APPLYING QUALITY FUNCTION DEPLOYMENT (QFD) APPROACH TO THE STUDY ON IMPROVING SERVICE QUALITY OF LOGISTICS SERVICE: AN EMPIRICAL STUDY OF HOME DELIVERY INDUSTRY IN EAST ASIA

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Abstract: *The purpose of this research concentrate on home deliver y industry in East Asia, applies quality function deployment (QFD) to analytically explore the service process in terms of quality and technical aspects for the improvement of customer satisfaction. The quality function deployment is one of the special tools to express the cross relationship between customer requirement and technical measure. We find out customer s requirements and analyze them by referring the related publication and research. Based on these customer requirements and by using QFD, customer s requirements on service quality will be transformed into technical measures. Ultimately, the house of quality (HoQ) is applied to build the priority of executing technical measures for improving the service of home delivery industry. We will select the top four technical measures as the results of the research and interview with the related experts to make analysis. The empirical study is performed to inspect service quality of home delivery industry by focusing on a group of leading company in East Asian region. The research aims to provide both academic and practical results of home delivery service for the reference of decision making and management consideration.*

Key words: *Home Delivery Service, Quality Function Deployment, Service Quality, East Asia*

1 INTRODUCTION

To dispense products to a customer's home have been flourished since last decade and amount of products delivered is still increasing with the maturity of internet vendors and communication technologies as an effective intermediary between suppliers and consumers. The domestic logistics policy research published by Ministry of Land, Infrastructure and Tourism in 2012 suggests advancing the logistics network and service level to satisfy the increasing demand for progress communications and city transport in Japan.[1] Home delivery service suggests delivery of products to shipper's home and a new approach of online shopping which customers receive their products without leaving home. Since the opening of the business with only 0.2 billion goods delivered around 1970, the average increasing rate was extremely high and after 20 years the total volume of delivery goods handled is 1.1 billion. Until now 2012, the average volume of delivery goods is about 2.2 billion and the number is growing with the expansion network of international, domestic air cargo and online shopping business according to the statistic report of small goods and parcels in Japan. After North Eastern Japan Earthquake happened on 11 March in Sendai, the whole logistics network were all destroyed in Northeast Japan, and many major home delivery companies contribute tremendously to distribute daily supply or provision to the disaster area with its large truck fleet and efficient network service.[2]

In Taiwan, the market expansion of the industry is considerably growing and appropriate competition strategy will help the company to earn more business. Recently, the greater complication of customer needs and increasing time sensitive products make it difficult for the home delivery service providers to deal with uncertain market change and emerging operational issues after global financial crisis. Many researches revealed that knowing what customer wants and delivering high quality service can help to improve business reputation, customer loyalty, customer satisfaction and eventually increase market share. Customer request is getting essential, demanding, complex and someway unclear, so logistics service providers would not only utilize their resources to improve the internal operation performance as well as hear the voice of customer to gain customer loyalty. According to the past research, scientific and theoretical decision making procedures will help and provide companies appropriate ways to improve the efficiency of the daily operation, managerial performance and effective long-term business strategy to stay competitive in the market. The research aims to provide both academic and practical results of home delivery service for the reference of decision making and management.

To precisely consider the service quality of a home delivery service is not easy because of its intangibility, inseparability and heterogeneity. Nevertheless, many empirical and academic studies have been done to look for the service quality topics in other transportation industries. McGinnis listed service quality criteria of shippers" choice about carrier. The criteria comprises freight rates, reliability, transit time, OSD (over, short and damaged), SMC (shipper market considerations), carrier considerations. Bloomberg analyzed the shippers" service criteria into four parts. It includes freight rate, customer service, claims handling, follow-up and special equipment availability and service flexibility. [3] Peters et al. indicate the finding of the examination with Chief Executive Officers (CEOs) of sixteen largest third-party logistics companies about the customer's outsourcing interest in Europe. The responses highlight the important reasons including reasonable price, geographical coverage, service assistance, company size and diversity of logistics service. The most significant issues for business are performance competition, systems maturity costs, marketing strategies, and revenues accrued. Liang et al. found four major service attributes for ocean freight forwarders. The four service attributes include procedure convenience and reaction ability, integrated service, transport ability, and price. Shams investigated quality administration of top five hundred firms as members of Logistics Association Australia with

