

Research on the Evaluation Index System of JT Company's Supply Chain Financing Performance based on BSC

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Abstract

Petrochemical industry is an important pillar industry in China, playing a crucial role in energy supply and promoting national economic development. In recent years, supply chain finance has brought new opportunities for solving the financing problems of petrochemical enterprises, however, in practical application, there are still significant differences in the evaluation of supply chain financing performance among enterprises. In the context of the new development pattern, the performance evaluation system centered on financial indicators can no longer meet the needs of enterprise performance evaluation. As a performance evaluation tool, the balanced scorecard can realize a multi-dimensional comprehensive measurement of enterprise supply chain financing operation. Based on the supply chain financing model of JT company, we analyze the existing problems of its supply chain financing and form a financing performance evaluation system based on the balanced scorecard, aiming to improve the performance of enterprise supply chain financing, help the enterprise's high-quality development, and provide a reference for the same enterprises in the same industry.

Keywords

JT Company; Supply Chain Financing Performance; Balanced Scorecard; Evaluation Index System.

1. Introduction

In recent years, with the development of Internet technology and the promotion of financial innovation, supply chain finance has been widely used in the petrochemical industry. Different from the traditional financing mode of fixed asset mortgage, supply chain finance is a new financing mode from the perspective of supply chain, which bundles all kinds of small and medium-sized enterprises in the upstream and downstream of the supply chain business with the core enterprise of larger scale to achieve resource integration (Du et al., 2020). Under this model, not only the flow of funds in the supply chain is realized, but also the flow of logistics and information is further realized, which makes the operation of the whole supply chain more flexible and improves the overall risk-resistant ability of the supply chain (Chakuu et al., 2019; Lu et al., 2020). In recent years, by carrying out supply chain financing with the core enterprises, JT has successfully solved the problem of capital shortfalls during the process of production and marketing. capital gap problem in the production and marketing process. However, due to its weak ability to resist market risks and because of certain dangers in production operations, it has led to non-negligible problems in JT Company's operations, credit and security. These problems and risks limit the financing behavior of JT Company to a certain extent and hinder the improvement of supply chain financing performance. Therefore, it is sufficiently necessary and practically significant to carry out supply chain financing performance evaluation on JT company.

At present, the academic community has not reached a unanimous conclusion on the definition of supply chain financing performance, and most of the studies focus more on discussing how

to measure supply chain financing performance, and the more recognized definition is the efficiency of enterprises' access to funds (Gupta et al., 2020), which can be measured from four aspects: borrowing availability, borrowing cycle, borrowing cost and total borrowing (Xu et al., 2018). However, the performance evaluation system centered solely on financial indicators cannot comprehensively measure the supply chain financing performance of enterprises (Liebl et al., 2016). Supply chain financing performance not only needs to consider the actual effect of enterprise financing, but also needs to be defined in conjunction with the supply chain's cooperation areas and other related achievements (Gomm, 2010). The balanced scorecard combines outcome (financial) indicators with the process of outcome formation (non-financial) indicators from the four dimensions of finance, customers, internal business processes, and learning and growth, combines the organization's long-term strategic objectives with the organization's short-term tactical behaviors, and combines the internal factors affecting the organization's performance with the external factors, constituting a set of logically complete and practically sound performance evaluation system (Faraji et al., 2022), the application of which can effectively improve the performance of chemical enterprise supply chain financing. Therefore, on the basis of existing research, this paper organically integrates the balanced scorecard theory with the supply chain financing performance evaluation system, and evaluates the financing performance of JT Company based on the establishment of its supply chain financing performance evaluation system, aiming to improve the performance of enterprise supply chain financing, help the enterprise's high-quality development, and provide a direction for petrochemical enterprises to improve the level of supply chain financing performance.

