

Analysis of Key Factors for Formation of Strategic Alliances in Liner Shipping Company: Service Quality Perspective on Asia/Europe Route after Global Economic Crisis

Sheng Teng Huang and Shigeru Yoshida

Abstract—Strategic alliances generally mean the cooperation or collaboration between firms which pursue for a synergy that each member hopes the benefits from the alliances would be much more than those from individual efforts. Past researches provide us sufficient theories and considerations for alliance forming in liner shipping market. This research reviews important academic journals for the past decade regarding to the most important reasons to form the alliances. We would explain the motive of alliances and details of shipping cooperation in literature review.

The paper also empirically investigates the key service quality requirements improved through alliances by using quality function deployment (QFD). Moreover, the research investigates famous shipping reports, shipping consultant websites and most recent shipping publications to find out the executive's viewpoint of several leading carriers among top 20 to assess current shipping strategic alliance on Asia/Europe route. These comments provide meaningful managerial reasons to consider alliance formations and search if there is any gap between the theories and industrial practice. Analysis of the empirical investigation and top management's perspective on current market situation will contribute us some meaningful managerial suggestions to evaluate these theories applied to current strategic alliances.

Keywords—Liner shipping, Strategic alliances, quality function deployment, service quality.

I. INTRODUCTION

LINER shipping industry typically operates closely with shippers, freight forwarders, non vessel owning common carriers (NVOCC), agents, brokers, port or terminal operators, customs clearance, stevedore companies, warehouse service, truckers, inland warehouse operators, railway transportation, freight distributors and consignees. It is a business service providing integrated intermodal transport or marine shipping. Shipper is considered as the ultimate customer but varieties of related parties operating on behalf of the shippers also have important mandatory power to the selection of reliable liner shipping service. Liner shipping industry is very capital-intensive, and large sums of asset on containers, trucks and vessels make the operation complex and difficult. In recent

years, important issues such as fluctuation of freight rates and exchange currency (strong Yen), high bunker prices, global economic downturn and uncertainty business cycle force the restructure of strategic alliances among major liner carriers to gain the comparative advantage. Almost all the top 20 carriers of the world have participation of their alliances.

International liner shipping industry experienced significant innovation after the 1980s. This was caused by the growth of Asian shipping to stay abreast of the economic development and the endorsement of the revised US Shipping Act in 1984. Before the act, liner shipping industry was exempt from antitrust law. The act was intended to loosen regulation and promote competition. Accordingly, liner shipping previously dominated by developed countries started to face large adjustment in market structure and liner shipping conferences with a history of more than a century began to fall down. Competition was intensified with the worldwide competition and many traditional shipping companies were forced to exit market. In such a condition, global alliances emerged rapidly for shipping companies to cater new requirements of customers. The liner shipping alliances have a variety of purposes that may include cost reduction by cooperation and the enhancement of facilities; service improvement in frequency and new region served through the expansion of capacity; and mutual share of management resources [4].

After the global financial crisis in 2008, many major liner shipping companies collaborate to deal with problems such as the surplus capacity of market supply, fierce competition, drop of cargo demand and low profit through strategic alliances as well as make preparation for the recovery of economy. In 2011, after Maersk line provided Daily Maersk product with an aim to diversify service on Asia/Europe route, a series of collaboration and alliance restructure were triggered among many major carriers. The service improvement projects closely followed with the announcement of the MSC-CMA CGM alliance on the same trade. Both initiatives seek to oppose Maersk, which currently offers the most comprehensive coverage of the Asia-Europe trade. In 2012, New World Alliance (APL, Hyundai and MOL) and Grand Alliance (Hapag-Lloyd, NYK and OOCL) signed a comprehensive agreement covering the Asia/Europe route as a new G6 Alliance. In March, Evergreen line announced its collaboration with CKYH to compete with

Sheng Teng Huang is with the Maritime transport systems, Kobe University, Hyogo, Japan (e-mail: m93730012@hotmail.com).

Shigeru Yoshida is with the Maritime transport systems, Kobe University, Hyogo, Japan (e-mail: syoshida@maritime.kobe-u.ac.jp).

Maersk, MSC-CMA CGM alliances and G6 alliances to provide better quality service and intensive sailings up to weekly 8 service loops (Fig. 1).

