provide guidance to managers to take measures to enhance supply chain partnership, promote information sharing, and supply firm performance.

Based on my conclusions, the following suggestions are put forward. For enterprise managers, they could strengthen the cooperation with other supply chain partners to improve the operation efficiency of enterprises, Supply chain relationship management has become a vital part of enterprise management system. Close supply chain partnership can realize information sharing, increase information transparency, reduce capacity waste in the supply chain, and then improve enterprise performance. For investors, they can carefully examine the supply chain partnership of the invested enterprise to avoid risk caused by inferior partners. Based on my conclusion, the better the supply chain partnership, the better the performance of the enterprise. Investors and investees are stakeholders. Enterprises with strong supply chain relationship management can bring more benefits to investors. For government, they can guide supply chain enterprises to integrate and make them become good supply chain partners. Enterprises share information and resources with each other, improve the performance of the supply chain, and finally promote healthy economic development.

This paper also has some limitations. enterprise performance could be studied from other aspects. but because size limitation of this paper, I don't further research. Also, the data used in this study reflect the situation of a single enterprise, rather than the matching survey between supply chain partner enterprises. In the future research, I should study more than two aspects when measuring firm performance, such as internal employee performance, organization management performance. And I can consider pairing supply chain partner enterprises to obtain data instead of data for a single enterprise. Supply chain is an important means to optimize industrial structure and product structure with market power. Supply chain management is of great significance to enterprises, government and society. Everyone should pay more attention to the development of supply chain.

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