A SERVICE DESIGN FOR AN AIR CARGO BUSINESS

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ABSTRACT

The aim of this research is to investigate the export activities of a logistics provider, specifically an air freight forwarder, to identify its strengths and weaknesses in the service it provides to its customers. This was part of the focal company's adoption of the Customer Relationship Model (CRM) approach. Ninety-two of this focal company's air cargo customers from the electronics industry were selected for a segmentation process using the Kansei Affective Engineering K-mean methodology, which measures feelings. The Quality Function Deployment (QFD) approach was used to identify the customers' relevant types of service (e.g. handling of complaints), and the Analytic Hierarchy Process (AHP) model was used to prioritize these customer needs. Two customer groups were generated by this methodology. In group one, four customers are classified as key customers, with similarity of characteristics. In group two, the remaining eighty-eight customers are classified as general customers. These segmented groups of customers were reviewed by four experts of the focal company. They agreed with the clustering result since it is similar to the company strategy for customer relationship. This clustering finding will help the company in improving its services for each segmented customer group, and consequently in improving its competitive advantage, in serving existing customers according to their needs, and in attracting more of their orders as well as attracting new customers Thus, the QFD methodology along with AHP is the foundation on which to build appropriate logistics services through this better understanding of customer requirements, in line with the CRM concept.

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บทคัดย่อ

งานวิจัยฉบับนี้จัดทำขึ้นโดยมีวัตถุประสงค์เพื่อออกแบบบริการการขนส่งสินค้าทางอากาศซึ่งเกี่ยวข้องโดยตรงกับกิจกรรมการส่งออกของธุรกิจการขนส่ง โดยได้นำกลุ่มลูกค้าตัวอย่างประเภทอิเล็กทรอนิกส์มาวิเคราะห์และแบ่งประเภทเป็นกลุ่มย่อยด้วยวิธีการแบ่งกลุ่มแบบ K-mean จากลูกค้ากลุ่มตัวอย่างทั้งหมด 92

ราย จากนั้นได้นำ QFD มาใช้ในการออกแบบบริการให้เป็นไปตามความต้องการของลูกค้า อย่างไรก็ตาม การออกแบบบริการโดยใช้หลัก QFD จำเป็นต้องอาศัยหลักการของ AHP ในการลำดับความสำคัญความต้องการของลูกค้าโดยยึดตามน้ำหนักความสำคัญของปัจจัยเพื่อทำความเข้าใจในองค์ประกอบของบริการ ผลการทดลองแบ่งกลุ่มด้วยหลักการ K-mean ทำให้ทราบว่าสามารถแบ่งกลุ่มลูกค้าตามความต้องการและลักษณะเฉพาะของลูกค้าได้เพียงสองกลุ่ม โดยกลุ่มแรกหรือกลุ่มลูกค้าหลักมีทั้งหมด 4 ราย กลุ่มที่สองคือลูกค้าระดับปกติมีทั้งหมด 88 ราย ซึ่งผลการแบ่งกลุ่มจะได้รับการตรวจสอบจากผู้เชี่ยวชาญก่อนนำไปปรับใช้ โดยผลสรุปจากผู้เชี่ยวชาญทั้ง 4 ท่านเห็นสอดคล้องกับผลลัพธ์ดังกล่าวเนื่องจากตรงกับกลยุทธ์ของบริษัทที่พยายามจะแบ่งแยกกลุ่มลูกค้าให้น้อยที่สุด ผลของการแบ่งกลุ่มยังสามารถนำมาเป็นแนวทางในการสร้างบริการให้เหมาะสมกับลูกค้าแต่ละกลุ่ม ช่วยส่งเสริมให้บริษัทมีความสามารถในการแข่งขันมากขึ้น สามารถให้บริการลูกค้าตรงตามความต้องการและนำมาใช้แบ่งกลุ่มลูกค้ารายใหม่โดยใช้ตัวชี้วัดเดิม โดยผลของการออกแบบบริการตามหลัก QFD ควบคู่กับหลักการจัดลำดับความสำคัญของ AHP ยังช่วยในการออกแบบการบริการทางด้านการขนส่งอย่างเหมาะสม ทำให้เข้าใจความต้องการของลูกค้ามากยิ่งขึ้น และได้รับความไว้วางใจจากลูกค้าตามหลักการของ CRM ซึ่งทำให้บริษัทมีโอกาสรักษาธุรกิจหรือได้รับงานเพิ่มมากขึ้น

