



Key Success Factor in the Innovative Transformation of State-Owned Roller Enterprises in China

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Abstract. The state-owned enterprises based iron and steel industry in China encountered the sharply decreasing business performance of large steel works resulted from the reform in 1990. Delphi Method is utilized for analyzing the strategies and approaches of innovative business model, and the MEFAS model is proposed for innovation management in roller industry, including material breakthrough, experience sales, focus marketing, corporate network alliance, real-time supply chain, reorganization, and innovative enterprise culture. Beijing Shougang Jingshun Rolls Co., Ltd. is sampled for the case study. Total 250 copies of questionnaires are distributed, and 178 valid copies are retrieved, with the retrieval rate 71%. The result shows that Material R&D Innovation, weighted 0.208, about 20.8% of overall weight, is mostly emphasized, followed by Local Supply Chain Innovation (weighted 0.174), Construction of Innovative Culture (weighted 0.168), Reorganization (weighted 0.142), Marketing Innovation (weighted 0.129), Organizational Network Innovation (weighted 0.116), and Sales Innovation (weighted 0.063).

1. Introduction

Since the reform and opening up, private-owned economy was inserted, as the supplement, to the socialistic public-owned economy in China; the economic reform created the market opening and economic growth and had China become the worlds second largest economy currently. Nevertheless, the inefficient management of state-owned enterprises (SOEs) in such reform and opening up requires continuous improvement. When implementing Company Law, the Central Peoples Government attempted to enhance the firm competitiveness of state-owned enterprises by being operated privately after the reform; however, merely few state-owned enterprises made changes under the reform pressure, stood out in the market competition, and recreated business performance and growth [1]. Being the basic industry of national construction and the inevitable production material, iron and steel industry became the key transformation industry in the practice of state-owned enterprise reform act [2]. After the reform of state-owned iron and steel works in China, the government still remained most stock rights of iron and steel companies [3](Woetzel 2001), but the business model changed from make-to-order in the command economy to iron and steel companies self-developing the market and technology, attempting to improve the inefficient production and technical development of state-owned iron and steel companies. However, the changes of business model after the reform largely reduced the business performance of steel works [1].

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When numerous iron and steel companies declined the business performance because of privatization, Shougang Group, one of top four steel groups in China, was able to enhance the business outcome through organizational transformation and innovation management. Especially, Jingshun Rolls Co., Ltd., the subsidiary, becomes the iron and steel work with the highest H-beam roller market share in China by the correct judgment of market analyses and successful material R&D as well as the multinational, cross-regional strategic alliance cooperation and innovative supply chain model to successfully step towards the multinational operating performance and establish the global competitiveness. In the state-owned enterprise reform wave in China, the Central Peoples Government actively facilitates state-owned enterprises changing from domestic businesses to international operation and from the extension of industrial chain to the focus on high-end products [4]. Being a model in Shougang Group, the successfully innovative business model of Jingshun Rolls Co., Ltd. could be the benchmark of state-owned enterprises in China that the value for academic research is highlighted.

This study tends to discuss how Beijing Shougang Jingshun Rolls Co., Ltd. establishes globally competitive advantages and gets rid of the inefficient business performance image of state-owned enterprises in China. The key success factors in the cross-industry applicability of business model present certain research contribution, which is expected to be the reference of business models for iron and steel industry as well as the strategic thinking direction for multinational enterprises searching for regional collaboration.

2. Business model

2.1. Definition of business model

A business model organizationally and strictly examines the current and future constitution and profitability of an enterprise, presents the possible threats caused by environmental changes from the real situation of an enterprise, or searches for beneficial business opportunities, and provides the blueprint of future action plans [5]. An enterprise constantly looks for new business models to cope with increasing competition. A business model, in short, reveals an enterprise creating profits with production, covering the dimensions of strategy and execution. For academic research, researchers define a business model from different points of view and regard it as the basis of operation model, value creation, or marketing profitability.

