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Measuring the Relative Importance of Service Encounter Dimensions and Price Perception to Customer Repurchase Intention for Container Shipping Companies --GCE Approach

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ABSTRACT

This paper examines the relative importance of service encounter dimensions and price perception to the customer repurchases intention for the container shipping industry. For avoiding measurement problems, generalized cross entropy (GCE) principle is employed. The findings of this paper are 1) four service encounter: sales representatives, employee service, container operations and booking service have positive impacts on the customer repurchase intention while the impact of perceived price is negative; and 2) these relationships are strongly moderated by the customers' business type. The advantages of GCE are also illustrated in the paper.

Keywords: Customer repurchases intention; Price perception; Generalized cross entropy, Service encounter; Ordered multinomial response data; prior information; non-sample information

I. Introduction

Over the last decade, the container shipping industry has experienced a severe price fluctuation and competition. For an instance, since Europe Freight Conference collapsed and global financial crisis occurred in 2008, the containership freight of Europe decreased from 1666 USD/per TEU in April 2008 to 316 USD/per TEU in January 2009. The containership freight of America Eastbound also decreased from 1061 USD/per TEU in June 2008 to 540 USD/per TEU. Par-

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ticularly, the containership freight between Taiwan and Hong Kong ever decreased to zero USD/per TEU. However, a price cutting strategy is easily emulated by competitors and thus liable to price war none of the players will benefit. In the meantime, with the fierce global competition, more and more companies in the industry seem to have focused their strategic efforts on the establishment and retention of long-term relationship with customers (Durvasula et al., 2002; Lu, 2003). Do the service satisfaction and price perception have difference impacts to the customer repurchase intention? Are these relationships moderated by the customer nationality or business type? The motivation of this paper intends to give the answers to these important questions from the perspective of container shipping companies.

This paper uses service encounters concept in the formation of service (quality) satisfaction. Researchers addressed that the interactive interface of service quality in service encounters which refer to the environment in which the service is delivered and where the firm and the customer interact (Baker and Cameron, 1996; Bitner, 1990, 1992) is a promising conceptual framework for future research into services marketing (Bitner et al., 1994; Chapman and Lovell, 2006; Kumar et al., 2008; Svensson, 2006) because the delivery of service activities often occurs through a series of encounters that customers have with personnel in the place. However, no study to date has examined the linkage between the satisfaction of service encounters and customer repurchase intention in the container shipping industry. This paper will fill the gap. On the other hand, research in consumer satisfaction argues that price can not be assessed in an objective manner but they should be measured from the customers' point of view, which is a subjective perception and evaluation (Matzler, et al., 2006). Therefore, the perceived price will be used to measure the price satisfaction in this paper.

There are at least two problems that have to deal with in the studies of service quality, customer satisfaction and behavior intention. The first, employing statistical model for investigating the relative importance and performance of the ele-

ments of service satisfaction would suffer from some difficulties such as model specification problem (Taylor, 1997) and/ or multicollinearity, etc. (Bacon, 2003). The second, the abnormalities of the measurements of service quality and satisfaction such as measures crowded at top ratings (Abalo et al., 2007; Bacon, 2003) will increase the difficulty to investigating relationships between the related variables. For avoiding these problems and obtaining statistical results as precisely as possible, this paper employs the generalized cross entropy (GCE) principle to analyze the ordered multinomial response data drawn from a survey on the customers of the container shipping industry in Taiwan. GCE, which is a robust statistical method and employs prior and non-sample information to find posterior solution, can mitigate the possible uncertainty caused by the two problems.

This paper not only investigates the impacts of key drivers of customer repurchase intention in the perspective of service encounters; the finding results will propose a more systemic focus on the totality of service design, but also illustrates the source where the benefit of GCE comes from in the empirical study. To the best knowledge of the author, this approach has never been applied to the filed of service management yet. The author believes that the uniqueness of this paper will contribute the container shipping industry in practice and also in the field of the service marketing empirical research.

II. Literature Review

2.1 Customer Repurchas Intention

Customer repurchase intention refers to "the individual's judgment about buying again a designated service from the same company, taking into accounts his or her current situation and likely circumstances" (Dongjin et al., 2008; Hellier et al., 2003). In other words, repurchase intention is the subjective judgments about how a customer will behave in the future. Increased customer repurchases intention

leads to behavioral impacts, including actual repurchase or customer retention (Bolton, 1998; Choi et al., 2004; Rust and Zahorik, 1993), in turn, leads to improved profitability and other financial outcomes (Gupta and Zeithaml 2006; Pasupathy and Triantis, 2007; Rust et al., 1994, 2004; Zeithaml, 2000; Zeithaml et al. 1999). Most marketing studies examine the association between service quality, satisfaction and customer repurchase intention rather than customer actual behavior (Gupta and Zeithaml 2006). This is because firms are unable to control the intervenient constructs of "situational influences" and "monetary constraints" (Ajzen, 1985; Fishbein and Ajzen, 1975), and the service delivered by firms cannot precisely predict actual customer purchase behavior.