INTRODUCTION

The two main challenge in export activities, especially in freight forwarders, are the bottom line cost of shipping and expanding their market share. In the past, shippers who are air cargo customers did not have much understanding of air freight cost fluctuations or the airfreight market situation as compared to ocean freight customers. This low awareness was because these freight forwarders are not permitted to communicate directly with airlines, while ocean freight customers are able to access service providers. The world economic crisis of 2008 had a big impact: it forced air cargo customers to shrink their budget and be more attentive in selecting partners.

Logistics Companies are Non-Vessel Owning Common Carriers (NVOCC) in this study: they have flexibility in their approach to supply chain management, to get the best shipping methods and pricing as part of their service to their customers. Also, they must concentrate on increasing their service efficiency due to fierce competition among logistics service providers. Hence, it is profitable to build a strong positive and mutual relationship with customers, whereas previously price was considered to be the only factor which had an influence on customer decision making.

This research found that the focal company’s way of treating customers is too simple: all kinds of customers are treated equally, without proper classification, and this can lead to ineffective allocation of resources, customer dissatisfaction,

and a low competitive edge. In contrast, the appropriate management approach related to the logistics company strategy should be to build types of a long-term relationship with its customers, both high profit customers and others, because both target groups can provide a continual flow of opportunities, generate consistent profit, expand market share and increase the bargaining power with air carriers and other service providers. This research presents a robust methodology for improving logistics services which can develop the logistics business to be more aligned to customer expectation.

REVIEW OF RELATED LITERATURE

Customer segmentation

Concept of Customer segmentation related to a CRM strategy

Customer relationship management (CRM) refers to a strategy, a set of tactics, and a technology, that has become indispensable in the modern economy. The understanding of customer needs, according to CRM strategy, can be gained through two channels: the Lean channel, such as transactional records, surveys using appropriate questions; and the Rich channel, which involves higher cost, semi-structured interviews, story-telling and picture drawing, which can convey considerably more information than that contained in words alone (Stringfellow, Professor, & Bowen, 2004). Market segmentation involves the grouping of customers or prospective customers who have similar responses to a product-market offer. The process of market segmentation includes an understanding of how and why customers buy, how a company can fit its competences to customer needs, and how it can develop strategies and marketing programs to enhance its customers' profits (Christopher, 1983).

Methodology of customer segmentation

There are several customer segmentation methodologies which can be applied in business fields, most of them being supported by software such as SPSS which is the easiest and most effective. The segmentation purpose is to classify customers into smaller groups together with optimizing a customer portfolio so as to assist business development. The most used segmentation methodology is the K-means algorithm. It divides the set of *n* objectives into so-called *k* clusters, each distinguished by the "degree of affinity" indicators between measurable objectives. This can generate high similarity within a cluster, and low similarity between clusters. Similarity of the clusters is measured objectively by a cluster centroid or center of gravity (He & Zhen, 2013).

The K-mean Algorithm:

1) Start by picking the number of clusters i.e. 'k'

2) Assume the centroid of these clusters (any random objects can be taken as the initial centroids or the first k objects in the given sequence can be treated as the initial centroids)
3) Repeat the following until stable (i.e. until there exists no object in any cluster that can be moved to another cluster):

a. Determine the coordinates for each centroid.
b. Find out the distance between each object and the centroids.
c. Group objects based on their minimum distance to the centroids.