The paper reviews literature from academic journal, publication of major carriers, famous shipping consultant companies in the past decade to give suggestions regarding to strategic alliances as follows: 1) to explore the evolution and

current situation of strategic alliances; 2) empirically find out the key service quality requirements improved through alliances by using quality function deployment (QFD); 3) to evaluate the important reasons of forming strategic alliance through literature review 4) highlight executive's viewpoint of strategic alliances; 5) discuss and conclude the empirical study of strategic alliances.

Since Jan 1,2012			New Structure			Since April 1,2012		
Carrier/Alliance	No. of Service	Total Ships	Carrier/Alliance	No. of Service	Total Ships	Carrier/Alliance	No. of Service	Total Ships
Maersk Line	6	67	Maersk Line	6	67			
CMA CGM	2	22	CMA CGM/MSC	4	44			
MSC	2	22	CKYH/ Evergreen	8	78			
CKYH	4	36	G6 Alliance	7	60			
Grand Alliance	3	32	Others	1	10			
The New World Alliance	4	40	Total	25	259			
Evergreen	1	9						
Others	4	38						
Total	26	266						

Fig. 1 New Structure on Asia/Europe (Source: Drewry shipping consultant)

II. QFD METHODOLOGY

Quality Function Deployment (QFD) was firstly developed by Yoji Akao in 1966 and was intended to assess the particulars of products. The most important tool of QFD is the House of Quality (HoQ) which was first applied in the Kobe Shipyard of Mitsubishi Heavy Industries for advancing a new building project of an oil tanker. The HoQ is useful to allocate possible contribution of improvements into service quality requirements [3]. Accordingly, service provider can handle the priorities of improvements for the maximization of customer satisfaction. The research investigates liner shipping alliance and service quality requirements are discussed under the QFD method. The procedure for building the house of quality for completion of the QFD can be constructed by the following steps [2]:

A. Service Quality Requirements (WHATs, SRs)

The weight of service quality requirement is to categorize the level of importance and satisfaction of each item. The result of deployment represents the voice of customers in this model. The research selects 10 service quality requirements as shown in Table I. We can use the following formula to calculate the weight of service quality requirements after finding the means of importance and satisfaction rating of the investigations. Let \bar{X}_i and \bar{Y}_i , $i=1,2,\dots,m$, symbolize the average degree of importance and satisfaction to service quality requirement A_i . Because the importance degree and the priority of shipper's requirements have the direct relationship, the satisfaction

degrees have the inverse relationship. We can get the priority rating v_i of A_i by $v_i = (5 - \bar{Y}_i) \bar{X}_i$.

$$w_i = \frac{v_i}{\sum_{i=1}^n v_i} \quad (1)$$

According to this formula, the standard weight w_i of SRs can be found. (eq. 1)

B. Technical Characteristics (HOWs, TCs)

Technical characteristics are constructed along with a firm's service or product based the firm's resource and coordination. The technical characteristic of this research is strategic alliance. We will evaluate how strategic alliances improve service quality requirements in this research.

C. Relationship Matrix

The relationship matrix shows the contribution level and relation of each technical characteristic to each service quality requirement. Typically, symbols represent three degree of strength (low relationship, moderate relationship, strong relationship, no relationship), such as 1-5-9. They are consist of strong relationship ("■" corresponding to 9), moderate relationship ("▲" corresponding to 5), low relationship ("●" corresponding to 1).

D. Target Values

It is essential to build the relationship between customer requirements and technical measures. The crisp numeric can present the value in precision-based QFD. In practical, the operators often estimate them according to their sensible experience, skilled knowledge and information. On the other hand, the estimation of the relation power between customer requirements and technical measures is usually demonstrated in linguistic values, e.g. 'high', 'medium' and 'low'. Through calculating weight of technical measures, we can find the target values of each Technical characteristic. The classical structure of the HoQ is listed in Fig. 2.

In the empirical study, we apply quality function deployment (QFD) and utilize house of quality to systematically utilize the strategic alliances as the technical characteristics for improvement among ten service quality requirements. This paper investigates the liner shipping business and the service quality requirements are discussed under the QFD procedure. The empirical study was conducted with several experts, practitioners and professors, and the findings and suggestions will be given in the conclusion [1].