2.2 Service satisfaction

Abstraction of the service satisfaction construct has been ambiguous in the literature. In particular, the number and content of posited dimensions has varied among researchers (Svensson, 2006). Various researchers have explored the construct of service quality in different empirical contexts and have developed quite different abstractions – all of which tend to be derived from the service receiver's perspective (Babakus and Boller, 1992; Bienstock et al., 1997; Bouman and van der Wiele, 1992; Dabholkar et al., 1996; Gagliano and Hathcote, 1994; Oliver, 1980, 1981, 1993, 1999; Parasuraman et al., 1985, 1988; 1991). Recently, researchers address that the interactive interface of service quality in service encounters is a promising conceptual framework for future research into services marketing (Bitner, 1990; Bitner et al., 1994; Chapman and Lovell, 2006; Kumar et al., 2008; Svensson, 2006).

Taking the viewpoint of the importance of service encounters' performance of interfacing departments in shaping satisfaction and perceived quality, Durvasula et al. (2002) examined a sample of shipping managers in Singapore who evaluated the service dimensions of ocean freight shipping companies to offer definite guidance

to ocean shipping lines in terms of the importance of key interfacing departments in shaping satisfaction and perceived quality. Using four constructs of service encounters to examine their relationships with the behavior intentions, the results of Keillor et al. (2007) study support the significant relationships between them. Chen et al. (2010) addressed that the efforts provided by the employees of service encounters have most importance impacts on the customer satisfaction. This leads to the first hypothesis:

H1. The satisfaction of service encounters offered by the container shipping companies will be positively associated with their customer repurchase intention.

2.3 Price perception

In the service marketing literature, price satisfaction and service satisfaction are considered as two distinct dimensions that influence perceived value, customer satisfaction and customer behavior (Anderson et al., 2004; Fornell, 1996; He et al., 2008; Matzler et al., 2006). It is well accepted that price plays a significant role in forming consumer purchase/repurchase intention which, in turn, leads to ultimate purchases that determine a firm's sales and profits (Engel et al., 1995; Mittal and Kamakura, 2001; Reichheld, 1996; Varki and Colgate, 2001). Common wisdom usually considers that price increases can generate negative reactions from customers (Homburg et al., 2005a, 2005b). In particular, a price increase can lower the attractiveness and utility of the product, which can then lead to lower sales or even customer boycotts (Sen, Gürhan-Canli and Morwitz, 2001). Research in consumer satisfaction, however, argues that price can not be assessed in an objective manner but they should be measured from the customers' point of view, which is a subjective perception and evaluation. Therefore, this paper argues that price needs to be measured as perceived by the customers. This leads to the second hypothesis:

H2. The customer perceived price will be negatively associated with their customer repurchase intention

2.4 Relative importance

Another research question this study intends to measure is whether the relative importance of dimensions of service encounters in the formation of service satisfaction and perceived price differs in their impact on customer repurchase intention. That is to test whether the coefficient of each dimension of service encounters is equal to the absolute value of the coefficient of the perceived price. A clear understanding of theses relationships should provide valuable information for customer relationship management because having such data; managers should better be able to set the right priorities (Chen et al., 2010; Matzler et al., 2006).

The research results about the question that does the perceived price have stronger influence than the constructs of service satisfaction on the customers' perceived value obtained from service provider are mixed. Varki and Colgate (2001) argue that price perceptions should have a stronger influence on value than service quality. However, Matzler et al. (2006) argue that in the case of hotels, service satisfaction may be a much stronger cue than in other consumption situations. The question of which the dimensions of service encounters or the perceived price have stronger influence on the customer repurchase intention has not studied extensively yet. However, due to the service characteristics of the container shipping industry, the paper doubts that the perceived price is the most important dimension to the customer repurchase intention in this industry. This leads to the third hypothesis:

H3. The impact of perceived price is not greater than each of the dimensions of service encounters, separately.

2.5 Moderating effect

Researches have found that the customer behavior usually be influenced by the characteristic of customers. Keillor et al. (2007) reported that there was a significant relationship between levels of service satisfaction and purchase intentions

in the developed markets but not in the developing markets. Matzler et al. (2006) argued that the relative importance of dimensions of service to the service satisfaction price satisfaction, and guest loyalty is strongly moderated by the guests' nationality, indicating cross-cultural differences in the importance of service dimensions. Chen et al. (2009) addressed that a perceived service quality gap between forwarders and shippers exists in this industry. This leads to the following two hypotheses:

H4. The customer nationality will influence the relative importance of dimensions of service encounters and perceived price to the customer repurchase intention.
And
H5. The customer business type will influence the relative importance of dimensions of service encounters and perceived price to the customer repurchase intention.

III. Analytical method

3.1 Measurement problems

The abnormality of measurements of service quality and satisfaction was noted in the literature. Researchers reported that measurements are crowded at top ratings (Abalo et al., 2007; Bacon, 2003), multicollinearity (Danaher, 1997; Rust and Zahorik, 1993), negatively skew distributed (Danaher and Mattsson, 1994; Estelami and DeMaeyer, 1997; Peterson and Wilson, 1992). The abnormality of measurements will increase the obscurity of the results obtained from the classical statistical methods. Therefore, robust statistical methods should be employed to estimating the impacts of the key drivers on customer repurchase intention.