Service design

Concept of Service design

Service design is the application of established design processes and skills to the development of new services. As proposed by Peranginangin, Chen, & Shieh (2009), service design is a creative and practical way to improve existing services and to innovate new ones. The main purpose of the Service Design stage of the lifecycle is the design of new or changed services for introduction into the live environment. It is important that a holistic approach to all aspects of design is adopted, and that when changing or amending any of the individual elements of design all other aspects are considered.

Methodology of service design – Kansei & Home Delivery Services

Kansei engineering (KE), proposed by Nagamachi (1989) is a proactive product development method to translate human impressions, feelings and requirements of existing products or concepts into design solutions and concrete design parameters (Nagamachi, 2002). For the service design purpose, Dahlgaard, Schutte, Ayas, & Dahlgaard-Park, (2008) indicated that Kansei engineering could be used to realize the associated relationships between service elements and customer emotional perceptions to assist operators and designers in establishing a systematic procedure for the design of logistics services, as in the home delivery services (HDS) field. A detailed case study to apply KE to home delivery services (HDS) has been made by (Chen, Hsu, Chang, & Chou, (2015) to transform real voices of customers into product and service design. In their study, they used the Partial Least Square (PLS) to analyze the relationships between the real feelings of customers and the characteristics of HDS. The procedure used by Chen et al. (2015) is described below.

Procedure of KANSEI applied for Home Delivery Services (HDS) Design

Step 1: Identify HDS as the design domain

Step 2: Build the semantic space and service property space of HDS

Step 2a: Span the semantic space of HDS

Kansei words from home delivery advertisements were collected, repeated-meaning words were deleted, and the final Kansei words were selected through discussions with logistics experts.

Step 2b: Span the space of HDS properties
Designed attributes from the studied HDS were collected. Some possible values were pondered for every attribute. Attributes which had an impact on the emotional response were selected.
Step 3: Synthesize the HDS semantic space and HDS property space
By means of a statistical method such as PLS, the relationship between Kansei words (i.e. semantic space) and HDS attributes (i.e. the space of properties) was created.
Step 4: Test the validity
Factor analysis was used to identify the key Kansei words and process the validity analysis. Additionally, Cronbach's α was used to process the reliability analysis.
Step 5: Build models for the relationship analysis
After being validated, three models were offered that related the HDS properties with each Kansei words. These three were related to three HDS stages, namely, package pick-up service, package tracking service, and package delivery service.

Results of KE employing Home Delivery Services (HDS) Design
The first and second models of Chen et al. (2015) show that the service characteristics of HDS have a significant influence on the comprehensive Kansei variables. Hence, the service characteristics adopted in the service stimulation of this study effectively affected the Kansei variables in the questionnaire. Besides, this study provided insight into the relationship between 32 service attributes (Kansei) and service characteristics, by calculating the cross loadings. They suggest that HDS companies include this concept in their process of service design or develop the building of these Kansei into the company image.

QFD (Quality Function Deployment) Methodology
QFD is defined as: "how do we understand the quality that our customers expect and make it happen in a dynamic way" (Martins & Aspinwall, 2001). QFD is also referred to as "House of Quality (HOQ)" because the matrix of QFD are shaped in the form of a house diagram (Kutucuoglu, Hamali, Irani, & Sharp, 2001). With the help of QFD, it is easy to understand the customer requirements and develop the service specification, while the HOQ (house of quality) tool helps to develop the relationship between customer requirements and product capabilities. Lin & Pekkarinen (2011) focus on design logistic services with high quality and large service variety, by adopting the framework of QFD, HOQ, and modular logic.