Pearson chi-square test. [4] The study exposed the most significant service quality component is on-time delivery, while the primary quality items to execute include transform corporate culture and employee's training. Chou utilized structural equation modelling method to investigate that service quality of home delivery industries in Taiwan positively related to switching costs and customer loyalty. This empirical study revealed that the order of customer's satisfaction service was range of delivery, seldom parcel loss, invoice accuracy, prompt reliable collection and on time delivery. After combining the aspects of assessing the service quality described in the above literature, taking into account the characteristics of home delivery business and consulting with home delivery expert and professional academics from Japan, US, China and Taiwan, 11 customer attributes are selected to measure the service quality of home delivery business. [5]

2 CHAPTER 1 QFD and HoQ matrix

Quality Function Deployment was primarily applied by Akao Yoji in 1966 and was intended to measure the particulars of new products based on customer response. The major portion of QFD is the House of Quality (HoQ) matrix which was originally applied in the Kobe Shipyard of Mitsubishi Heavy Industries for improving a new building scheme of an oil tanker. Yoji Akao recommended the application of QFD for the shipbuilding industry and later its recognition was enhanced among several industries. Since 1975, the Japanese Society for Quality Control chose the Computer Research Committee. The report of QFD exercise among eighty Japanese firms was published through in a final description by this committee. The major inspiration of the QFD method is derived from the Japanese business viewpoint which is formed by the long-term competitiveness and the patient capital. QFD is clarified as "a general idea that explains a means of translating customer requirements into the proper technical requirements for each phase of product development and production" (Sullivan,1986). Ford is the first company to employ this method in the US in 1986. QFD has been practical by many Japanese companies, most well-known one is Toyota. Toyota cut 50% of their design costs and development time after using QFD in their production. A logical method as QFD depends on the idea of applying knowledge to people can assist companies recognize their customers' needs and accomplish target needs within their resources and ability. [6]