3.2 Cross entropy principle

This paper employs GCE principle, which is developed by Golan et al. (1997),

to analyze ordered multinomial response data. GCE combines 1) the frequency distributions of the relative importance of the drivers to the customer repurchase intention as prior information and 2) the service marketing model as non-sample information to find posterior probability distributions of the relative importance of the drivers to customer repurchase intention. This approach makes use of weak sampling assumptions and performs well over a range of non Gaussian error distributions and ill-posed and well-posed problems.

For illustration, let *n* denote the number of respondents, *J* denotes the number of drivers, then, the ordered multinomial regression model can be written as

$$\mathbf{y} = \mathbf{Xb} + \varepsilon \qquad (1)$$

where

$\mathbf{y} = \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{bmatrix}$ is the vector of ordered ratings for the customer repurchase intention;

$\mathbf{b} = (b_1, b_2, \cdots, b_J)'$ is the vector of coefficients of the drivers whose ratings are represented by the matrix $\mathbf{X} = \begin{bmatrix} x_{11}, x_{12}, \cdots, x_{1J} \\ x_{21}, x_{22}, \cdots, x_{2J} \\ \cdots \qquad\qquad \cdots \\ x_{n1}, x_{n2}, \cdots, x_{nJ} \end{bmatrix}$, will be reformulated as

$$\mathbf{y} = \mathbf{Xb} + \varepsilon = \mathbf{XZp}^{b} + \mathbf{Vp}^{\varepsilon} \qquad (2)$$

$$\sum_{l=1}^{L_j} p_{lj}^{b} = 1 \text{ and } \quad p_{lj}^{b} > 0, \quad \text{for all } l, j \qquad (3)$$

$$\sum_{k=1}^{K} p_{ik}^{\varepsilon} = 1 \text{ and } \quad p_{ik}^{\varepsilon} > 0, \quad \text{for all } k, l \qquad (4)$$

where $\mathbf{Z} = \begin{bmatrix} \mathbf{z}_1', \mathbf{0}, \cdots, \mathbf{0} \\ \mathbf{0}, \mathbf{z}_2', \cdots, \mathbf{0} \\ 0, 0, \cdots, 0 \\ \cdots \quad \cdots \\ \mathbf{0}, \mathbf{0}, \cdots, \mathbf{z}_J' \end{bmatrix}$ denote the matrix of the support points

$\mathbf{z}_j' = (z_{1,j}, z_{2,j}, \cdots, z_{L_j,j})$ of the driver j obtained from a survey directly on the respondents, and $(\mathbf{p}_j^b)' = (p_{1j}^b, \cdots, p_{L_j,j}^b)$ is the vector of relative frequencies of driver j which has L_j positive ordered ratings, the superscript denotes the transpose operation of the matrix; $\mathbf{V} = \begin{bmatrix} \mathbf{v}_1', \mathbf{0}, \cdots, \mathbf{0} \\ \mathbf{0}, \mathbf{v}_2', \cdots, \mathbf{0} \\ 0, 0, \cdots, 0 \\ \cdots \quad \cdots \\ \mathbf{0}, \mathbf{0}, \cdots, \mathbf{v}_n' \end{bmatrix}$ is the matrix of support points $\mathbf{v}_j' = (v_{i,1}, v_{i,2}, \cdots, v_{i,K})$ of model errors, and $(\mathbf{p}_i^\varepsilon)' = (p_{i1}^\varepsilon, \cdots, p_{iK}^\varepsilon)$ is the vector of relative frequencies of error *i*, i=1,2,…,*n*, which has *K* positive values, for all *n*. Eq.s (3) and (4) are the constraints for each relative frequency distribution of driver and error. Instead of estimating $\mathbf{b}$ directly, GCE principle will estimate the posterior probability distributions $\mathbf{p}^b = \lfloor \mathbf{p}_1^b, \mathbf{p}_2^b, \cdots, \mathbf{p}_J^b \rfloor$ and $\mathbf{p}^b = \lfloor \mathbf{p}_1^b, \mathbf{p}_2^b, \cdots, \mathbf{p}_J^b \rfloor$ as nearly to the prior probability distributions $\tilde{\mathbf{p}}^b$ and $\tilde{\mathbf{p}}^\varepsilon$, which is a matrix consisting of the empirical relative frequency distributions of the drivers and errors, as possible by minimizing a measure of distance (Csiszár, 1991) defined by

$$\mathrm{I}(\mathbf{p}^b, \mathbf{p}^\varepsilon; \tilde{\mathbf{p}}^b, \tilde{\mathbf{p}}^\varepsilon) = -\sum_{j=1}^{J}\sum_{l=1}^{L_j} p_{lj}^b \ln\left(\frac{p_{lj}^b}{\tilde{p}_{lj}^b}\right) - \sum_{i=1}^{n}\sum_{k=1}^{K} p_{ik}^\varepsilon \ln\left(\frac{p_{ik}^\varepsilon}{\tilde{p}_{ik}^\varepsilon}\right), \qquad (5)$$