Description of HOQ Procedure to Design Services Following the QFD Philosophy
1) Identify customer requirements (WHATs) using experts' experience, and evaluate important weights in the left wall of the house by using AHP to prove

the process for prioritization. The fundamental scale proposed by (Saaty, 1987) will be used in AHP processes

2) Translate customer requirements into service design characteristics (HOWs) in response to service needed just below the roof

3) Compare the competitiveness of the services in the right wall, The Likert scale of 1 to 5 will show competitiveness from very weak to very strong

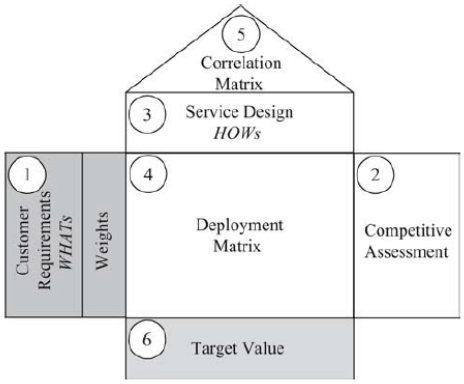
4) Define the relationship between WHATs and HOWs in the central deployment matrix which is called the relationship matrix to evaluate the impact of design requirements on customer requirements: 3 degrees of correlation are established by suitable factors: 3 represents strong related, 2 represents average related, 1 represents weak related and 0 represents not related.

5) Define the relationships between the various service design characteristics in the correlation matrix in the roof: 3 symbols will be established to represent the degree of relationship: ++ represents strong related, + represents related and – represents not related.

6) Design the target values of the service on the ground floor of the house, which is the absolute importance for each service design characteristic.

Target value or Weight$(HOW)_i$ = V of $(HOW)_{i1}$ x imp of $(WHAT_1)$ + … + V of $(HOW)_{in}$ x imp of $(WHAT_n)$, where $V(HOW)_{in}$ is the correlation value of HOW_i with $WHAT_n$, and imp$(WHAT_n)$ represents the importance or priority of $WHAT_n$

Figure 1: House of Quality



(Source: Lin & Pekkarinen, 2011)

Data collection

1.) Data were collected in this research from a field visit and semi-structured interviews, to obtain the information from both the focal case Company and its three customers, as well as secondary documentation, which can facilitate data triangulation in this research (Voss, Tsikriktsis, & Frohlich. 2002).

2) The primary data were collected by two types of semi-structured interviews

a) In-depth interviews with 12 top-level managers to extract the managers' personal opinions on how QFD and modularity can help in logistic service design.
b) Focused interview with 19 middle-level managers to identify how 3PL applies QFD/HOQ and modular logic in the logistic service design.

Result of applying QFD for Service Design in 3PLs
Applying QFD philosophy and HOQ method are useful for the creation of customized, high-quality logistics services. QFD and modularity, used simultaneously as design principles, can ensure service design quality at three layers (service, process, activity) in the modular logistics service platform. Through identifying customer requirements and generating a comprehensive and modular logistics service platform, 3PLs could competitively offer customized services and solutions not only to new customers from new industries, but also to existing customers with new service needs.

METHODOLOGY

Research will be mainly divided into two parts: customer segmentation adopting K-mean clustering methodology; and service design applying QFD integrated with AHP

Customer segmentation
Ninety-two customers in the electronic industry were classified into smaller groups by K-mean methodology on SPSS program, and segmented groups were ultimately reviewed by experts as to whether they were correctly grouped according to their characteristics.

Data collection for customer segmentation
Below are the characteristics used for segmentation.

Table 1: Customer characteristics

Characteristics
1) Moved volume in 2016
2) Total no. of shipments in 2016
3) Percentage of margin/profit in 2016
4) Level of cargo distribution: how customers distribute their cargo to company, classified as 1) Global contribution, 2) Regional contribution, 3) Local contribution
5) Year of relationship until 2016
6) Frequency of complaints issue: divided by 4 types: (1) frequent hard complaint, (2) non-frequent hard complaint, (3) frequent soft complaint, (4) no complaint
7) Financial status: classified as 3 groups: (1) always has bad debt, (2) sometimes has

bad debt, and (3) never has bad debt
8) Customer's price-sensitivity: will have sale team feedback on frequency of bargaining by customer: (1) always, (2) sometimes, (3) never bargain.
9) Level of decision maker: (1) product staff level, (2) manager level and (3) senior management level
10) Frequency of meetings: number of meeting arrangement: (1) less than 5 times per year, (2)5-12 times per year, (3)12-15 times per year, and (4) above 15 times per years

Source: Author

Service Design

QFD methodology was chosen for designing service, as it is that most used as compared to Kansei which is usually applied in product design.