III. LITERATURE REVIEW

Midoro [7] pointed out three out of the four new alliances forced to adjust their structure because of cross-alliance acquisitions and mergers. Slack et al. [8] examined the formation of alliances in container shipping focus on renovation of services, the evolution of fleet, changes made to the ports of call. The improvement includes the spread and increasing of services, deployment of largest vessels and greater standardization on container shipping industry. Lu [5] revealed key success factor of shipping alliances with management perspective such as partner with similar organization structure and culture, past collaboration and reputation, team work ability, reasonable risk and revenue sharing, flexibility of market change.

TABLE I
SERVICE QUALITY REQUIREMENTS

<i>Service quality requirements</i>	<i>Description</i>
1. Cheaper service	Price of service
2. Transit time	Time spent for transport
3. Safety of cargo	Delivery condition for cargo
4. Time for customs	Time passed for custom clearance
5. Responsive operation	Close contact between customer and staff
6. Professional staff	Ability of the staff
7. Intermodal service	Accessibility of different modes of Transport
8. Prompt response	Taking care of customer claims
9. Easy documentation	Paperless or simple procedure
10. Reputation	Record and performance of former of former service

Yoshida et al. [10] analyzed network economies effects of strategic alliance. They think Japanese liner shipping companies have achieved cost reductions through the network extension brought about by the alliances. Lu et al. [5] evaluated CKYH alliance and revealed possible disadvantage during cooperation. Alliance member seems worried about the market

competition, inherent instability and inefficient decision making procedure within cooperation partners. They have strong confidence that they will not be merged or acquired by their partners in the alliance. Mitsuhashi [6] found market complementary, alliance network and resource compatibility as important alliance formation factors in liner shipping and matched partner would improve firm performance and survival chance. Slack [8] stressed correct partner selection process would make the alliance successful such as trustful and honest relationships, common strategic goals, and resource sharing. Firms seeking long-term alliances selected partners with substantial capital and financial stability to survive a market's downturn, as well as the resources required for expansion during a recession. Yang [10] applied core theory to verify liner shipping alliance's stability from perspective of market and case study.

In 2011, IHS Consulting director explained the alliance formation of small group with larger carriers has guided analysts to identify the characteristics of an oligopolistic competition, with extremely high barriers to entry into the market and alliances offering very similar products. Decision making of an alliance would immediately influence other rivalry alliances and freight rates pressure may increase under both market structure and high oil price pressure. Panayides [9] explained the characteristics of top 20 ocean shipping companies and dynamics of strategic alliances and almost all of them are members of alliances. Alliance announcement related to strategic and operational changes should not considered as closed group entities and every collaboration agreement is signed individually under definite situation. These insights would help to direct us to build up an assessment of the alliance stability.

TABLE II
SCHOLAR'S FINDINGS OF FORMING STRATEGIC ALLIANCES

Considerations	Scholar's findings
Finance	1. Selling excess capacity for revenue 2. Reducing operating cost
Economic	3. Invest fewer fleet to maintain weekly service 1. Economies of scale 2. Resources sharing 3. Operational synergy
Strategic	1. Entering new region with lower risk 2. Alternative strategy for global market uncertainty 3. Opposing with other alliances 4. Attaining competitive advantage without losing autonomy
Management	1. Learning techniques from partners 2. Cooperation with rivalry companies may bring more revenue than competition. 3. Time-consuming coordination is necessary. 4. Carriers can relieve from competition and focus on creating core strength
Global supply chain	1. Expanding service coverage 2. Strengthening global network.
Customer service	1. Increasing service frequencies 2. Achieving customer satisfaction with diversified service
Market structure	When scale of alliance becomes bigger, the oligopolistic or monopolistic characteristics would emerge rapidly such as higher barriers of market entry, huge capital investment and pressure on freight rates because every alliance provides exact same service.
Uniqueness	Each agreement is signed individually under specific situation because of the complexity, uncertainty and dynamics in market.
Merger & Acquisition	Frequent merger among carriers which form a giant alliance may lead the market structure to monopoly or oligopoly pattern. As a result the service quality may not improve and freight rates may remain high with decrease number of competitors.

Source: author

IV. EXECUTIVE'S POINT OF VIEW REGARDING TO STRATEGIC ALLIANCE

This section gives several executive's comment of strategic alliances in liner shipping companies to analyze the current alliance formations during recent economy and industry downturn as shown in Table III. Their viewpoints would provide us important development of current alliance and how they collaborate to overcome common difficulty and wait for recovery. All of these decision makings and comments from executives contain meaningful managerial considerations in terms of competition, customer service, market structure and strategic perspective mentioned in literature review.