under the constraints of Eqs. (2) to (4), where $\tilde{p}_{lj}^b$, for all *l*, are frequency probabilities of the relative important measures of driver *j*, for all *j*; and $\tilde{p}_{ik}^\varepsilon$, for all *k* , are

empirical probabilities of error *i*, for all *i*. Here $p\ln(p/q)$ is defined to be 0 if p=0 and $+\infty$ if $p>q=0$. Let $\hat{p}_{lj}^{b}>0,$ for all *l* and *j*, and $\hat{p}_{ik}^{\varepsilon}>0,$ for all *i* and *k*, be the optimal solutions to the above problem. Then, the unknown parameters and the unknown error terms can be recovered by

$$\hat{b}_j=\sum_{l=1}^{L_j} z_{lj}\hat{p}_{lj}^{b}\ ,j=1,2,...,J,\ \text{and}\ \ \hat{\varepsilon}_i=\sum_{i=1}^{K} v_{ik}\hat{p}_{ik}^{\varepsilon}\ ,i=1,2,...,n, \qquad (6)$$

respectively. Csiszár (1991) proves that Eq. (5) is the only single criterion satisfying six axioms under the constraints of Eqs. (2), (3) and (4).

Golan et al. (1997) reported following seven advantages the GCE model have: i) uses both the sample and nonsample data to reduce the uncertainty that we have concerning the unknown $\mathbf{b}'$and ε ; ii) avoids using information that we usually do not have concerning the underlying data generation process or likelihood function; iii) uses a dual loss function involving both the estimation precision and prediction objectives; iv) works well with both ill-posed and well-posed problems; v) is robust relative to the underlying data generation process and to the limited-incomplete nature of economic data; vi) performs well relative to competing estimators under a squared error measure of performance; and vii) uses all the information in the data and not just a finite set of sample. In addition, the Pythagorean theorem (Campbell, 2003; Theorem 1, p105) can be used to demonstrate that the solution obtained from GCE model is better than the solutions obtained from direct measures or Eq. (1), separately.

Comparing to $\tilde{\mathbf{p}}^{b}$ and $\tilde{\mathbf{p}}^{\varepsilon}$, the reduction in uncertainty of the GCE estimates will assessed the parameter and error information indices to measure the (Golan, 1988; Soofi, 1992) which are defined by

$$1-S(\hat{\mathbf{p}}^{b})=1-\frac{-\sum_{j=1}^{J}(\hat{\mathbf{p}}_{j}^{b})'\ln(\hat{\mathbf{p}}_{j}^{b})}{-\sum_{j=1}^{J}(\tilde{\mathbf{p}}_{j}^{b})'\ln(\tilde{\mathbf{p}}_{j}^{b})}, \qquad (7)$$

and

$$1-S(\hat{\mathbf{p}}^{\varepsilon})=1-\frac{-\sum_{i=1}^{n}(\hat{\mathbf{p}}_{i}^{\varepsilon})'\ln(\hat{\mathbf{p}}_{i}^{\varepsilon})}{-\sum_{i=1}^{n}(\tilde{\mathbf{p}}_{i}^{\varepsilon})'\ln(\tilde{\mathbf{p}}_{i}^{\varepsilon})}, \qquad (8)$$

respectively.

IV. Empirical study

4.1 Sample

The top 300 shipper in the 2007 “List of Leading Firms” published by the Board of Foreign Trade of the Ministry of Economic Affairs and 300 forwarders in the International Ocean Freight Forwarders & Logistics Association of Taiwan was targeted. A personalized mailing was undertaken to the employees responsible for export operations, a postage-paid return envelope was included, and the respondents were promised a copy of the results. In all 600 questionnaires were distributed, yielding 175 completed questionnaires, after deleting twenty three invalid copies, 168 copies were usable, resulting in a 28 percent response rate. Among them, 91 responses came from forwarders while 77 responses came from shippers; 110 responses were from domestic firms with the remaining 58 responses from the branches (or agents) of foreign companies. Among them, the annual turnover (US$) of all customers was under 10 million, 25 % of customers whose shipments per month below 10 TEUs, 65% of customers whose shipments per month between 10

to 100 TEUs, 9% of the customers whose shipments per month between 100 to 300 TEUs, and only 1% of the customers whose shipments per mouth was over 300TEUs.

Respondents were asked to state their level of agreement using a 9-point Likert scale ranging from "strongly disagree" to "strongly agree" for the questions in a questionnaire. On the same questionnaire, respondents are also asked to state the important level of all questions related to the drivers of customer repurchase intention using a 9-point Likert scale ranging from "extremely unimportant" to "extremely important". The important measures will be used to act as the prior information $\tilde{\mathbf{p}}^b$ in Eq. (5).