Data collection for service design

1) Service requirement were reviewed by two sale managers, one airfreight manager and one airfreight assistance manager who have experiences in logistics fields of more than ten years.

2) Interview thirty percent of total customers from each segmented group to get customer evaluation on both focal logistics company and competitors. Average of customers' scores were used for creating a QFD chart.

Data Analysis for service design

(1) Identify customer requirements (WHATs) using experts' experiences, which were generated below:

Service 1 or SV1 Fast responsiveness
Service 2 or SV2 Professional staff attitude
Service 3 or SV3) Flexibility to provide freight charge
Service 4 or SV4) Ability to maintain good cargo condition
Service 5 or SV5) Frequency of on-time cargo delivery
Service 6 or SV6) Complaint management
Service 7 or SV7) Regular customer visits
Service 8 or SV8) EDI transmission
Service 9 or SV9) Rapidity in confirming space
Service 10 or SV10) Rapidity in issuing invoice and releasing AWB

(2) Evaluate important weight using AHP

Table 2: % ratio scale of customer preference priority

CTQ'S	SV1	SV2	SV3	SV4	SV5	SV6	SV7	SV8	SV9	SV10	CUMULATIVE SCORE	% RATIO OF SCALE OF PRIORITY
Fast responsiveness	0.33	0.60	0.23	0.30	0.31	0.30	0.24	0.22	0.11	0.13	2.76	**27.60%**
Professional staff attitude	0.07	0.12	0.38	0.30	0.24	0.30	0.08	0.15	0.20	0.13	1.97	**19.67%**
Flexibility to provide freight charge	0.11	0.02	0.08	0.10	0.10	0.06	0.08	0.09	0.11	0.10	0.85	**8.50%**
Ability to maintain good cargo condition	0.11	0.04	0.08	0.10	0.24	0.18	0.08	0.09	0.15	0.13	1.20	**12.03%**
Frequency of on time cargo delivery	0.04	0.02	0.03	0.01	0.03	0.06	0.08	0.15	0.15	0.13	0.71	**7.09%**
Complain management	0.07	0.02	0.08	0.03	0.03	0.06	0.24	0.15	0.15	0.13	0.97	**9.73%**
Regular customer visit	0.11	0.12	0.08	0.10	0.03	0.02	0.08	0.09	0.02	0.06	0.71	**7.12%**
EDI transmission	0.05	0.02	0.03	0.03	0.01	0.01	0.03	0.03	0.07	0.10	0.37	**3.68%**
Rapidity in confirming space	0.07	0.01	0.02	0.01	0.00	0.01	0.08	0.01	0.02	0.06	0.29	**2.92%**
Rapidity in issuing invoice and releasing AWB	0.05	0.02	0.02	0.01	0.00	0.01	0.03	0.01	0.01	0.02	0.17	**1.67%**
TOTAL	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**10**	**100%**

Source: Author

The study revealed that customer priority preference ranking was (1) Fast responsiveness, (2) Professional staff attitude, (3) Ability to maintain good cargo condition, (4) Complaint management, (5) Flexibility to provide freight charge, (6) Regular customer visits, (7) Frequency of on-time cargo delivery, (8) EDI transmission, (9) Rapidity in confirming space and (10) Rapidity in issuing invoice and releasing AWB.

(3) Translate customer requirements into service design characteristics (HOWs)

(1) Negotiable, (2) Responsiveness, (3) Compensation Operational Excellence, and (4) Dedicated manpower, were considered as service design characteristics to respond to customer demand.

