Evaluation on Shipbuilding Enterprise International Operation Value Chain Management based on 9 shipbuilding Listed Companies

Wang Yujing

School of Economics and Management, Harbin Engineering University,Harbin, China

Email:wangyujing@hrbeu.edu.cn

Abstract—Based on shipbuilding enterprise value chain management mode, evaluation index system is built from value chain disassembly management, value chain integration management and operating mechanism of value chain management. Value chain management of 9 shipbuilding listed companies is evaluated by DEA. Then countermeasures for improving shipbuilding enterprise international operation value chain management in our country are put forward.

Keywords-Shipbuilding enterprise ; international operation ; value chain management

1. Introduction

It is essential of international operation that value chain segments are arranged in different geography spaces which beyond national boundaries. It is considered that international competition is rather between value chain than products, techniques or enterprises (Krugman, 1995) [1]. Competition advantage can be searched and cultivated by comparing own value chain with competitor's.[2] Management manner of enterprise is supposed to change according to value chain division. By the way of carrying on industry international transfer, management in China shipbuilding enterprise can be improved. As a result, station in global value chain is going to be better. Research on evaluation of value chain management is abundant home and abroad. Shank and Govindarajan(1993) put forward an accurate way to make sure of competition advantage by calculating payback and profit margin of every value chain segment. However, it is hard to acquire competitor's data, which cuts practicability of this way. [3] As a result, there are a lot of research which has evaluation system but no calculation. [4]

Evaluation index system is built from value chain disassembly management, value chain integration management and operating mechanism of value chain management, based on which value chain management of 9 shipbuilding listed companies is evaluated by DEA.

2. Composition of Value Chain Management Pattern of Shipbuilding Enterprise International Operation

Value chain management pattern of shipbuilding enterprise international operation is illustrated in Fig. 1. Value chain disassembly management is illustrated as dotted line. According to analysis of value chain, strategic segment which creates more profit is supposed to maintain in enterprise, while non-strategic segment is transferred to other enterprise home and overseas by outsourcing in order to optimize resource. Value chain integration management is illustrated as real line. Depending its own competition advantage, shipbuilding enterprise is supposed to string value chain segment domestic and overseas together to a new, more efferent and profitable value chain. In Fig. 1, real line has double arrowhead, which means in value chain integration management, there are choose and chosen of cooperate partner. In Fig. 1, curve means operating mechanism of value chain management, namely trust mechanism, profit relationship mechanism, synergy mechanism and control& encourage mechanism.

By value chain disassembly management, value chain integration management and operating mechanism of value chain management working together, enterprises on value chain can gain double win and improve international competition ability. As a result, ability of creating value and efficiency of whole value chain are

both increased to a higher level. Then value chain management and competition are working on this new level to another cycle.
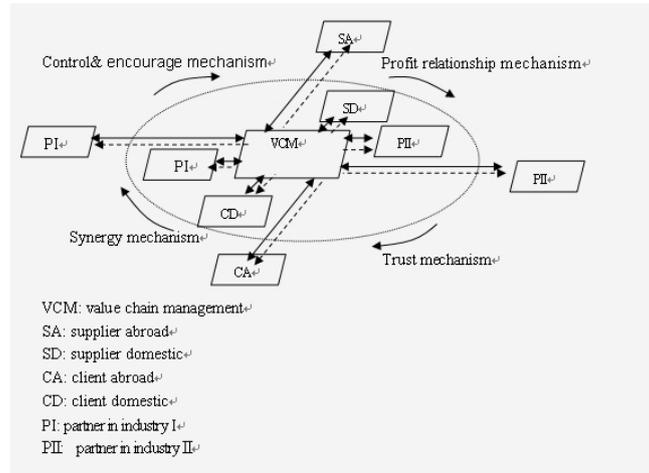

Figure 1. Value Chain Management Pattern of Shipbuilding Enterprise International Operation

3. Evaluation of Value Chain Management of Shipbuilding Enterprise International Operation

3.1 Evaluation Method

Relative effectiveness among decision making units(DMU) which have multiple input and out put is evaluated by mathematical programming model in Data envelopment analysis (DEA) .[5] There is no need to unify data ahead in DEA so as to keep integrity and authenticity. Value chain management of shipbuilding enterprise international operation in this research conforms to specification of DMU, which has same industry competition and same law domestic and overseas.

3.2 Evaluation Indexes

It is so complicated of value chain management that an impersonal and comprehensive evaluation system is needed. Evaluation indexes are chosen according to value chain disassembly management; value chain integration management and operating mechanism of value chain management, and are classified as input(X) and output(Y).