4.2 Measures

Durvasula et al. (2002) used seven service dimensions including sales and marketing service, booking services, documentation, telephone services, operations, personal visits and claims service to determining the pattern of interfacing departments that maximize service satisfaction. Keillor et al. (2007) used twelve questions to describing the service encounters. Chen et al. (2010) studied the service performance of container shipping industry of Taiwan using business process viewpoint of which five service dimensions including: employee ability, service design ability, operation ability, administrative ability and equipment supply ability are measured.

This paper remains the sales representative service because Durvasula et al. (2002) reported that sale representative service have the great service satisfaction by perceptions of interfacing departments, but uses employees (except sales representatives) service to replace two Durvasula et al.'s dimensions: personal visits and telephone service. This replacement is based on (1) employee service have emphasized in the results of Chen et al. (2010) and Keillor et al. (2007), and (2) personal

visit and telephone service are also performed by employees. In addition to the other dimensions in Durvasula et al. (2002), this paper includes a servicescape dimension in service encounters because this is one of four service encounters' construct used by Keillor et al. (2007) and was also considered in Chen et al. (2010) and Zeithaml et al. (2006). Finally, eight dimensions: sale representative service, employee (except sale representative) service, container operations, booking service, documentation service, complaints handling, comfortable servicescape and physical equipments, are included in the questionnaire of this study. The question of whether or not the price offered by your container shipping company is high and of what important level of price to your repurchase intention is are also included in the paper.

The question of customer repurchase intention included in this paper follows from the works of Cronin et al. (2000) and Lin et al, (2005). In addition, the questions of the moderating effects of customers' business type and nationality are also included in the paper. Table 1 lists the questions used in the questionnaire; the references of each question are attached at the end of the question.

Table 1 The measures

Service dimension	Question
Customer Repurchase Intention	If situation is not changed, I would choose my present the service provider again. (Chen et al., 2010; Cronin et al., 2000;)
Perceived Price	My present container shipping service provider relative higher ocean freight than competitors (Chen et al., 2010; Cronin et al., 2000)
Sales Representative Service	The sales representatives are competent, pleasant, friendly and caring (Chen et al., 2010; Durvasula et al., 2002)
Employee service	The employees (other than sales representative) of my present container shipping company provide service reliably, consistently and dependably (Chen et al., 2010; Durvasula et al., 2002; Keillor et al., 2007)
Container shipping Operations	My present container shipping company provides quick and precise operations for the container delivering and warehousing. (Chen et al., 2010; Durvasula et al., 2002)
Booking Service	The booking service provided by the encounters of my container shipping provider is precisely and quickly. (Chen et al., 2010; Durvasula et al., 2002)
Documentation Service	My My present container shipping service provider provides accurate documentation (Chen et al., 2010; Durvasula et al., 2002)
Claims Handling	My present container shipping service provider provides prompt settlement of cargo claim. (Chen et al., 2010; Durvasula et al., 2002)
Comfortable servicescape	Their facilities are comfortable. (Keillor et al., 2007)
Physical Equipments	My present container shipping service provider provides good-condition equipments (Chen et al., 2010; Durvasula et al., 2002; Keillor et al., 2007)

4.3 Results

This paper does not employ confirmatory factor analysis (CFA) to verify the validity of the scale because that the occurrence of significant nonzero values of Mardia's multivariate kurtosis (=25.46) and univariate kurtosis indicates that the variables of this paper are not multivariate normal distributed (refers to the values of kurtosis column of Table 2). Violating the multivariate normality assumption in least squares method and maximum likelihood estimation usually leads to the wrong approximate standard errors and incorrect fit statistics based on the χ^2value of which CFA uses (Browne, 1984). This paper, firstly, calculates Cronbach Alpha and item-to-item correlations for each drivers and customer repurchase intention except two moderate variables. The fact that the Cronbach Alpha of each deleted variables increase and over 0.8 indicates the reliability of data is highly enough. Second, the composite reliability (CR) and the average variance extracted (AVE) of eight service dimensional drivers are calculated and their values are 0.86 and 0.75, respectively. As customer repurchase intention and perceived price are single-item measures which can not assumed error-free (Hair et al., 2006). This paper assumes that the reliabilities of these three measures are not lower than that of the item with the lowest Cronbach Alpha, which is 0.8, in the scale. On the basis of Fornell-Larcker-ratio (Fornell and Larcker, 1981) criterion, the reliability of scale in this paper is properly for the statistics requirement.

The frequencies of the measures of all drivers are crowed at ratings 7 and 8 except the ratings of perceived price, these observations are consistent with the reports of Abalo et al. (2007) and Bacon (2003). Since the crowd phenomenon, this paper manipulates support points by combining the ratings below 5 into the rating 5, and divided by 9 for all drivers except perceived price; the support points of perceived price are obtained by the same manner except the ratings divided by - 9 because the relationship of perceived price and customer repurchase intention should

be negative. Table 2 presents these support points and their relative frequencies. The relative frequencies of moderate variables that are the proportions of customers in the sample are not shown in the table.