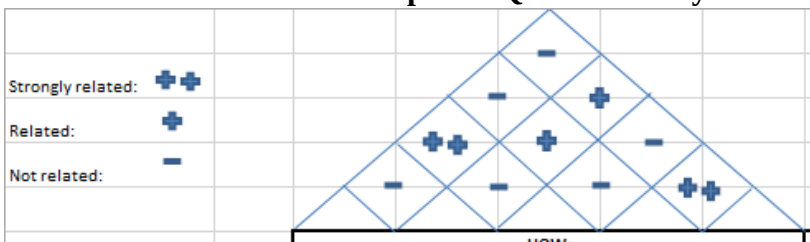
(4) Compare the competitiveness of the services

(5) Define the relationship between WHATs and HOWs in the central deployment matrix which is called the relationship matrix

(6) Define the relationships between the various service design characteristics in the correlation matrix, in the roof

(7) Design the target values of the service on the ground floor of the house

Table 3: Completed QFD of the key customers

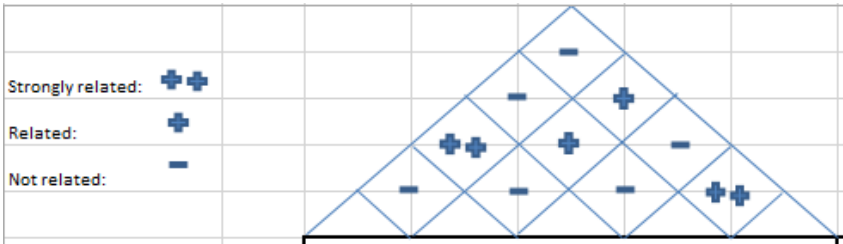


		HOWs					Selected FF service			Competitors service	
WHATs	Weight of important	Negotiatable	Responsiveness	Compensation	Operational excellence	Dedicated manpower	1	2	3	4	5
Fast responsiveness	0.28	1	3		3	3					★
Professional staff attitude	0.20	2	1			2					★ ★
Flexibility to provide freight charge	0.08	3	3		2	2					★ ★
Ability to maintain good cargo condition	0.12			2	3	2					★ ★
Frequency of on time cargo delivery	0.07	1			3	1					★
Complain management	0.10	2	3	3	3	2					★ ★
Regular customer visit	0.07		2		2	3					★ ★
EDI transmission	0.04		2		3	3				★	★
Rapidity in confirming space	0.03	2	3		3	2		★			★
Rapidity in issuing invoice and releasing AWB	0.02		3		3	3				★	★
	Target	1.2482155	1.9250947	0.5325257	2.2537644	2.329762					

Source: Author

Regarding customer feedback, the focal company provided six services to the key customers which were better than competitors, such as 1) Professional staff attitude, 2) Flexibility to provide freight charge, 3) Ability to maintain good cargo condition, 4) Complaint management, 5) Regular customer visits, 6) EDI transmission to their customers which contributed only 61% importance weight (leaving 39% to achieve). To satisfy the customers by providing fast responsiveness can help the company to reach 89% customer satisfaction and may be able to gain more business from these potential customers since they have consistently sent their cargo to the company.

Table 4: Completed QFD of general customers



		HOWs					Selected FF service			Competitors service	
WHATs	Weight of important	Negotiatable	Responsiveness	Compensation	Operational excellence	Dedicated manpower	1	2	3	4	5
Fast responsiveness	0.28	1	3		3	3					★
Professional staff attitude	0.20	2	1			2				★	★
Flexibility to provide freight charge	0.08	3	3		2	2					★
Ability to maintain good cargo condition	0.12			2	3	2				★	★
Frequency of on time cargo delivery	0.07	1			3	1				★	★
Complain management	0.10	2	3	3	3	2				★	★
Regular customer visit	0.07		2		2	3				★	★
EDI transmission	0.04		2		3	3				★	★
Rapidity in confirming space	0.03	2	3		3	2		★			★
Rapidity in issuing invoice and releasing AWB	0.02		3		3	3				★	★
	Target	1.2482155	1.9250947	0.5325257	2.2537644	2.329762					

Source: Author

According to Table 4, the focal company also provides six better services than competitors:

1) Professional staff attitude, 2) Ability to maintain good cargo condition 3) Frequency of on-time cargo delivery 4) Complaint management, 5) Regular customer visits, 6) EDI transmission to general customer, all together comprise 60% of the overall importance weight. There is only a small percentage difference between scores from the key customers and the general customers, which supports the assumption that the company did provide the same service level to all their customers. Therefore, the company must learn how to develop their services by relating them to customer feedback, as most general customers can easily decide to switch to another freight forwarder due to not signing a long-term contract.