2.2. Innovative operation model for enterprises

Mgretta (2002) [6] regarded a business model as the story explaining the operation of an enterprise and how an enterprise creating value and considering services for clients and all participants in the normal operation of the enterprise. Hamel (2000) [7] considered a business model as the application of business concepts, including core strategies, strategic resources, customer interface, and value network, to inspect the business model from the aspect of innovation.

2.3. Mechanism of an enterprise creating value

Amit and Zott (2001) [8] pointed out a business model as the key in the innovation and value creation of an enterprise; and, a business model was the transaction combination designed for creating value in the expansion of business opportunities that a business model should contain Content Transaction, Structure Transaction, and Governance Transaction. Morris et al. (2005) [9] indicated that a business model was an enterprise applying the decisive variables in strategies, structure, and economy to create and maintain competitive advantages and corporate value in a limited market.

From the aspect of technical development, Chesbrough and Rosenbloom (2002) [11] pointed out a business model as the bridge to change technical development into economic value creation. Chesbrough and Rosenbloom regarded the functions of a business model as

- Linking value: To link science and technology and provide value for customers.
- Confirming market segmentation: To confirm the value offered to the target customers by innovative technology and the definite profit-making mechanism.

- Defining value chain: To understand the internal structure of value creation and determine the complementary asset for supporting corporate positioning.
- Cost structure and potential earning power: To confirm the value chain structure for further understanding the cost structure and potential earning power.
- Value network positioning: To define the positioning of an enterprise in a value network supply chain and consider the potential complementors and competitors.
- Constructing competitive strategies: To construct advantages equivalent to the competitors for the acquisition and maintenance of innovative enterprises.

2.4. *Basis of business marketing and making profit*

Chesbrough and Rosenbloom (2002) [11] regarded a business model as the coordination and change between technical development and value creation, i.e. an enterprise tended to investing in technologies suitable for the business model and acquiring value from technical development. Afuah and Tucci (2003) [12] considered that a company established and utilized resources according to the business model and provided the clients with larger value to made profits; in this case, a business model was a primary factor in company performance and was regarded as the method of a company making profits. Stewart and Zhao (2000) [13] further indicated that a business model was the approach of an enterprise making money and long-term maintaining profits.

In conclusion, a business model involves in technology research and development, process innovation, customer marketing, and the achievement of profit objective as well as an integrated model to go through business strategies and environmental integration, providing a value model for an enterprise.

2.5. *Dimension of business model*

The past research presented distinct theories and models for business models. In this study, Morris, Schindehutte and Allens integrated business model [9], Zott and Amits business model with product-market strategic fit [10], and Hamels four-dimension innovative business model are utilized for analyzing the theories of business models.

2.6. *Integrated business model*

Keen and Williams (2013) [14] indicated that industrial innovation could be searched the creative value from customers, alliance partners, and suppliers and considered the provision of innovative products and services. Morris et al. (2005) [9] regarded the inconsistent consensus of business models that a business model was correlated with many other management concepts, including the core elements of business plans and the details of operating processes. They further proposed six decision problems in the establishment of business models.

1. How did an enterprise create value?

It contained production line decisions, channel decisions, and product added value enhancement decisions (self-production, outsourcing, or authorization).

2. For whom did an enterprise create value?

It focused on the competitive market characteristics and scopes, including types of customers, target market areas, market coverage areas, and the position of customers in the industrial supply chain.

3. What were the internal advantage sources of an enterprise?

An enterprise had to understand the core competence superior to the competitors (Hamel 2000) for establishing the business model. The internal advantage sources contained production and operation systems, financial operating, supply chain management, marketing or sales, technology innovation, or the establishment of corporate network

4. How did an enterprise position itself in the market?

An enterprise had to find out the excellent abilities which could be permanently maintained and were not easily imitated, such as the positioning of cost, efficiency, differentiation, innovation, operational reliability, and product or service quality.

5. How did an enterprise make profit?

The core of a business model was a consistent profit-making logic. Four sub-items were used for the measurement, including operating leverage, the proportion of an enterprise stressing on market opportunities and internal competence, the relative profits an enterprise being able to acquire, and the revenue model of an enterprise.