2. Current Situation of Supply Chain Financing in JT Company

2.1. Supply Chain Financing Mode of JT Company

The existing mode of JT Company's supply chain financing is warehouse receipt pledge financing mode, which is an alternative financing mode of movable property pledge. The specific financing mode is that the financing enterprise will store a certain quality and quantity of goods in the warehouse of the custodian designated by the bank (the custodian is a warehousing enterprise or a logistics and warehousing company, etc.), and the custodian will issue a bill of lading for the goods to the depositor after checking the pledge into the warehouse, which is also known as warehouse receipt, and the financing enterprise will apply for a loan to the financial institution based on this warehouse receipt. The use of warehouse receipts pledged to the bank loan, can relieve and solve the small and medium-sized enterprise loan difficult and difficult financing problems, for more liquidity turnover, to achieve the business scale expansion and development, improve the economic efficiency of the purpose. For banks, warehouse receipts pledge business can help financial institutions to attract and stabilize customers, increase lending opportunities and cultivate new economic growth points. For guarantee companies, it reduces the risk of guarantee without physical collateral and expands new business, thus increasing the number of guaranteed customers and expanding the guarantee business. For third-party logistics enterprises, on the one hand, you can use the advantages of warehouse receipt pledge loans for owner enterprises to attract more owner enterprises, retain a stable number of goods storage, improve the utilization rate of warehouse space, while promoting warehousing enterprises to continue to strengthen the construction of infrastructure, improve the supporting services to enhance the comprehensive competitiveness of enterprises; on the other hand, you can increase your business through the collection of handling fees, the provision of On the other hand, it can increase the economic income of the enterprise by charging handling fee, providing place and information. Warehouse receipt pledge financing business turns the static inventory into capital, which will promote the

virtuous circle of economy and improve the quality of economic operation. Therefore, financing by pledging assets such as raw materials or finished products will be conducive to the establishment of a financing link between banks and enterprises, unclogging the channels for enterprises to raise funds, and changing the problem of difficult loans and financing for small and medium-sized enterprises.

The specific steps are:

- (1) JT Company delivers the goods legally owned by itself to B Logistics Warehouse Party for custody;
- (2) Logistics warehouse B issues warehouse receipts corresponding to the stored goods to JT Company;
- (3) JT Company endorses the warehouse receipts with the words "pledge" and the seal of B Logistics and Warehousing Party, and then delivers them to R Bank;
- (4) Bank R and JT sign a loan contract and warehouse receipt pledge contract, agreeing to pledge warehouse receipts as security for repayment of the loan;
- (5) Bank R, Company JT and Logistics Warehouse B signed a tripartite warehouse receipt pledge supervision agreement, agreeing that Logistics Warehouse B would perform supervisory duties on the goods under the warehouse receipt and release the goods in accordance with Bank R's instructions;
- (6) JT Company repaid the loan on time and Bank R released the warehouse receipts to it.

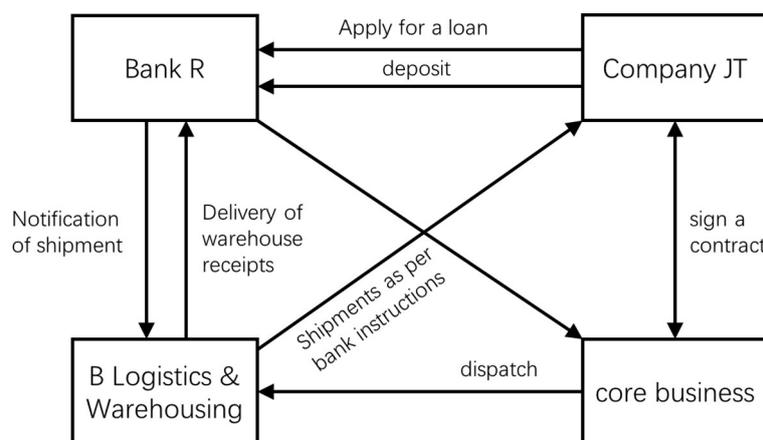


Figure 1. JT Company Financing Chart

2.2. Problems of JT Company's Supply Chain Financing

2.2.1. Instability of Pledged Goods

Firstly, the warehouse receipt pledge financing mode makes JT Company very sensitive to the fluctuation of raw material prices. The production of chemical products requires a large number of raw materials, and the prices of these raw materials are often affected by market supply and demand, policy changes and other factors, resulting in large price fluctuations. When the price of raw materials rises, JT Company often faces the pressure of rising production costs, which cuts profits or reduces the scale of production; and when the price of raw materials falls, the value of the company's inventory is also affected, which may lead to a reduction in the value of warehouse receipts, thus affecting the ability to finance. And once the value of the pledge is lower than the amount of the bank loan, the financial institution will not be able to recover the full loan when the abandoned goods are realized. Secondly, the fluctuation of market demand may also affect the stability of JT Company's products. The chemical products market is affected by a variety of factors such as the macroeconomic situation, industry competition and changes in consumer demand, and market demand is highly volatile. If there

is a sudden drop in market demand, JT Company's sales and revenues may be impacted, thus affecting the Company's cash flow and repayment ability. Lastly, the storage of crude oil, as a flammable and explosive chemical, requires specific physical conditions to ensure its quality and stability, such as temperature, light and humidity. If the pledge of crude oil fails to obtain proper storage conditions, deterioration and damage may occur, easily damaging all parties.