The process for building the house of quality for implementation of the QFD can be constructed by the following steps: [7]
1. Customer attributes (WHATs, CAs): Customer attributes information can be known throughout survey or direct questions to customers. The weight of customer attributes is to understand the rate of importance and satisfaction of each attribute. The result of deployment represents the voice of customers in this model. We can use the following formula to calculate the priorities of customer needs after finding the means of importance and satisfaction rating of the surveys.
2. Technical measures (HOW, TMs): Technical measures are constructed according to a firm's service or product based the firm's resource and coordination. TMs are applicable for measuring a firm's service or product.
3. Relationship Matrix: Combining each WHATs and HOWs, the relationship matrix shows the contribution level and relation of technical measures to each customer attributes. This is the major part of HoQ and can be completed through a series of expert consultation. As usual, signs represent three degree of strength (low relationship, moderate relationship, strong relationship, no relationship), such as 1-4-7 or 1-5-9.
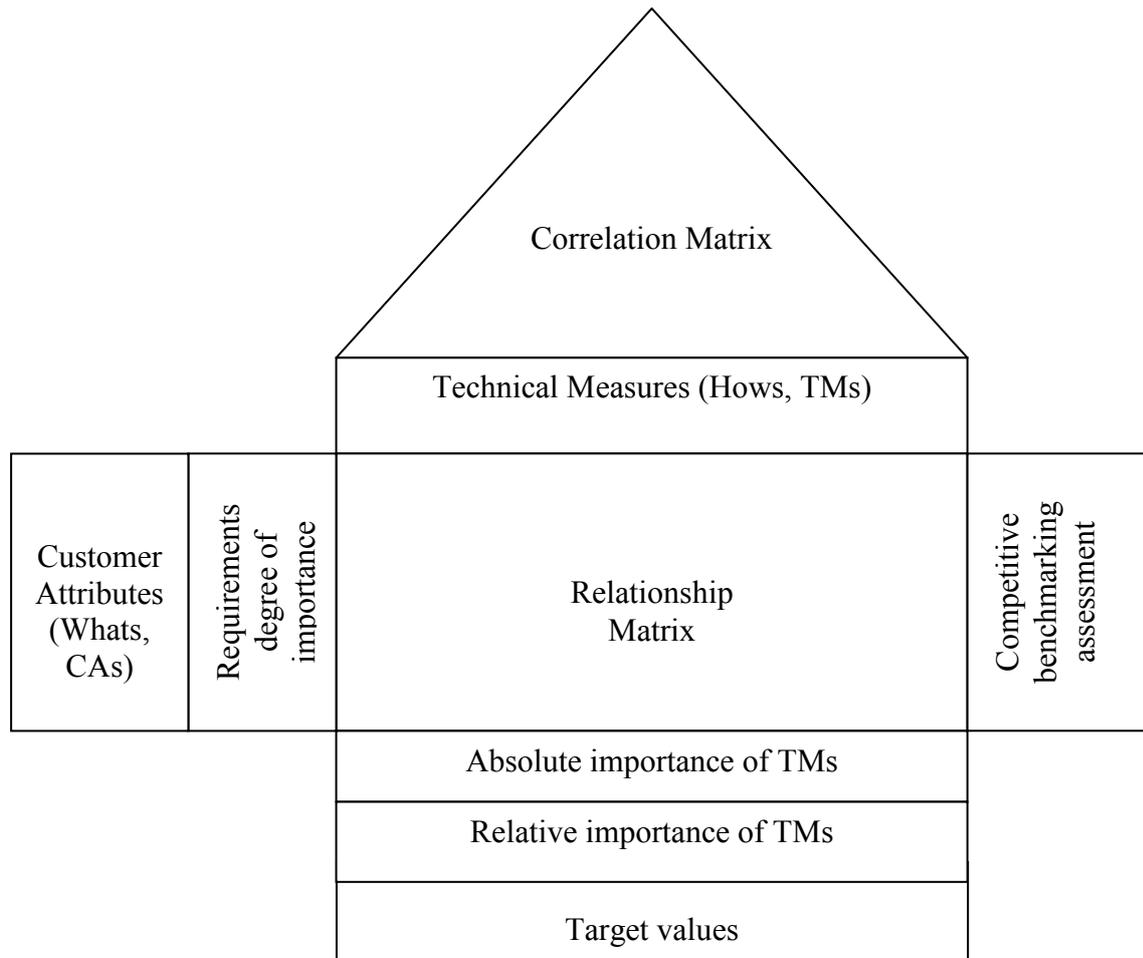
Figure 1. House of Quality [8]

4. Correlation Matrix: Correlation Matrix Relationship is to measure the relationship of each engineering characteristics and how much they affect each other. Correlations are represented with signs that express the degree of relation between engineering characteristics. Signs are translated into a four-value rating scale (low relationship, moderate relationship, strong relationship, no relationship), such as 1-3-5-9 or 1-3-7-9.

5. Target values: It is important to construct the relationship between customer needs and service management requirements. The crisp numeric can present the value in precision-based QFD. In practically, the business operators often estimate them according to their practical experience, skilled knowledge and information. To assess them exactly is also very hard. On the other hand, the estimation of the relation power between customer needs and service management requirements is usually demonstrated in linguistic values, e.g. „high‟, „medium‟ and „low‟. Through calculating weight of component characteristics, we can find the target values of each EC. The classical structure of the HOQ is listed in Figure 1. [9]

3 CHAPTER 2 Deployments of Technical Measure and Empirical Study

After assessing the service quality requirement of customers and discussing with several home delivery experts, 12 technical measures are selected in terms of customer service, operation efficiency and service coverage to improve the quality of home delivery service and enhance customer satisfaction as listed in Figure 2. The customer service stress the important issues to measure performance such as how quick the company response to their

