



## Asian Manufacturers' Competitive Pattern: An Empirical Study Based on Competitive Priority

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**Abstract:** Asia is playing an increasingly important role in the global manufacturing network, however, different countries and regions adopt different manufacturing competitive strategies. Based on this, from the perspective of competitive priority, this paper researches Asian major manufacturing countries and regions' the competitive priority features, such as China, India, Taiwan, Japan, Malaysia, meanwhile compares preference differences among Chinese mainland and other countries and regions. In the support of empirical data from the International manufacturing strategy survey (IMSS) 2013, this paper uses multi-variable variance analysis and the results show that there exist significant differences between Chinese mainland and other countries and regions on competitive priority preferences. In addition, according to the average index score of various competitive priority of different countries and regions, this paper draws the Asian manufacturers' competitive pattern.

**Keywords:** Asia, Competitive priority, Competitive pattern, Manufacturing enterprise

### 1 Introduction

With the rapid development of internet technology as well as the globalization and integration of the world economy, the manufacturing increasingly takes on a whole new organization and development model-the global manufacturing network [1]. In this network, the Americas and Europe have been the global manufacturing powerhouse, but in recent years, what can't be neglected is the trend that manufacturing focus is gradually shifting to Asia. Altenburg believes the prosperous development of Asian manufacturing, especially the formation of the East Asian manufacturing network in which China act as the key role makes Asia gain a lot of attention in the global manufacturing network [2]. In addition, the "Deloitte 2013 Global Manufacturing Competitiveness Index" reports that by 2018, there will be ten Asian countries and regions

ranking among the first fifteen in manufacturing competitiveness, including China, India, South Korea, Taiwan, Singapore, Japan, Thailand, Malaysia, Vietnam, Indonesia [3]. However, in the global manufacturing network, different countries and enterprises are in different segments of the value chain, thus, the competitive environments they face and competitive advantages they have are different [1]. Due to these, Asian manufacturers take various competitive strategies to obtain competitive advantages. Lee proposes enterprise's preference to competitive priority determines its competitive strategy, different countries and regions prefer to different competitive priorities [4], so selecting the correct competitive priority directly relates to the business performance, which is the key to gaining competitive advantage [5-6].

### 2 Literature Review

#### 2.1 Competitive priority

Skinner first proposes the concept of "manufacturing tasks" and "focused factory", he notes that only the company allocates limited resources between different "manufacturing tasks" can gain competitive advantage [7]. Hayes and Wheelwright first introduce the concept "competitive priority" and define it as the business strategy preference or the selection of competition dimension in the target market [8]. Boyer and Lewis consider that competitive priority represents the manufacturing enterprise strategic points which are taken to consolidate the market position of enterprises [9-10]. Díaz-Garrido, Martín-Peña and Sánchez-López define competitive priority as the target that a manufacturing unit must meet to gain competitive advantages and achieve the stated activities [11].

#### 2.2 Competitive priority elements

For manufacturing competitive priority elements, Skinner first proposes low-cost, quality, timely delivery, flexible these four basic elements [7] which has been recognized by many scholars, such as Hayes and Wheelwright, Roth and Miller, Noble etc. [8-9, 12-13].

Subsequently, Hayes and Wheelwright propose that the rapid development of technology makes

Supported by the National Natural Science Foundation of China (71372089,71002060), the Heilongjiang Postdoctoral Scientific Research Foundation (LBH-Q12098)

manufacturing market competition continue to intensify and accelerates product replacement rate and life cycle, so innovation is considered to be the fifth dimension of competitive priority [8]. Noble points out that the development of economic globalization and the rise of global manufacturing network place a greater need on stable supply chain, thus the reliability of product delivery should also be one of competitive priority dimensions [14].

Since the 1890s, with the rise of Internet shopping platform, consumers have more choices and greater bargaining power, they demand lower prices, more reliable and faster logistics, more diversified products and personalized service needs. In this regard, Zhao, Yan Yeung and Zhou put the customer services into the competitive priority elements system and find it has a significant impact on the enterprise performance [15].