The coefficients estimated by regression analysis are presented in the last two column of Table 2. Four dimensions of service encounters including sales representative service, employee service, container operations and booking service are significantly. However, the p-value of the coefficient of the perceived price is 0.199 which seems to imply that the perceived price does not influence to the customer repurchase intention for this industry. This result seems neither consistent with the common knowledge and nor with the results reported by the most of previous studies. Under the conditions: 1) $\mathbf{v}_i$ is specified to be symmetric, and to have equally spaced, support around zero; 2) the bounds for the error support $\mathbf{v}_i$ are $\pm 3\sigma_r$ where σ_r (=0.96 in this case) is the empirical standard deviation of residuals estimated by the regression model (Pukelsheim, 1994; Golan, 2001); and 3) the empirical frequency distribution $\tilde{\mathbf{p}}^b$ is treated as the prior information, the coefficients estimated by GCE are presented in the last column in Table 2, in which not only all drivers which are significant in regression model are remained in the model, but also the coefficient of perceived price is negative significantly. The value 0.155 of parameter information index means that comparing to the regression model the confidence to the coefficients estimated by GCE increases 15.5%. Similarly, the value 0.05 of error information index means that 5% uncertainty in the error of Eq. (1) is reduced. These two values indicate that the quality of statistical inference has actually improved when the GCE model takes place the traditional regression model although the mean square errors of both model have little different.

Table 2 The frequency distributions of variable ratings and the estimates of models

Service dimension	Support points **z** and their frequency					Kurtosis	Coef. of reg. model	Coef. of GCE model
Customer Repurchase Intention						-0.4185		
Pricing Factors	0.0[1]	-0.25	-0.5	-0.75	-1.0	-0.788	-0.059	-0.145
	24[2]	37	36	35	36		(0.199)	(0.002)
Employee service	0.0	0.25	0.5	0.75	1.0	-0.635	0.294	0.264
	25	25	40	43	35		(<0.0001)	(<0.0001)
Sales Representative Service	0.0	0.25	0.5	0.75	1.0	0.678	0.348	0.377
	26	27	47	46	25		(0.0005)	(<0.0001)
Business Operations service	0.0	0.25	0.5	0.75	1.0	1.877	0.250	0.305
	23	23	52	46	48		(<0.0001)	(<0.0001)
Booking Service	0.0	0.25	0.5	0.75	1.0	0.234	0.220	0.240
	10[2]	23	43	49	43		(0.0007)	(0.0002)
Documentation Service	0.0	0.25	0.5	0.75	1.0	0.394		
	13	18	46	53	38			
Claims Handling	0.0	0.25	0.5	0.75	1.0	0.361		
	16	23	50	55	24			
Comfortable Servicescape	0.0	0.25	0.5	0.75	1.0	0.200		
	20	28	64	40	16			
Physical Equipments	0.0	0.25	0.5	0.75	1.0	0.678		
	16	21	56	53	22			
Mean square errors							0.775	0.772
Parameter information index								0.148
Error information index								0.055

[1] the values in the first row for each driver denote the support points of this driver;

[2] the values in the second row for each driver denote the frequencies of corresponding support points of this driver;

[3] the values in parentheses are p-values of the estimates.

For comparing the relative importance of dimensions of service encounters and the perceived price to the customer repurchase intention, the Wald statistic (Golan et al., 1997) is used to test hypothesis H3. The p-values of testing the constraint: coefficient of the perceived price + coefficient of X = 0, where X denotes one of employee service, sales representative service, container operations and booking service, are 0.0617, 0.0004, 0.0176 and 0.198, respectively. These results imply that the impacts of employee service, sales representative service, container operations are significantly greater than the negative impact of perceived price on the customer repurchase intention but booking service is not significant.

For examining whether the relationships between these significant variables in the GCE model and the customer repurchase intention will be influenced by the customer's nationality or business type. These variables are considered one by one. When a specific variable is examined, an additional variable which is formed by a product of this variable multiplied by an indicator denoting the moderating effect will be entered in the GCE model. A discrete uniform prior probability with support points from -0.5 to 0.5 is assumed by the indicator. The uniform probability distribution implies that no further information is considered in the test of the moderating effect. The set-up of this testing model is equivalent to estimating two customer repurchase intention equations for the specific tested variable, one for a group of customers and the other one for another group of customers (Baltagi, 1998). The results are shown in Table 3. The evidence revealed in the columns of p-value supports hypotheses H5 that the relationships between the customer repurchase intention and its key drivers are influenced by the customer's business type but does not support H4 that the relationships between the customer repurchase intention and its key drivers are influenced by the customer's nationality.

Table 3 The estimates of moderating effects of customer nationality and business type

Dimension	Nationality(foreigner=1)			Business type(shipper=1)		
	estimate	t value	p value	estimate	t value	p value
Perceived price	-0.014	-0.70	0.483	0.058	2.73	0.007
Sales representative	-0.018	-1.01	0.314	0.044	2.82	0.024
Employee service	-0.021	-0.98	0.327	0.049	2.54	0.012
Business operations	-0.018	-0.96	0.339	0.045	2.25	0.026
Booking service	-0.016	-0.87	0.384	0.046	2.34	0.021

V. Discussion, implications and conclusion

The results of the study generally support the five hypotheses. In the following discussion we will focus on the most revealing findings that were gleaned from the study and examine some of the implications of those findings.