The findings of the trend regarding to alliance formation are as follows: 1) Market structure has a tendency to be oligopoly because of frequent M&A, lower market investment, low return of equity; 2) Alliance creates high barriers for potential entrants; 3) The scale and scope of alliance become larger, and cutthroat competition is inevitable; 4) Service quality and reliability will be the key issues for alliances in the future.

V. CONCLUSION

The research discusses the executive's comments to consider alliance formations and search if there are gaps between theories and industrial practice. In recent years, surplus of capacity and global economy downturn force major carriers to adopt aggressive strategy to survive in the market. This

discussion would a series of recent strategic alliance restructure in different perspectives to analyze them. First, from service quality perspective, with the introduction of Daily Maersk to differentiate their service on Asia/Europe route in 2011, they improve their products by giving the concept of absolute reliability; shorten transportation time, daily service and penalty systems to enhance customer satisfactions. Second, from the management perspective, the MSC cooperated with CMA instead of competition would help both to increase revenue and handle surplus capacity. The alliance strategy gives them chance to optimise their resources, fleets, performance and relieve from fierce competition. Third, from the market structure perspective, formation of G6 alliance makes the market more like oligopolistic structure since the giant alliances consist of six powerful carriers due to the diminishing profit and increasing cost pressure. The barriers for new company to entry become very high and independent carrier almost can't survive in this market structure. Alliance formation becomes a good tool to enlarge business scale and gain more market share. Fourth, from the strategic perspective, with the purpose of competing with the giant three alliances, collaboration between Evergreen and CKYH leads the competition eventually from company versus company to alliance versus alliance basis. In the past, Evergreen line seldom participate alliance or agreements with other companies on Asia/Europe route, so the alliance formation may imply Evergreen is obliged to take aggressive attitude under the market dynamics and uncertainty.

The paper empirically explores how the formation of strategic alliances improves service quality requirements of liner shipping alliance [3]. The results reveal the top four service quality requirements improved are business reputation, less transit time, intermodal service and cheaper service after analysis. The findings show us collaboration with famous carriers and enlargement of scale would have positive impact on business reputation to attract more customers. Moreover, strategic alliances can efficiently reduce operating cost and increase revenue, so the shippers may enjoy the cheaper service. Concerning the less transit time, alliance would help to increase the service frequencies, expand the service network and reduce total transportation time to attract potential clients. As for intermodal service, collaboration among liner shipping companies may not limit to vessel pooling or slot exchange. Agreements such as inland transport or other logistics service could help carriers to enhance intermodal service ability.

TABLE III
EXECUTIVE'S VIEWPOINT OF STRATEGIC ALLIANCES

Executive	Position	Viewpoint
Jean-Louis Cambon (2011)	Chairman of European shipper's council	The operating alliance among competing mega carriers could reduce capacity but not offer better quality service. The challenge for MSC and CMA CGM to demonstrate their customers that their alliance would improve their quality of service and reliability.
Eivind Kolding (2011)	Maersk Line CEO	Shipper cares about total transportation time rather than transit time. The concept of absolute reliability is the primary task that alliance should promise their shippers because only about 50% containers arrive on time according to Daily Maersk report.
Diego Aponte (2011)	MSC Line's VP	The alliance between two family-owned companies came at a time of deepening losses caused by capacity surplus and slowing world trade. Collaboration may help us to optimise the deployment of our respective fleets, improve transit time and service quality, offer better solution, increase performance and mutual commitment.
Koichi Muto and Jiro Asakura (2012)	CEO of MOL, CEO of K Line	We don't think it's better to combine Japan's Big three liners to form a Japan Line. NYK and MOL are part of G6 alliance while K Line is with CKYH. Even if we all suffered tough situation because of rising yen, oversupply and bunker price, we should work hard in each alliance. MOL believes investing large scale ships with lower slot costs is good for Asia-Europe market.
Anchor Chang (2012)	Evergreen Liner president	Collaboration between competing liners throughout joint services or slot swaps is common. We'll cooperate with our competitor as long as we meet our customer's need. Evergreen thinks that even in good times, liners should still collaborate with each other to provide diverse service, improve service quality so that a win-win solution can be reached.
Jason Wong (2012)	APL's VP	It is necessary to work with alliance partners on slot swaps to enhance port coverage and frequency. Swap slots is cost-effective to increase port coverage without deploying more assets.
Frank F. H. Lu (2012)	Yang Ming Lin CEO	The cooperation between CKYH lines and Evergreen lines is designed to offer customers the best sailing frequency, transit time, service coverage, stable price and slot supply so as to both fulfil customer needs and control transport capacity more efficiently in view of continuous uncertainties in the global economy.
Neil Dekker (2012)	Drewry Shipping Consultants' Head	The liner shipping is a game of scale and need to raise market share, they need to increase their size of ships to minimize unit cost and more weekly services to become more competitive and they can achieve that through strategic alliances.