What's more, in recent years, the wave of global environmental protection compels companies to focus on sustainable development. Chen, Lai and Wen put forward, in order to cope with the growing number of international environmental conventions and consumers' gradually increased environmental awareness. Companies must increase product and green technology innovation and recognize the value and status of green innovation [16]. So environmental management and innovation should be the next most important competitive advantage flag [17] and should be incorporated into future competition priority system [11]. In addition, the company's intangible assets, such as corporate ethics and social responsibility are to be competitive in the future. Craig and Marianne put out corporate ethics and social responsibility are the important pushers to improve the competitive advantage [18] and with these intangible assets, enterprises can gain long-term advantage [19].

In summary, the main elements of competitive priority system are cost, quality, flexibility, delivery, reliability, innovation, service, environmental protection and social responsibility.

### 3 Methodology

#### 3.1 Data source

Data in this paper comes from the International Manufacturing Strategy Survey project. The project was launched in 1992 by Voss professor of London Business School and Lindberg professor of Sweden Camos University. IMSS questionnaire is designed by internationally prestigious experts in the field of strategic management and production management and translated into local languages by experts from all countries and regions in the relevant fields. Besides, IMSS respondents are all the top management in charge of manufacturing activities who fully understand the status of enterprise's manufacturing strategy. At present, there are more than twenty business schools and thousands of enterprises worldwide participating in the project. Since the project

started in 1993, it holds every four years and has been conducted six times by 2013.

IMSS questionnaire uses a Likert 5-point scale to quantify different countries and regions manufacturing preference to competitive priority, the index average score represents the degree of attention.

This paper uses the Asian data of IMSS VI 2013. The data contains a total of 343 samples of India, China, Taiwan, Malaysia, and Japan, in which 325 samples are valid. Specific sample distribution is shown in Tab. 1.

**Tab.1 Sample geographic distribution**

Country/Region	Sample Number
India	85
Chinese Mainland	115
Taiwan	28
Malaysia	14
Japan	82
Total	325

#### 3.2 Variable system

IMSS mainly uses 15 items to describe different competitive priority elements which belong to seven class level variables: price, quality, delivery, service, flexibility, innovation and responsibility, particularly seen in the Tab. 2.

**Tab. 2 Variable system**

	Item
Price	Lower selling prices X <sub>1</sub>
	Better product design and quality X <sub>2</sub>
Quality	Better conformance to customer specifications X <sub>3</sub>
	More reliable deliveries X <sub>4</sub>
Delivery	Faster deliveries X <sub>5</sub>
	Superior product assistance/support X <sub>6</sub>
Service	Superior customer service X <sub>7</sub>
	Offer more product customization X <sub>8</sub>
Flexible	Wider product range X <sub>9</sub>
	Offer new products more frequently X <sub>10</sub>
Innovation	Offer more innovative products X <sub>11</sub>
	Greater order size flexibility X <sub>12</sub>
Responsibility	More environmentally sound products and processes X <sub>13</sub>
	Higher contribution to the development and welfare of the society X <sub>14</sub>
	More safe and health respectful processes X <sub>15</sub>

#### 3.3 Reliability and validity test

This paper uses Cronbach's Alpha reliability coefficient to test internal consistency of competitive priority indicators. By applying statistical analysis software SPSS18.0, the results shows the Cronbach's Alpha coefficient is 0.885, which indicates that the questionnaire has good reliability.

This paper uses factor analysis method to test questionnaire construct validity. Before analyzing the validity of the questionnaire, we conduct KMO and Bartlett sphericity test. The results show that the KMO

value is 0.845 and the questionnaire pass the Bartlett's test of sphericity ( $p < 0.001$ ), it means all sets of data are suitable for factor analysis. The results show that the cumulative variance contribution of competitive priority indicators is 80.285% higher than 80%, which indicates that the questionnaire has good construct validity.