5.1 Service Encounters

The results of this study show that four dimensions of service encounters: sales representative service, employee service, container operations and booking service have significantly positive relationships with the customer repurchase intention. Except employee service, other dimensions were recognized as the most important interactions with interfacing departments by Durvasula et al. (2002). Chen et al. (2010) reported that employee's service ability is the most important

dimension of service quality and its performance is also ranked at the first priority for improvement in the industry. These results are quite consistent with the findings of the current study.

The high relative importance of the dimensions of sales representatives' service and employees service have important implication to the managers of this industry. The question of employee service, "The employees (other than sales representative) of my present container shipping company provider service reliably, consistently and dependably", refers to the extent of success the companies take care the customer benefits. This implies that what real benefits received from the service delivered by their service providers is the main concerns of the customers. While this high performance can not be achieved without service delivered by sales representatives. The sales representatives provide another important personal service activity - the off-the-job service for their customers since a well customer relationship management will be achieved only by considering both formal and informal relationships between service providers and their customers, as well as how they interact.

An empirical study (Lee, 2009) reported that online service offered by the container shipping companies has not come into vogue yet. However, this does not mean that companies in the industry do not realize the importance of maintaining close relationships with their customers. On the contrary, informal or private relationships between the container shipping companies and their customers are considerable closed. The close relationships are typically built around frequent, off-the-job activities with officious social activities conducted by the sales representatives of the container shipping companies. For example, sales representatives usual invite their customers playing golf or banqueting together, etc. These officious socialites usually strongly supported by the top management of the firms. By an informal survey, the authors find that each sales representative manager of a container shipping company almost costs five thousands US dollars per month on

average in the entertainment expenses. These activities result in the close relationships between the sales representative and their customers and explain that the impact of sales representatives on the customer repurchase intention has more significant than the other service provided by the container shipping companies. Durvasula et al. (2002) reported a quite similar result that the mean overall service satisfaction for firms in the group (51% of the sample) of having a favorable opinion of sales representative service is above the overall mean score.

In addition to the service provided by the employees and sales representatives, the significance of container operations and booking service implies that the customers concern not only their subjective perception but also the tangible productivity of the companies. The fact that customers lay their stress on the booking service implies that companies can increase the customer repurchase intention through enhancing their on-line service performance. Lee (2009) reported that the highest frequent online activity used by the customers is "container space booking" although there are 41 percent of Taiwanese liner customers have never used the online service offered by the companies. Actually, the missions of the container shipment have to be well done, otherwise, the long-term relationships between service receiver and provider will not be maintained.

The insignificance of documentation service and telephone service on the customer repurchase intention is not inconsistent with Durvasula et al. (2002) who reported that the importance of these dimensions are less than that of sales representative service and container operations. The insignificance of physical equipments can be explained by a result of Chen et al. (2010), in which the authors surveyed the improvement priority of service items for increasing the customer satisfaction and addressed that physical equipments is ranked at the last priority among all service quality constructs. The insignificance of servicescape would be explained by the fact that the offices, in particular, the headquarters have been well decorated in this industry.

5.2 Price perception

The second interesting finding was that the perceived price has negative impact on the customer repurchase intention, but its impact on customer repurchase intention is relatively lower than the dimensions of service encounters, which is indirectly consistent with the findings of Matzler et al. (2006) but contradicts Varki and Colgate (2001). The significantly negative impact of perceived price on customer repurchase intention can be interpreted by the price cutting competition since Europe Freight Conference collapsed and global financial crisis occurred in 2008. The competition was triggered by a forwarder first and followed by some forwarders and small size container shipping companies for attracting more customers of "less than a container load". However, the shippers having large volume seem to have little changed their repurchases intention which has been developed by their carriers with a close relationship between each other in a long time. This findings support the conjectures of previous studies (e. g., Matzlrer et al., 2006) that the dimensions of service encounters are more attractive than the price perceived by the customer of this industry. The result that service satisfaction is more important than price satisfaction on the customer repurchase intention might imply that in severe competition the container shipping industry has reached a situation of price-service performance consistency (Voss et al., 1998).

5.3 Moderating Effects

The relationships between the customer repurchase intention and its key impact factors is strongly influenced by the customer's business type but not by the nationality of customers are another interesting findings of this paper and have important implications to the industry.

It is plausible that the customer's nationality does not influence the studied relationships in this study because most of managers of foreign branches or agents are Taiwanese, those managers did not establish an organization climate differing

from domestic business and/or they are well acquainted with the business practices. This finding will be helpful to many international shipping companies for the choice of setting up branches or employing agents in Taiwan.