(1)Tightness of value chain (X_1)

Doing business internationally, partners of shipbuilding enterprise locate in different country and district, which needs more energy to keep value chain tight, because of geography distance, time difference and cultural diversity. Tightness of value chain is measured by purchase of largest five suppliers to all purchases and sales of largest five clients to all sales.

(2)Agility of value chain(X_2)

The key of modern international competition is speed. The one who discovers potential market and occupies it first can win the competition. Not only single enterprise needs agility, but also whole value chain needs it. They must react to the changing surroundings together in order to keep value chain working smoothly. Agility is embodied as time. Inventory turnover is selected. The more quickly, the less capital occupied, so the shipbuilding enterprise can centralize resource to more profitable segment such as R&D.

(3)Profit margin of strategic segment(Y_1)

Profit margin of strategic segment stands for ability of creating value by strategic segment according to value chain disassembly management. The more profit margin of strategic segment is, the better of value chain disassembly management effects.

(4)International revenue of core value activity(Y_2)

According to value chain disassembly management, core value activity is maintained inside of shipbuilding enterprise and becomes primary business. In international operation, the more profit created by primary business, the better of recognizing core value activity.

(5)Quality of value chain(Y_3)

Aim of value chain integration management is to rebuild a better quality value chain. Quality of value chain can be measured by Net cash flow from operating activities. More net cash flow from operating activities means there is more income after reducing the cost, which enterprise can use for investment.

(6)Weighted average return on equity net of non-recurring gains and losses(Y_4)

Weighted average return on equity net of non-recurring gains and losses is an index that measure how much net profit created by every unit assets. That is, measure ability of creating profit by enterprise net assets. The more weighted average return on equity net of non-recurring gains and losses is, the better allocation of enterprise value chain is.

(7)Satisfaction of value chain stakeholder (Y_5)

Relationship among enterprises on value chain is fellowship. Whether value chain can work smoothly and stably depends on every stakeholder gain there operation aim and satisfaction. Satisfaction of value chain stakeholder is measured by price earnings ratio.

3.3 Data Obtaining

Data for evaluation are almost financial information. However, it is hard to obtain from normal enterprise, while it is public in listed company. So 9 shipbuilding listed companies is evaluated in this paper.

4. Analysis on evaluation

4.1 Scale Validity Evaluation

TABLE I.   RESULTS OF SHIPBUILDING ENTERPRISE INTERNATIONAL OPERATION VALUE CHAIN MANAGEMENT EVALUATION

indexes / enterprises	CTE	Times referenced	PTE	SE	Cluster analysis
300008	1	5	1	1	obviously valid
000039	1	3	1	1	
600320	1	2	1	1	
600150	1	1	1	1	margin valid
600128	0.7282055	–	1	0.7282055	margin invalid
601989	0.5509893	–	1	0.5509893	Obviously invalid
600896	0.45241	–	1	0.45241	
600072	0.3794919	–	1	0.3794919	
600685	0.3481197	–	0.3627547	0.9596562	

It can be seen in Table I that 8 enterprises are purely technical scale valid, which achieve output maximization at existing input level. Among them, there are 4 enterprises are comprehensive technical scale valid, which are in best station of constant returns to scale. Relative value of comprehensive technical efficiency (CTE) and purely technical efficiency (PTE) is scale efficiency (SE). The closer to 1 scale efficiency is, the more proper enterprise scale is. Such as 600685, whose comprehensive technical efficiency and purely technical efficiency are not very high, while scale efficiency is nearly 1. That means this enterprise has a proper scale, but it needs improve its technical efficiency.

4.2 Cluster Analysis

According to times of DMU being referenced, DMUs can be classified as 4 clusters as follows [6]:

- There are 3 obviously valid enterprises, 33.3% of all enterprises researched. 57690388 is referenced 5 times, while 600320 is referenced 2 times. These enterprises can distinguish and maintain core value chain segment. Besides, they can judge competitors exactly. So they can select so proper international market and mode of international operation that outsourcing non profitable segment. For example, major business field of 300008 are ship and ocean design, which focuses on profitable value chain segment. When selecting partners, they often choose enterprises that have complementary advantages. Relationship between them and partners are beneficial two-win or all-win based on trust. With effectual control and encouragement mechanism, there becomes obvious synergistic effect.
- 600150 is the only one margin valid enterprise, which is referenced one time. It does well in value chain management. However, ability of prediction is so lack that risk resistance capacity is a little weaker. Once there is change in competitive surroundings, the efficiency will debase.
- There is one margin invalid enterprise, 600128, whose efficiency is more than 0.7. Value chain management of this enterprise is good but still has space to be improved. In nowadays, affected by financial crisis, material price rising and appreciation of the RMB, the efficiency is less than 1. Once competitive surroundings are better, the efficiency will increase.
- There are 4 obviously invalid enterprises, 44.4% of all researched enterprises. They needs to improve their value chain management.