Source: Lloyd's list, Lloyd's Fairplay

REFERENCES

- [1] Agarwal R. and Ergun O., "Network Design and Allocation Mechanisms for Carrier Alliances in Liner Shipping", *Operations Research*, Vol.58, pp. 1726-1742, 2010.
- [2] Duru, O., Huang, S.T., Bulut, E. and Yoshida, S., "Multi-layer Quality Function Deployment (QFD) Approach for Improving the Comprised Quality Satisfaction under the Agency Problem: A 3D QFD Design for the Asset Selection Problem in the Shipping Industry", *Quality and Quantity*, doi: 10.1007/s11135-011-9653-4, 2011.

- [3] Hauser, J. R. and Clausing, D., "The House of Quality", *Harvard Business Review*, Vol.66, No.2, pp. 66-73, 1998.
- [4] Huang, S.T. and Yoshida S., "Applying Quality Function Deployment to Enhance the Service Quality of Liner shipping Industry: An Empirical Study", *Proceedings of Asian Logistics Round Table & Conference British Columbia*, Vancouver, 2012
- [5] Lu H. A., Cheng J., Lee T. S., "An Evaluation Of Strategic Alliances in Liner Shipping-An Empirical Study Of CKYH", *Journal of Marine Science and Technology*, Vol. 14, No. 4, pp. 202-212, 2006.
- [6] Mitsuhashi H. and Greve H.R., "A Matching Theory Of Alliance Formation And Organization Success: Complementarities And Compatibilities", *Academy of Management Journal*, Vol.52, pp. 975-995, 2009.
- [7] Midoro R. and Pitto A., "A Critical Evaluation of Strategic Alliances in Liner Shipping", *Maritime Policy and Management: The flagship journal of international shipping and port research*, Vol.27, No. 1, pp. 31-40, 2000.
- [8] Slack B. and Comtois C. "Strategic Alliances in the Container Shipping Industry: a Global Perspective", *Maritime Policy and Management: The flagship journal of international shipping and port research*, Vol.29, No.1, pp. 65-76. 2002.
- [9] Song D.W., Panayides P.M. and Wang T.F., "Inter-organisational Relations in Liner Shipping as a Cooperative Game", *Proceedings of the Eastern Asia Society for Transportation Studies*, Vol 3, No 1, pp. 247-262, 2001.
- [10] Yoshida S., Yang J. H., Kim K. H., "Network economies of global alliances in liner shipping: the case of Japanese liner shipping companies", *World Shipping and Port Development*, Palgrave Macmillan, New York, pp. 36-49, 2005.



and Shipping Economics.

Shigeru Yoshida is Professor in Maritime Logistics Science at Kobe University, Japan. He received his Ph.D. from the Kobe University in the research field of Growth and Competitiveness of Modern Japanese Shipping Industry. His research interests are shipping and transport economics, and corporate strategies in shipping business. He has published several papers in refereed academic journals and books. He is the former Vice-President and current senior advisor of the Japan Society of Logistics



of shipping company, port and transportation industry in Japan. He has the memberships of Hyogo Prefecture International Student Association and Japan Society of Logistics and Shipping Economics.

Sheng Teng Huang is a Ph.D. candidate at Kobe University, Japan. He used to be exchange student on behalf NTOU (National Taiwan Ocean University) to Kobe University majoring in Maritime Safety Management (Lab of Prof. Kinzo Inoue) in 2007 and worked in Singapore office of Inchcape Shipping Services for one year. He has several publication in journal and conference. His current projects are to investigate the service quality and customer satisfaction