client through cell phone, or email, promotional price and individual client service, service points number, service options and availability. The operation efficiency generally includes factors to facilitate the operation and cost management to maximize profit. The Key focus operation issue may be the utilization of advance IT application to minimize the documentation time and reduce human error while the more intensive service point will be convenient both for collecting and delivery. The strategic alliance may help company to share the resource and cooperate with other business to gain so-called business synergy. The education of employee and expert places emphasis on the quality manning and management to the contribution of future development and corporate strategy. [10]
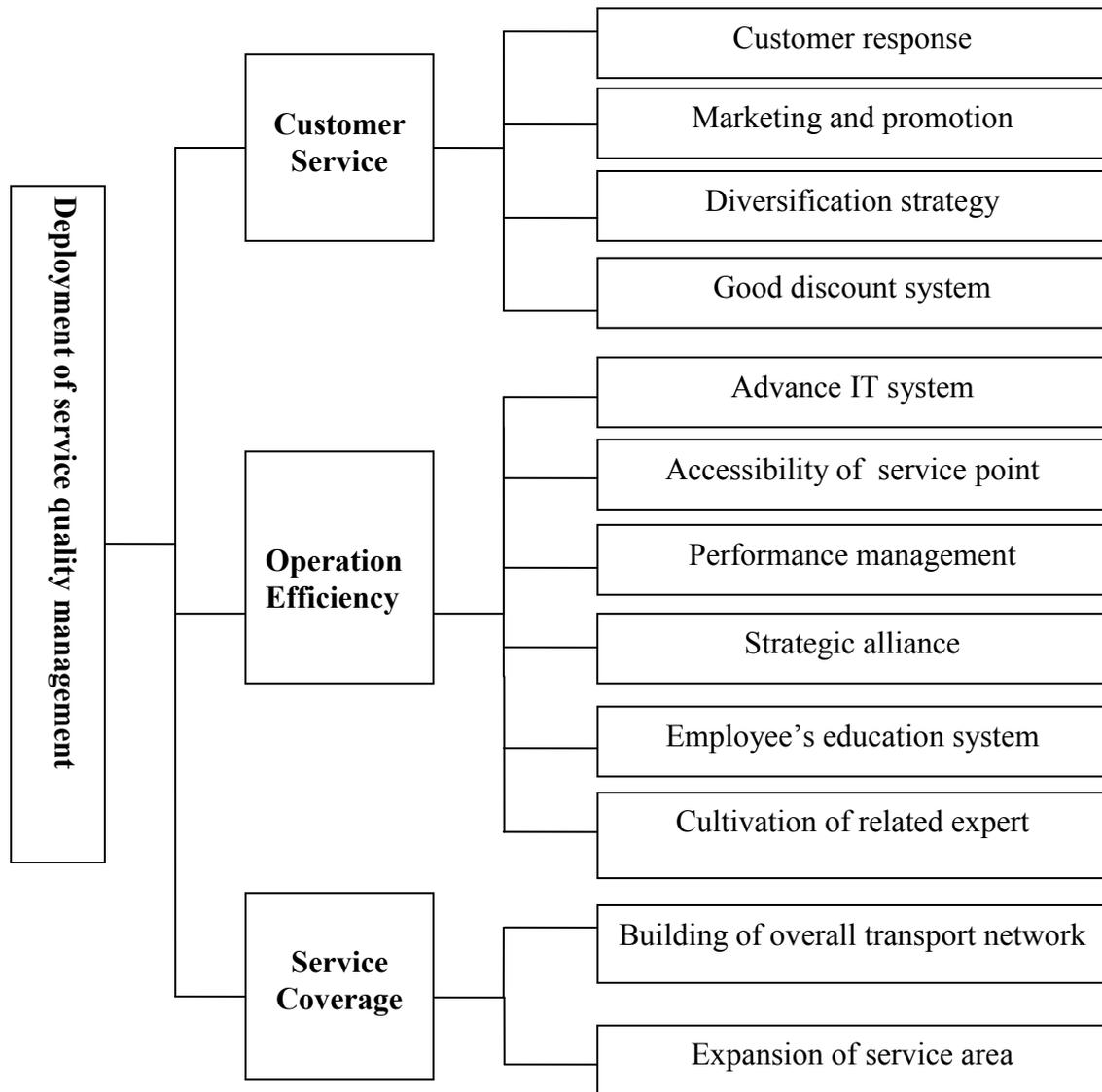

Figure 2. Deployment of Technical Measures

Finally, as to the service coverage generally means the strategy to construct the overall route with existing truck fleet and expand the geographical service areas. In order to understand and hear the voice of customer, selected 12 technical measures are used to design expert consultation contents and carried out with shippers and business practitioners in East Asian region.