## 4 Empirical Analysis and Discussion

This paper uses multi-variable variance to analyze the data and believes the competitive priority elements

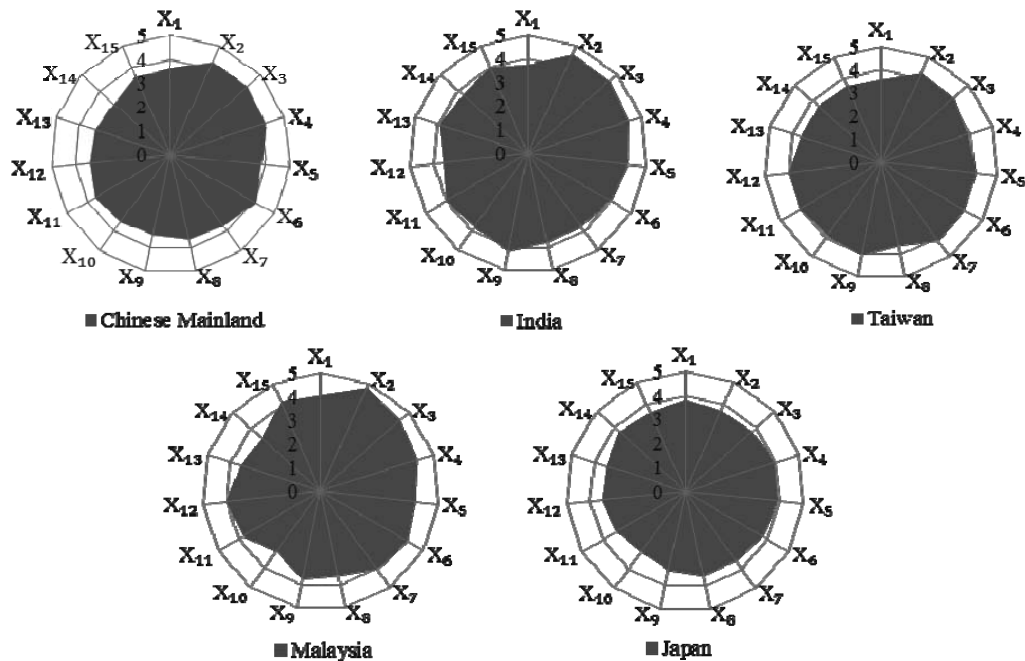


Fig.1 Competitive priority mean value radar chart of Asian manufacturing enterprises

are preferred to the manufacturers when the average score is 4.0 or more.

### 4.1 Competitive priority characteristics of five countries and regions

#### (1) Chinese Mainland

From Fig.1, for Chinese mainland manufacturers, this paper finds its most important competitive priorities are product design and quality, customization, reliability and product support services.

In this regard, Zhao, Yan Yeung and Zhou point out that with the development of internet trading platform, customers have a wider choice and greater bargaining power, which requires better quality, more reliable delivery, higher flexibility to meet their desired design, better customer service [15]. Lin, Ma and Zhou point out in response to intense competition in the industry caused by excess production capacity and customer customization requirements, enterprises attach great importance to the ability to respond quickly to customer needs, fast and effective product design and timely delivery [20]. In addition, with the advent of the service-oriented modern manufacturing industry, many manufacturers are beginning to conduct experience service innovation, for example, Huawei is constantly improving the performance of their products to meet customer needs and gain the customer loyalty.

#### (2) India

From Fig.1, we find that Indian manufacturers prefer to design and quality, customization, reliability, speed, product type, product support service, innovation, speed, safety and health, environmental protection. Particularly, for the design and quality, customization, reliability, their average scores are 4.5 or more.

In 1991, India began economic reforms so that domestic market gradually turned from a strictly controlled market into a free and open market. With the accelerated economic growth, India also faces enormous competitive challenges at home and abroad. The fierce competition in the domestic market and the desire to become a global manufacturing base both force India to promote to strengthen the emphasis on quality by adopting total quality management (TQM) and accessing to a variety of quality certifications. In addition, to reduce cost, defect and delivery time pressure, India gives more attention to Total Productive Maintenance (TPM) and The Time Production (JIT), thus India prefers to quality, delivery reliability, timeliness of delivery [21]. What's more, global manufacturers are seeking to outsource or invest in India, for example, Indian auto parts manufacturers are almost major suppliers of Japan and the United States carmakers, including Ford, General Motors and Toyota [22], which to a large extent due to Indian cheap labor and raw materials, so the Indian products have been dubbed "low cost, low value". To change customer impression to their products, India tries

to strengthen the product range, product support services and the pace of innovation.