2.2.2. High Credit Risk

Since JT Company's pledged goods are centrally stored in B Logistics warehouse party, the cargo right of such pledged goods is a key issue. In previous warehouse receipt pledge financing transactions, due to the inconsistency between the cargo right and the property right, many cases of fraudulent loans have occurred, resulting in losses for all parties. Legitimate warehouse receipt pledge financing is based on the fact that the financier has the cargo right in the goods referred to in the warehouse receipt. In the previous fraudulent warehouse receipt pledge financing business, it is common that the financier has the right in rem over a certain item of goods, but does not have the right of goods at the same time. According to China's current laws, if the financier does not have ownership of the goods referred to in the warehouse receipt, and the pledge contract signed with the financial institution has not been agreed by the party having the right to the goods, the contract is not legally binding on the owner of the goods. Once the financier fails to repay the loan on time or other circumstances requiring the transfer of the pledged goods occur, although theoretically the financial institution's security right in the pledged goods is protected by law, the financial institution is unable to prove that it has acquired the goods in good faith, the security role of the goods will no longer exist. The lack of clarity of the right to the goods means that the financial institution will fundamentally lose all or part of the security right to the goods, when the risk is great. At the same time, B logistics warehousing party and JT company belongs to the same subsidiary company, the financing party may collude with the warehouse personnel, private withdrawal of goods, thus leading to the value of the pledge is reduced or can not fully protect the value of the loan provided by the bank. These factors, if they occur, will not only affect the interests of the depositor and the warehouse party, but also cause losses to the bank providing the loan.

The risk of environmental pollution in the chemical industry is also a major credit risk for JT Company. In modern society, the awareness of environmental protection is gradually increasing, and the concern for environmental pollution is also increasing. Chemical companies may produce pollutants such as wastewater, waste gas and solid waste during the production process, and if they fail to effectively treat and dispose of these pollutants, they may face penalties and regulatory restrictions from the environmental protection authorities, which may even lead to suspension of production and rectification. This will directly affect JT Company's production capacity and the stability of its supply chain, which in turn will affect JT Company's repayment ability.

3. Design of Supply Chain Financing Performance Evaluation System for JT Company

3.1. Integration of Balanced Scorecard and Supply Chain Financing Performance Evaluation

In the past decade, Chinese scholars have paid extensive attention to the measurement of supply chain financing performance of SMEs, and a certain degree of research has been carried out on how to measure their financing performance, and some of the literature with high citation frequency is set up as shown in Table 1.

Table 1. Review of Research on Supply Chain Financing Performance of SMEs

Year	Research content	Scholars	Key indicators
2014	EVA-based supply chain financing model and performance measurement	Song et al.	Financing cycle, financing volume, cost of capital
2015	Research on financing performance of SMEs based on four-dimensional evaluation system	Yang et al.	Financing Difficulty, Capital Cost, Time Efficiency, Private Financing
2020	Research on the impact of hard technology heterogeneity on financing performance based on supply chain flexibility capability	Yao et al.	Financing frequency, financing cost rate
2021	Management incentives, innovation capability and supply chain financing performance	Zhang Min	Financing scale, financing cost, term structure
2021	The impact of collaborative innovation on supply chain financing performance of SMEs - A signaling theory perspective	Lu et al.	Financing cost, financing cycle, financing volume
2022	Import Competition, Supply Chain Financing Performance and Intellectual Capital Investment of Manufacturing Firms	Li et al.	Financing cost, financing scale, financing term structure

Evaluating the supply chain financing performance of JT firms needs to consider the actual effect of financing, which includes financing scale, financing cost, financing term structure and financing frequency. If the enterprise has successfully revitalized a large amount of capital through supply chain financing and at the same time obtained a low financing cost, then this financing can be considered successful. In addition, if the financing can also optimize the structure of the participants, such as reducing the profits of intermediaries and improving production efficiency, then the performance is even more significant.