FINDINGS

Step 1: Customer segmentation by K-means

Based on the results, two small groups emerged. Four customers, C18, C61, C67, C73, were classified as the key customers due to similarity of characteristics in terms of level of contribution, number of shipments in 2016, volume moved in 2016, frequency of complaint, customer price-sensitivity, level of decision maker, and frequency of meetings. The remaining eighty-eight customers, C1-C17, C19-C60, C62-C66, C68-C72 and C74-C92, were grouped as general customers. These two segmented groups were reviewed by four experts. All of them agreed with the clustering result because it was similar to company strategy to classify their customers into a few groups. They mentioned that the number of customer groups in this research was small because they included only customers in the electronics industry, and moreover, most air cargo customers in the same industry always have very similar characteristics and probably make about the same use of this Logistics Company. Nevertheless, the idea that there should be two customer groups can support the company in focusing on specific valuable customers instead of focusing on all customers and avoid resources being wasted on less important or less profitable customers.

Step 2: Service design using QFD methodology

Comparing services offered to both customer groups, the key customers were satisfied with the focal company in terms of flexibility regarding freight charges: the reason is due to there being a contract rate which includes all shipping orders, and it is easy for the focal company to verify and offer the right rate to customers. Meanwhile, general customers felt that they were treated better in terms of frequency of on-time cargo delivery: the reason is due to their flexibility in accepting a slightly longer transit time according to current market situation. In the same situation, competitor companies might increase their rate, causing dis-satisfaction.

Regarding the QFD result, it appeared that the company is at risk of losing some of their business to competitors due to poor service provided, especially fast responsiveness which was ranked as the 1st important criterion. However, before improving this quality, the company should try to investigate why customers scored their service performance lower than competitors. If fast responsiveness will result in waste of time and human resources, the company should consider allocating their service time and resources to the key customers prior to the general customers due to the more consistent profit this would earn.

CONCLUSION

The K-means methodology using SPSS analysis was applied to the focal company, to identify the services they should be providing for each of the segmented customer groups, to improve its competitive advantage, serve customers according to their needs, and allocate service resources in a reasonable way. Particularly, the clustering result supports company management to easily justify groups of new customers who can be categorized based on characteristics used as indicators in this research. It will greatly save analysis time and could be well worth applying to customers in different industries.

A Logistics company should attempt to have better service quality, but cost management is also necessary. Air cargo customers as shippers do play a vital role to stimulate service improvement in Logistics Companies, especially freight forwarders. Therefore, employing QFD methodology integrated with AHP to design appropriate logistics services can lead to greater benefits, as listed below:

- Experts' experiences were leveraged to construct initial customer requirements
- Establishing service design characteristics derived from customer requirements which can be correct responses to their needs
- With proper ranking of customer requirements using AHP, the result suggested that Fast responsiveness, Professional staff attitude, and Ability to maintain good cargo condition, are the most important criteria which contributed a high percentage of customer satisfaction.
- Customer scores represented performance from their viewpoint, and it allows a company to have a better understanding of what and where should be improved to increase customer satisfaction and customer loyalty. This is the CRM concept, and a company would probably have more chance of retaining their customers' business or even gain more than currently handled.
- The correlation of service requirements and service design characteristics indicates the relative response of customer requests to the service offered

Limitation of this research. Clustering was done only within one industry and it may not be generalizable to other industries, and the segmented group of customers in this research is low in numbers. Further research should be encouraged, to include more industry types for clustering analysis and have specified competitors selected for the QFD approach to understand unique differentiations of service.

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