In addition, during 2006-2011, Indian manufacturing exports compound annual growth rate was 17.1%, of which the manufacturing exports accounts for total exports was 50.3% [23]. Meanwhile, many countries strengthen restricts on environmental and health safety of imported products, therefore, the Indian manufacturers also attaches great importance to these two elements to ensure that its manufacturing exports are unimpeded.

### (3) Taiwan

From Fig.1, we can find that Taiwan manufacturers value design and quality, customization, customer service, product support services, speed, product type, the rate of innovation, more innovative and competitive products most. Chen points out Taiwan SNEs manufacturing enterprises prefer to quality, innovation and flexibility because they believe product development is most relevant to elements innovation, the control system is most relevant to reliability and flexibility, quality projects is most associated with the quality [24]. Meanwhile, new brands and new market require changing traditional marketing to attract the attention of customers. On the other hand, most enterprises' owners have a technical background, because from 1991 to 2003, in Taiwan, forty percent of higher education graduates' major are engineering and mathematics every year [25].

This study also finds that Taiwan prefers to customer service and product support, for example, one of the world's largest professionally integrated circuit manufacturer "Taiwan Semiconductor Manufacturing Company" through allowing customers to directly access to its own company and its strategic partners' customers information system to obtain real-time order status reports or other means of feedbacks to improve customer service and product support services so as to strengthen ties with customers [26].

### (4) Japan

The most important manufacturing competitive priority of Japan is delivery reliability, as followed by speed, price and quality, as shown in Fig.1. Nakane's research indicates that achieving reliability needs to reach the minimum quality level at least; achieving cost-effective must obtain a minimum level of quality and reliability; and achieving flexibility requires to obtain a minimum level of quality, reliability and cost [27]. In other words, Japan will gradually put quality, reliability, cost, flexibility as the strategic focus as time goes. During 1990s-2000s, Japanese continued and stable quality management, including using TQM, JIT and TPM management tools, become one of competitive edge strategic weapons as well as the survival and prosperous foundation of Japanese manufacturing companies [28]. So the product quality in Japan has reached the level where Japanese manufacturers will pay more attention to overcome the traditional "cost-effective and flexible" trade-off [29]. Combined with this paper analysis results, it can be found that the strategic focus of

Japan has gradually transform from quality, delivery reliability into cost, delivery speed. Japan firstly puts forward full quality management, and thus obtains a competitive advantage. While, with the improvement of the quality awareness of each country, the quality advantage of Japanese manufacturers continues to decline. Only the reliability and speed of delivery can further help Japan win orders to maintain customer satisfaction and loyalty and improve business performance.

### (5) Malaysia

For Malaysia, the domestic manufacturing enterprises prefer to design and quality, customization, reliability, product support services, safety and health, price, customer service, speed and innovation. Particularly, the design and quality, customization, they average scores are 4.5 and above.

As an emerging economy, Malaysia are facing more fierce competition not only including external challenges of improving quality, reliability, technical development and marketing skills, also facing the internal challenges such as cost reduction. Therefore the credibility of enterprises becomes the key to win orders. Meanwhile, Malaysian manufacturing enterprises attach great importance to relations with suppliers in order to obtain valuable customers' demand information from the supplier, which in turn ensures product quality and delivery reliability. Besides, Malaysia pays great attention to the advanced quality practice, including forecasting possible manufacturing difficulties and product failure causes, saving field failure data and so on. In addition, in order to gain an export competitive advantage, Malaysia strongly reduces material and labor cost to win the price advantage [30].

This paper also finds that Malaysia is gradually increasing emphasis on service, safety and health, innovation, which will further promote the development of manufacturing companies in Malaysia.

## 4.2 Comparative analysis of competitive priority

### (1) Chinese mainland and India

As shown in Tab.3: ①at 0.05 significance level, preference differences between Chinese mainland and India are mainly reflected on the design and quality, customization, reliability, speed, product type, the rate of innovation, environmental protection, safety and health; ②Chinese mainland and India both prefer to design and quality, customization, reliability, but for the emphasis, India accelerates China mainland; ③In addition, India also focuses on speed, product type, the rate of innovation, environmental protection, safety and health, nor the Chinese mainland. Obviously, compared with the Chinese mainland, India puts more attention to wider competitive priority elements.