4.3 Projection Analysis

TABLE II. ANALYSIS ON PROJECTIVE DATA OF SHIPBUILDING ENTERPRISE INTERNATIONAL OPERATION VALUE CHAIN MANAGEMENT EVALUATION

	X1	X2	Y1	Y2	Y3	Y4	Y5
600685	-65.19%	-77.89%	256.89%	0.00%	29.72%	0.00%	8.37%
600150	-70.98%	-62.05%	999.90%	0.00%	203.81%	999.90%	0.00%
600128	-27.18%	-76.60%	151.71%	46.56%	999.90%	0.00%	0.00%
600896	-54.76%	-54.76%	567.87%	999.90%	999.90%	999.90%	0.00%
601989	-56.37%	-44.90%	999.90%	0.00%	0.00%	0.00%	9.27%

By projection analysis, it can be seen that every index adjust direction of shipbuilding enterprises whose efficiency is less than 1. It is shown in Table II.

It can be seen in Table II, Y1 is the one that has much space to improve, which the largest is 999.90%. The enterprises should recognize value chain core segment better so that create more profit. They also should increase tightness and agility of value chain. As for Y2, Y3 and Y4, some enterprises do better, while some need improve. Y5 is the index which is least to improve. Almost every enterprise has a perfect score, which means value chain stakeholders are satisfied.

4.4 Scale-DEA Analysis

Scale-DEA analysis is the way to measure effect station of one index in whole evaluation system by sum all DMU's weight value of this index. Aim of Scale-DEA analysis is to find major factor affecting shipbuilding enterprise value chain management. It is shown in Table III.

TABLE III. SUM OF SHIPBUILDING ENTERPRISE INTERNATIONAL OPERATION VALUE CHAIN MANAGEMENT INDEX WEIGHT

index	X1	X2	Y1	Y2	Y3	Y4	Y5
Weight sum	48.82	1.44	1.39	0.001	0.001	9.73	0.02

It can be seen in Table III that tightness of value are most important in value chain management. Only relationship among every enterprise on value chain is sound and tight, resource can located efficiently. Based

on tight cooperation, shipbuilding can rely on suppliers at any moment instead of producing all accessories itself, so they can focus on its main business.

5. Countermeasures

It can be seen in evaluation that there is a lot of gap for shipbuilding enterprise to improve in value chain management. It is suggested that they increase ability of creating value by core segment by comparing value chain with competitors, focusing on profitable segment and outsourcing others. Besides, they should build sound relationship with other enterprise so as to increase efficiency of all value chain. Information management can also help information flow in value chain smoothly and exactly.

6. Conclusion

According to DEA evaluation of 9 shipbuilding listed companies value chain management, 8 are purely technical scale valid, while 4 are comprehensive technical scale valid. 3 of them are obvious valid and 1 is margin valid. Y1 is the one that needs improve most, while Y5 is the least one, by projection analysis. Scale-DEA analysis shows Y1 is most important in value chain management. At last, countermeasures are put forward.

7. Acknowledgment

8. References

[1]   Krugman P. Growing World Trade[J]. Brookings Papers on Economic Activity. , 1995,1: 327-377P.

[2]   Chen Wei. Research on Value Chain Management Mode based on Competition Strategy[D]. Harbin Engineering University, 2003.

[3]   Shank J K, Govindarajan V. Strategic Cost Management: The New Tool for Competitive Advantage [M]. Free Press.

[4]   Wang Fu-sheng, Wang Xin, Liu Shi-yu. Research on Evaluation Ways of Value Chain Optimization Performance [J]. Journal of Harbin Institute of Technology. 2006, 38(10): 1797-1800,1805P.

[5]   Charnes, Cooper, Rhodes. Measuring the efficiency of decision making units[J]. European Journal of Operational Research. 1978(2): 429-444P.

[6]   Fare, Grosskopf, Lindgren, et al. Productivity change in Swedish pharmacies 1980-1989:A nonparametric Malmquist approach[J]. Journal of Productivity Analysis. 1992(3): 85-102P.