The paper improves on the Balanced Scorecard by emphasizing on further refining and clarifying the concerns of the four dimensions from the perspective of corporate supply chain financing. Among them, the financial dimension is oriented to the effect of financing, and comprehensively assesses the financial status of the enterprise from the aspects of the enterprise's financing scale, financing cost, financing cycle, etc.; the customer dimension is oriented to the customers, and comprehensively demonstrates the evaluation of the enterprise by the customers and the relationship between the enterprise and the customers from the aspects of the enterprise's market share of the products, customer satisfaction, customer loyalty, etc.; and the dimension of the internal business process is based on the internal business, and focuses on which The internal business process dimension is based on the internal business, focusing on which business processes need to be further standardized and re-planned, so that the enterprise can be recognized by investors and the products can be recognized by customers; the learning and growth dimension is based on the perspective of the development of the enterprise, and the study is based on the default situation of supply chain finance, new products and partner relationships. Under the framework of Balanced Scorecard, these four dimensions are not independent but interrelated, for example, financing effect will affect the operation of internal capital flow, on-time delivery rate will affect customer loyalty, customer satisfaction will affect sales, supply chain finance default rate will affect corporate credit, which will affect the effect of corporate financing. In the context of the integration of industry and finance, the combination between the dimensions and even between the dimension refinement indicators will appear more complex.

3.2. Selection of Indicators in Each Dimension

Through interviews with the management and communication and discussion with the relevant responsible departments, as well as combining the relevant information of the Group, the key

indicators of each dimension of the balanced scorecard were selected and established to form the supply chain financing performance evaluation system of JT Company based on the balanced scorecard (Table 2).

Table 2. Evaluation system of JT Company's supply chain financing performance based on balanced scorecard

Dimension	Secondary indicators	Indicator description or calculation formula
Financial dimension	Financing scale	Natural logarithm of the total amount of supply chain financing obtained by the enterprise
	Financing cost	The ratio of interest expense to total financing amount obtained by the enterprise in supply chain financing
	Financing term structure	Proportion of long-term borrowings in the enterprise's supply chain financing
	Cost-expense margin	Total profit/ (operating cost + period expense)
	Enterprise profitability	Net profit/revenue
Internal business processes	On-time transport rate	Number of on-time arrivals as a percentage of total shipments
	Production and sales ratio	Percentage of products sold in the year to the number of products produced in the year
	Safety accident rate	Percentage of planned production affected by safety accidents and production stoppages
	On-time delivery rate	Percentage of on-time deliveries to total deliveries within a certain period of time
Customer dimension	Comparative price advantage	The ratio of the difference between the average market price of the firm's products and the average market price of similar products to the average market price
	Market share	Percentage of total product sales to similar sales in the market over the same period of time
	Customer satisfaction	Number of satisfied people as a percentage of the total number of people surveyed
	After-sales service quality	Number of complaints as a percentage of total business volume
	Returns rate	Number of returns as a percentage of sales volume
Learning & Growth	Employee Knowledge Training	Number of participants×number of training sessions
	Supply chain finance default rate	Default amount as a percentage of total transaction amount
	Technological innovation intensity	R&D expenditure as a percentage of sales revenue
	Level of environmental protection investment	Degree of resources and funds invested by enterprises in environmental protection
	Partnership	Relationship between financial institutions and enterprises in the supply chain

4. Conclusion

As a pillar industry supporting the development of China's national economy, the petrochemical industry has a direct impact on the social economy in terms of its development speed and scale. The downstream products of petrochemical industry have a wide variety, covering base oil, refined oil, chemicals, fine chemicals and other fields, which makes the whole industrial chain extremely complex and diversified. Because of this, supply chain finance has a wide range of

application scenarios in the petrochemical industry, and the supply chain finance business in this industry is relatively mature in China. However, SMEs in the petrochemical industry chain still face some challenges and dilemmas in the process of participating in supply chain finance, and they need to establish an evaluation system and explore solution paths to improve their financing performance. Only through continuous improvement and innovation can supply chain financing better serve the enterprises in the chain, which can further promote the development of China's economy and enhance the effectiveness of the overall operating costs. Based on the balanced scorecard, the study designs JT Company's supply chain financing performance evaluation system, adheres to the concept of win-win situation and sustainable development, and systematically analyses the index system and supply chain financing performance evaluation system. However, as the actual situation of the enterprise itself and the external competitive environment continue to change, JT company should carry out dynamic follow-up, and constantly optimize and adjust the evaluation system to meet the needs of the future development of the enterprise.

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