**Tab.3 Chinese mainland and India comparative analysis**

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
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Common preference	X <sub>2</sub>	4.351	1	4.351	6.068	0.015
	X <sub>3</sub>	4.181	1	4.181	6.924	0.009
	X <sub>4</sub>	3.610	1	3.610	5.592	0.019
	X <sub>5</sub>	7.337	1	7.337	8.656	0.004
	X <sub>9</sub>	23.056	1	23.056	22.893	0.000
Only India preference	X <sub>11</sub>	6.772	1	6.772	6.412	0.012
	X <sub>13</sub>	20.734	1	20.734	20.409	0.000

X <sub>15</sub>	7.758	1	7.758	6.632	0.011
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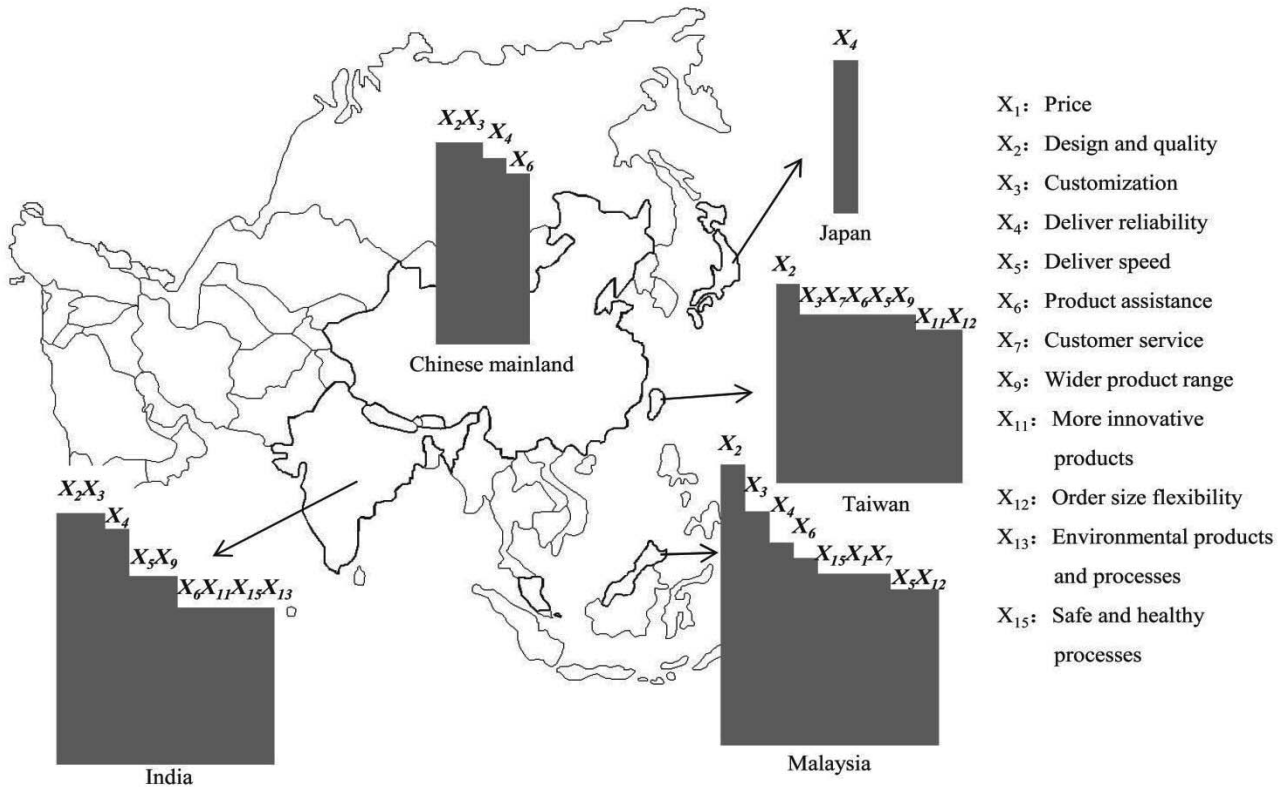


Fig.2 Competitive Pattern of Asian manufacturing enterprises

Tab.4 Chinese mainland and Malaysia comparative analysis

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Common preference	X <sub>2</sub> 2.997	1	2.997	3.953	0.049
Only Malaysia preference	X <sub>12</sub> 4.624	1	4.624	4.039	0.047

(2) Chinese mainland and Malaysia

As shown in Tab.4: ① there are significant differences in the design and quality, degree of innovation between Chinese mainland and Malaysia; ② Chinese mainland and Malaysia both prefer to design and quality, but the average score of these two elements are both 4.8 in Malaysia which is over Chinese mainland; ③ in addition, Malaysia also attaches great importance to the degree of innovation, while the Chinese mainland do not pay attention.