6. What was the ambition of survival time, scope, and size of an enterprise? The investment model of an enterprise focused on the survival and the maintenance of basic financial requirement, continuous and stable income, or long-term capital benefits.

2.7. *Business model with product-market strategic fit*

Zott and Amit (2007) [8] discussed the goodness of fit between product-market strategies and business models of an enterprise and regarded a business model as the structure mold showing how the enterprise transacted with the clients, partners, and suppliers, i.e. the selection of an enterprise linking the products with element markets. A business model design focusing on innovation and efficiency was proposed to correspond to product differentiation and cost leadership in order to search for a structure applicable to the product-market strategic fit.

- Novelty-centered business model, referring to the innovative economic exchange among various participants, containing new transaction and new product transaction mechanisms to link two groups.
- Efficiency-centered business model, referring to the promotion of transaction efficiency. The transaction efficiency could be improved by reducing the uncertainty, complexity, and information asymmetry between transactions and decreasing negotiating costs and transaction exposure.

Overall speaking, the business model proposed by Zott and Amit (2007) [8] focused on the economic exchange between an enterprise and the external members.

2.8. *Hamel's innovative business model*

Hamel (2000) [7] mentioned that the innovation of management strategies, in addition to the most suitable business model, unique technologies, and abundant capitals, was the key factor in an enterprise permanently maintaining the competitive advantage. In other words, an enterprise was capable of planning strategies and mobilizing talents with brand-new and distinct approaches as well as distributing capitals. In addition to acquiring competitive advantages with technology innovation, an enterprise should constantly create new value for customers and search differentiation sources so as to establish a continuously successful business model. Hamel proposed a comprehensive business concept structure, covering four dimensions of core strategies, strategic resources, customer interface, and value network.

1. Core strategies were the competitive basis for an enterprise making the business mission, product and market scope, and differentiation strategies.
2. Strategic resources included core competence, strategic assets, and core process as the competitive advantage backing of an enterprise.
3. Customer interface revealed the contact between manufacturers and customers to construct the customer service and marketing system.
4. Value network defined the investment scope and degree and searched cooperation or alliance for the business model of an enterprise to make up or enlarge the current resources.

Hamel (2000) [7] considered that innovation was not the traditionally new product development or new technology application, which were restricted to one level, but the establishment of innovative systems, the application of new business models, the changes of bases in specific industry, the establishment of new rules in current market competition, the starting point of the entire business model, and more comprehensive focus than simply on products or technologies.

3. Methodology

3.1. Delphi Method

The AHP dimensions and criteria are established in this study based on Delphi Method. Delphi Method, also named expert survey, is an approach separately distributing problems to experts and enquiring for opinions through mails; all expert opinions are collected and organized for synthetic opinions, which are sent back to the experts with prediction problems for further opinions; and, the revised opinions of experts, according to the synthetic opinions, are further collected. Such processes are repeated for several times to acquire the consistent result.

Based on the system program, anonymous opinions are used in Delphi Method, where the experts do not discuss with each other, do not have lateral contact, but merely contact with the researcher, and propose opinions about the questionnaire for several runs. The consistent opinions are organized with repeated inquiries, summaries, and revisions for the prediction result. Such an approach presents broad representativeness and is more reliable.

3.2. Establishment of evaluation index

Experts in different fields are delivered the questionnaire through email. The considerations are the first expert feedback. Such factors with similar quality are classified and delivered back to the experts for further opinions. After several runs, the classifications are determined in the expert conference, in which the key success factors in the Innovative Transformation of State-owned Roller Enterprises are set organization orientation. Such key factors are regarded as the AHP dimensions, and the corresponding criteria are classified to establish the AHP questionnaire. Figure 1 shows the research structure after the revision with Delphi Method.