4 CONCLUSIONS

After analyzing the empirical results, we gained the top four important technical measures such as employee's education system, building of overall transport network, cultivation of related expert, diversification strategy as shown in Table 1.

First, since the employee's education system is the most important technical measure in this study. The education is not only giving the knowledge and working manual to salesperson but also understanding the nature of service industry. For example, the training system in Yamato Transport Corporation encourages the employee to try and to think on behalf of customer to enhance their overall service quality. They believe the only quality staff would provide quality service to delight each customer. The driver's training is extremely important because he drives, delivers, receives and directly interacts with client and can directly reflect client's willing to company as a representative. In this research, we find that the driver's training is not sufficient and the customer satisfaction towards etiquette could be strengthened. The home delivery business should make more effort on driver and staff training.

Second, the building of overall transportation network is also essential to improve efficiency and reduce transportation time. Also, the number of distribution or logistics centres, frequency of pickup and delivery per day would directly make a difference on delivery time and transport quality. Some time-sensitive, fruit and fresh commodity may need to increase frequency or better equipment to protect them from damage. On the other land, with larger network and truck fleet, the company can enjoy the economy of scales and confirm service coverage to each service point. The original concept of Yamato Transport and Nippon Express is to plan service route and service according to the coverage of local police station, which implies police or home delivery driver can reach to serve in thirty minutes in Japan. Now the development of delivery points and routes are restricted in urban area, and the company should build transportation network to other suburb area to expand their potential market. [11]

Third, the cultivation of expert is necessary for long term plan. With the quick change of the market and customer demand, the expert of different fields can facilitate more business or save operational costs. Some Japanese companies take some innovative and cost effective measure such as delivery of golf, snowboard, medical equipment, furniture, fish, fruits and rice boxes to satisfy different type customers. The experiential executives contribute most to these new measure and right decision making do bring a lot of profit to company. No matter in economy recession or booming, home delivery company must keep their experts to cope with any circumstance. Finally, the diversification strategy of company is important tool for competition. For example, two anonymous companies in Japan has equalled share the home delivery market. One company strengthen its internet vendor, delivery and warehouse system to deliver commodity with surprising speed and successful expand more market share in recent years. Diversification strategy means to offer slightly different or specific service to make customer feel special and surprised. The home delivery service provider should find out their unique niche to improve customer satisfaction. Since home delivery business is a service industry, the company should constantly make market research to offer competitive service to meet their customer needs.

Table 1. House of quality for customer's requirement.

Row No.	Direction of improvement	Customer response	Marketing and promotion	Diversification strategy	Good discount system	Advance IT system	Accessibility of service point	Performance management	Strategic alliance	Employee's education system	Cultivation of related expert	Building of overall transportation network	Expansion of service area
		X	▲	X	▲	X	X	X	▲	X	X	X	X
1	Cheaper service	●	■	●	■	●		▲	●	■	■		●
2	Speedy delivery and reliability	■		▲			●			■		▲	▲
3	Good business reputation	●	●	●	●		▲		▲	▲		▲	
4	Good service attitude and problem solving ability		●	●						▲	■	■	●
5	Good individual service ability		●	■	●		●			▲	■	●	
6	Convenience of payment			■	●		▲	▲	●	■	■	●	●
7	Good delivery quality	●	●	▲		●		●		●	●	▲	
8	Various service options		▲	■		▲				●	■		▲
9	Cargo tracking system and real time information	●		■		▲	●	●		■	●	▲	
10	Strong online shopping system	▲	●			▲				●		■	●
11	Emergency delivery service	●	●	▲					▲	●	●	■	▲
	Max. value in column	9	9	9	9	9	9	5	9	5	9	9	9
	Sum product	3.69	2.51	3.17	2.22	1.4	1.03	1.69	0.92	6.13	3.44	4.48	2.01
	Relative weight	0.1	0.07	0.09	0.06	0.04	0.03	0.05	0.03	0.17	0.1	0.12	0.06
	Rank	3	6	5	7	10	11	9	12	1	4	2	8

Relationship Indicators

- ■ Strong relationship
- ▲ Moderate relationship
- ● Low relationship
- No relationship

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