(3) Chinese mainland and Taiwan

It can be seen from Tab.5 that the differences between the Chinese mainland and Taiwan focus on product types and innovation. Taiwan attaches great

importance to product type and degree of innovation while Chinese mainland disregards.

Tab.5 Chinese mainland and Taiwan comparative analysis

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Only Taiwan preference	X <sub>9</sub> 7.923	1	7.923	8.302	0.005
	X <sub>12</sub> 8.343	1	8.343	7.981	0.005

(4) Chinese mainland and Japan

Tab.6 shows that: ① Chinese mainland and Japan differ in the design and quality, customization and product support services; ② Chinese mainland attaches great importance to these three elements above, Japan does not pay attention.

Tab.6 Chinese mainland and Japan comparative analysis

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Only Chinese	X <sub>2</sub> 17.971	1	17.971	21.148	0.000

mainland preference	X <sub>3</sub>	13.668	1	13.668	18.166	0.000
	X <sub>6</sub>	5.633	1	5.633	7.385	0.007

## 5 Conclusion

By analyzing the characteristics of the manufacturing competitive priority in different Asian countries and regions, this paper draws the competitive landscape of Asian manufacturing enterprises, as shown in Fig.2. Besides, this paper concludes as follow:

(1) In general, all Asian countries' manufacturing enterprises attach great importance to the design and quality, customization, reliability, product support, customer service.

(2) Different national and regional manufacturers prefer to various competitive priorities. Japan not only values delivery reliability, but also pay great attention to the speed of delivery and price; India prefers to product range, safety and health, environmental protection; Taiwan prefers to the pace of innovation, degree of innovation, product range, Malaysia also prefers to price, speed and degree of innovation.

(3) The preferences differences among Chinese mainland and other national and regional are mainly reflected in: ①India pays more attention to design and quality, customization, and reliability than the Chinese mainland; ② Malaysia attaches more importance to design and quality than the Chinese mainland. For other elements, there were no significant differences; ③There are no significant differences between Chinese mainland and Taiwan; ④Chinese mainland pays more attention to design and quality, customization and reliability than Japan.