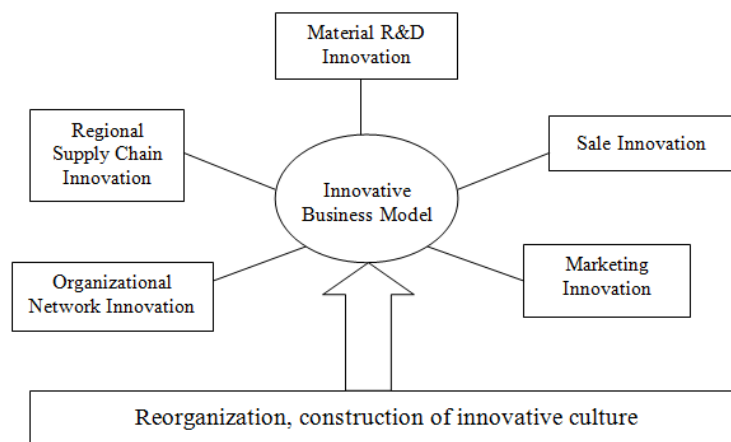


Figure 1: Research structure

3.3. Research subject

The state-owned enterprise Beijing Shougang Jingshun Rolls Co., Ltd. (originally Beijing Rolls Plant) was established in 1956 and was one of the earliest manufacturers of mill rolls in China. Shougang Group was a successful case under the profit-contract system in 1980s. In spite of hard-budget constraints, a lot of performance indices showed the financial self-sufficiency, and a private-owned bank Huaxia Bank was even established. Shougang Group borrowed one billion US dollars from Huaxia Bank in 1993-1994 and invested 1.6 billion US dollars in the construction of a steel work in Shandong Province. The oversize financial vulnerability encumbered the business performance [2]. Moreover, the privatization market competition from state-owned enterprise reform shook and crumbled the inefficiently managed Shougang

Group in late 1990s. Unexpectedly, Shougang Group, with reorganization and innovation management, was reborn in 2000-2010, and the subsidiary Jingshun Rolls Co., Ltd. became the iron and steel work with the highest large H-beam roller market share in China. In the five decades, the production and marketing volume of roller products was ranked on top of domestic roller industry in China, and the products were first promoted in international markets. With more than five hundred employees, it is now one of the largest roller manufacturers in China.

Beijing Shougang Jingshun Rolls Co., Ltd. therefore is sampled for the case study. Total 250 copies of questionnaires are distributed, and 178 valid copies are retrieved, with the retrieval rate 71.

4. Results

After completing all hierarchical weights, the evaluation indicators are distributed with the relative importance to show the importance of hierarchical indices in the overall evaluation system as well as to generate the overall weight of the factors in the innovative transformation of state-owned roller enterprises in China, Table 1.

From the questionnaire analysis, Table 1, the following conclusions are summarized.

Material R&D Innovation, weighted 0.208, 20.8% of overall weight, is mostly emphasized in Hierarchy 2, followed by Local Supply Chain Innovation (weighted 0.174), Construction of Innovative Culture (weighted 0.168), Reorganization (weighted 0.142), Marketing Innovation (weighted 0.129), Organizational Network Innovation (weighted 0.116), and Sales Innovation (weighted 0.063). The result reveals that Material R&D Innovation is mostly emphasized in the innovative transformation of state-owned roller enterprises in China.

5. Discussion

According to the overall weight of the evaluation indices of the key success factors in innovative transformation of state-owned roller enterprises in China, the top five indices mostly emphasized, among 21 evaluation indices, contain Innovative material, Brand authentication, Innovative reform, Manufacturing restraint breakthrough, and Regional supply chain.

Based on the dimensions of business models organized from past research, the preliminary structure of a business model is established in this study. It attempts to analyze the direction for the establishment of corporate value from the aspects of organization, internal management, and external market. Furthermore, a successful innovative business model for iron and steel industry is extracted from the case study on Beijing Shougang Jingshun Rolls Co., Ltd., where the major elements of Material R&D Innovation, Sales Innovation, Marketing Innovation, Organizational Network Innovation, and Local Supply Chain Innovation and two supportive factors of Reorganization and Construction of Innovative Culture are utilized for empirical further research.

In the wave of comprehensively changing state-owned enterprises to private-owned ones in China, merely 20% remains state-owned. Enterprises in the state-owned system are eventually moving towards independent governance of operating cost, finance, and marketing because of the Central Peoples Government policy of gradually reducing operating funds for enterprises. In this case, current state-owned enterprises are facing the same fate of Beijing Shougang Jingshun Rolls Co., Ltd. before the reorganization. In the reform and opening up, Beijing Shougang Jingshun Rolls Co., Ltd., through innovative business models, re-established the leading brand of rollers in China, presented the most market share of large H-beam roller market in China, and collaborated with Taiwan Bei Chao Co. for the sales of steel in Taiwan and the marketing in Southeast Asia. It further expanded points in EU for the broad marketing and indirectly occupied the markets in Central/South America. Within the 11 years after the reform, it became one of the most successful state-owned enterprises in China. Beijing Shougang Jingshun Rolls Co., Ltd. not only is the paradigm of reform management among state-owned enterprises in China, but the regional alliance model also becomes the reference of foreign-owned enterprises intending to cooperate with state-owned enterprises in China.

Table 1: Overall weight of factors in innovative transformation of state-owned roller enterprises in China

Dimension	Hierarchy 2 weight	Hierarchy 2 sequencing	Index	Overall weight	Overall sequencing
Material R&D Innovation	0.208	1	Material change	0.036	13
			Innovative material	0.14	1
			Manufacturing restraint breakthrough	0.066	4
Sales Innovation	0.063	7	Flexible pricing	0.034	14
			Price discretion	0.022	18
			Financing benefits	0.043	11
			Trust cooperation	0.047	9
Marketing Innovation	0.129	5	Flexible decisions	0.045	10
			Innovative marketing	0.017	19
			Pooling of resources	0.058	6
			Sales model	0.01	21
Organizational Network Innovation	0.116	6	Periodic frequent review	0.055	7
			Implementation review	0.012	20
			Problem-solving efficiency	0.04	12
Local Supply Chain Innovation	0.174	2	Flexible regional offices	0.031	15
			Regional supply chain	0.063	5
			Brand authentication	0.094	2
Reorganization	0.142	4	Prospects and international prospective	0.028	16
			Operating team	0.051	8
Construction of Innovative Culture	0.168	3	Innovative value	0.026	17
			Innovative reform	0.082	3

6. Conclusion

Material R&D Innovation: The R&D team develops and boldly changes innovative wear-resistant materials to break through the maximum restraint on large H-beam steel in China and produces innovative

rollers better conforming to the requirements for large H-beam steel works.

Sales Innovation: In the beginning of developing innovative materials for large H-beam rollers, the clients are offered the sales innovation with free online test, the sales representatives are allowed for making their own price decisions within a limit, and the clients are provided financing beneficial sales conditions to have the clients preliminarily trust the cooperation with the supply chain.

Marketing Innovation: It intends to achieve the innovative marketing with flexible marketing decisions and regardless of reform costs. The resources are concentrated on the innovative roller market when large H-beam steel could not be produced at the time. The sales models in Taiwan are effectively utilized as the access board for the global marketing.

Organizational Network Innovation: The periodical frequent implementation review among Beijing Shougang Jingshun Rolls Co., Ltd., Taiwan Bei Chao Co., and Spain Fundicion Company allows the immediate report of problems.

Local Supply Chain Innovation: Flexibly setting supply chain points regionally for clients indeed tends to develop the market to acquire decisive opportunities. The successful paradigm of regional supply chain is comprehensively and synchronously implemented in Asia and China, and the brand authentication of domestic and international clients allows it becoming the leading brand of H-beam rollers in China.

Reorganization: CEO and the operating team with prospects and international prospective are boldly changed in the beginning of reform.

Construction of Innovative Culture: The consensus of employees towards innovative value is established to commonly devote to the innovative reform.

7. Recommendations

According to the research analysis, the following suggestions are proposed in this study, expecting to provide definite guidance and directions for the innovative transformation of state-owned roller enterprises in China.

The management of the plants should be reorganized to obtain a more effective performance. Innovation should be given more importance and R&D departments should be improved. Organization of the enterprises should be designed to be more sustainable and stable.

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