## References

- [1]D Ernst. Global production networks and the changing geography of innovation systems. Implications for developing countries[J]. *Economics of Innovation and New Technology*, 2002, 11(6): 497-523.
- [2]T Altenburg, H Schmitz, A Stamm. Breakthrough? China's and India's transition from production to innovation[J]. *World Development*, 2008, 36(2): 325-344.
- [3]Deloitte's Global Manufacturing Industry Group, the US Competitiveness Council.2013 Global Manufacturing Competitiveness Index[R].2013:1-2, 31-50.
- [4]C Y Lee. Manufacturing strategies and business practices between Korea and Japan: a comparative study of their development and perceptions in the electronics industry[J]. *International Journal of Commerce and Management*, 2002, 12(2): 1-30.
- [5]J Takala. Analysing and synthesising multifocused manufacturing strategies by analytical hierarchy process[J]. *International Journal of Manufacturing Technology and Management*, 2002, 4(5): 345-355.
- [6]D I Prajogo, P McDermott. Examining competitive priorities and competitive advantage in service organisations using Importance-Performance Analysis matrix[J]. *Managing Service Quality: An International Journal*, 2011, 21(5): 465-483.
- [7]W Skinner. Manufacturing—Missing Link in Corporate Strategy[J]. *Harvard Business Review*, 1969,(5-6):136-145.
- [8]R H Hayes, S C Wheelwright. Restoring our competitive edge: competing through manufacturing[M]. New York: John Wiley, 1984: 201-210.
- [9]K K Boyer, M W Lewis. Competitive priorities: investigating the need for trade - offs in operations strategy[J]. *Production and Operations Management*, 2002, 11(1): 9-20.
- [10]A V Roth, M V D Velde. Operations as marketing: a competitive service strategy[J]. *Journal of Operations Management*, 1991, 10(3): 303-328.
- [11]E Díaz-Garrido, M L Martín-Peña, J M Sánchez-López. Competitive priorities in operations: Development of an indicator of strategic position[J]. *CIRP Journal of Manufacturing Science and Technology*, 2011, 4(1): 118-125.
- [12]X Zhao, C C Sum, Y Qi, et al. A taxonomy of manufacturing strategies in China [J]. *Journal of Operations Management*, 2006, 24(5): 621-636.
- [13]R Sarmiento, M Byrne, L R Contreras, et al. Delivery reliability, manufacturing capabilities and new models of manufacturing efficiency[J]. *Journal of Manufacturing Technology Management*, 2007, 18(4): 367-386.
- [14]M A Noble. Manufacturing competitive priorities and productivity: an empirical study[J]. *International Journal of Operations & Production Management*, 1997, 17(1): 85-99.
- [15]X Zhao, Yan Yeung J H, Zhou Q. Competitive priorities of enterprises in mainland China[J]. *Total Quality Management*, 2002, 13(3): 285-300.
- [16]Y S Chen, S B Lai, Wen C T. The influence of green innovation performance on corporate advantage in Taiwan[J]. *Journal of Business Ethics*, 2006, 67(4): 331-339.
- [17]T Y Chiou, H K Chan, F Lettice, & S H Chung. .The influence of greening the suppliers and green innovation on environmental performance and competitive advantage in Taiwan. *Transportation Research Part E: Logistics and Transportation Review*, 2011,47(6), 822-836.
- [18]C R Carter, M M. Jennings. Social Responsibility and Supply Chain Relationships[J]. *Transportation Research*, 2002,38(1):37-52
- [19]X Zhang, C Song, Y Sun. An empirical study on the relationship between corporate social responsibility and competitiveness[J]. *Science Research Management*, 2010,03:149-157.
- [20]Y Lin, S Ma, L Zhou. Manufacturing strategies for time based competitive advantages[J]. *Industrial Management & Data Systems*, 2012, 112(5): 729-747.
- [21]D Seth, D Tripathi. Relationship between TQM and TPM implementation factors and business performance

- of manufacturing industry in Indian context[J]. *International Journal of Quality & Reliability Management*, 2005, 22(3): 256-277.
- [22]R Kathuria, S J Porth, N N Kathuria, & T K Kohli. Competitive priorities and strategic consensus in emerging economies: evidence from India[J]. *International Journal of Operations & Production Management*, 2010, 30(8): 879-896.
- [23]Ministry of Industry and Information Technology of the People's Republic of China. Annual Report of the manufacturing industry in the world's major countries and regions in 2013[M]. Publishing House of Electronics Indust, 2014,1:66.
- [24]W H Chen. The manufacturing strategy and competitive priority of SMEs in Taiwan: A case survey[J]. *Asia Pacific Journal of Management*, 1999, 16(3): 331-349.
- [25]C Y Lin, M Y Chen. Does innovation lead to performance? An empirical study of SMEs in Taiwan[J]. *Management Research News*, 2007, 30(2): 115-132.
- [26]Y C Hsieh, N P Lin, H C Chiu. Virtual factory and relationship marketing—a case study of a Taiwan semiconductor manufacturing company[J]. *International Journal of Information Management*, 2002, 22(2): 109-126.
- [27]J Nakane. Manufacturing futures survey in Japan: a comparative survey 1983-1986[R]. System Science Institute, Waseda University, Tokyo, 1986.
- [28]A C Phan, Abdallah A B, Matsui Y. Quality management practices and competitive performance: Empirical evidence from Japanese manufacturing companies[J]. *International Journal of Production Economics*, 2011, 133(2): 518-529.
- [29]A D Meyer, J Nakane, J G Miller, et al. Flexibility: the next competitive battle the manufacturing futures survey[J]. *Strategic Management Journal*, 1989, 10(2): 135-144.
- [30]M A Karim, A J R Smith, S K Halgamuge, et al. A comparative study of manufacturing practices and performance variables[J]. *International Journal of Production Economics*, 2008, 112(2): 841-859.