The significant moderating effect of customer business type on the relationships implies that the speciality in ocean shipping operations is the core value of service delivered by the container shipping companies and the forwarders to their customers who are not familiar with or have not enough human resources to conduct the ocean shipping operations. Some interesting findings appeared in the estimates of moderating effect model that are presented in Table 4. The mean of forwarders' customer repurchase intention is lower than, but not significant in statistics (not shown in the paper), that of shippers, however, means of all explanatory variables under forwarder are all greater than the means of those variables under shippers. The significant higher mean value of perceived price of forwarders than shippers implies that the significant lower price satisfaction perceived by the forwarders than the shippers. The higher mean values of these key service encounter dimensions and lower repurchase intention perceived by the forwarders imply that the relative importance of service satisfaction offered by these encounters is significant lower than the importance to the forwarders although the estimates using total sample data reveal different results in original GCE model. Comparing to the shipper, the forwarders' relative importance of perceived price higher than dimensions of service encounters to the repurchase intention implies that the forwarders have lower loyalty to their container shipper service providers than the shippers (Cronin et al., 2000; Matzler et al., 2006). This finding has very important implication to the managers of container shipping industry because they can differentiate their service marketing strategies between these two groups of customers.

Table 4 The means of key dimensions of service encounters, perceived price and customer repurchase intention

Dimension	Nationality		Business type	
	Foreign agent	Domestic	Shipper	Forwarder
Customer repurchase intention	7.649	7.585	7.659	7.545
Perceived price	6.631	6.3783	6.087	6.9090
Sales repre-sentative	7.385	7.036	6.956	7.389
Employee service	7.333	7.279	7.263	7.337
Container operations	7.192	6.810	6.791	7.116
Booking ser-vice	7.491	6.963	6.978	7.337

5.4 Cross entropy principle

For avoiding the statistical problems caused by illness conditions of measurements, this paper employs GCE principle to analyzing the ordered multinomial response data and has obtained some improvements in the estimates due to the shrinkage effect resulted from GCE principle (Golan, 2001; Golan et al., 1996). The insignificant of perceived price on the customer repurchase intention is caused from the fact that the measures of customer repurchase intention were crowded at the ratings from 5 to 9. For illustrating the effect, Figure 1 is the scatter plot of the ratings of perceived price and customer repurchase intention. It is obvious that the

regression analysis is unable to reflect the negative relationship of these two variables. However, GCE can reflect the negative relationship using the frequencies of support points. For example, the frequency of support point -1 is 36 that greater than the frequency of support point 0 which is 24 (see Table 2), this make the coefficient of perceived price statistically significant on the customer repurchase intention at the level 0.002.

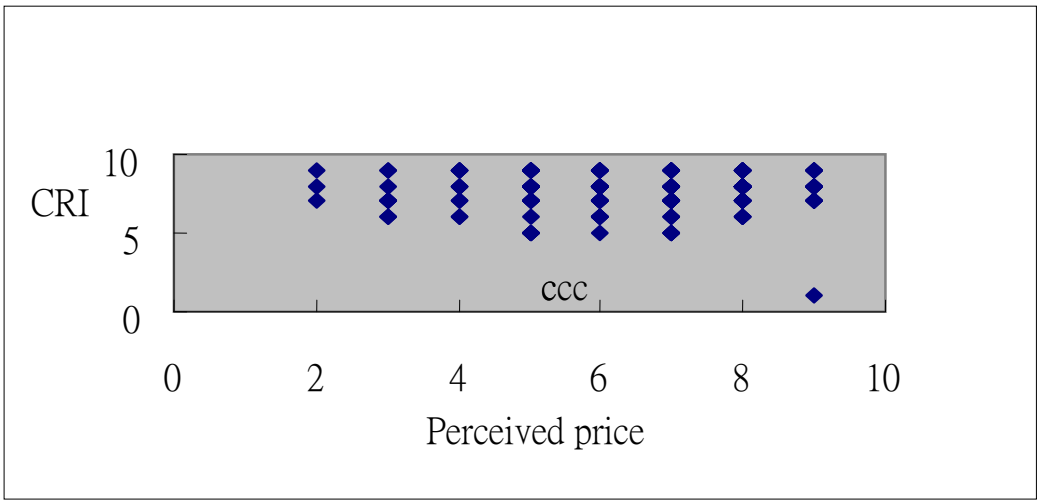

Figure 1 Regression analysis of perceived price on CRI

5.5 Conclusion

This paper proposes the GCE principle as a new approach to investigating the relative importance of key dimensions of service encounters and price perception to the customer repurchase intention for the container shipping industry. Instead of measuring the importance of the drivers using either information obtained directly from respondent ratings or indirectly from model estimation, the GCE employs the respondent ratings as a prior guess of the relative importance of the drivers for revising the solution to the statistical model. The results of the empirical study indicate that the sales representative service, employee (except sales representatives),

container operations and booking service have positive impacts on the customer repurchase intention; the impact of perceived price on the customer repurchase intention is negatively, and these relationships are strongly moderated by the customers' business type. GCE principle provides an answer more reasonable than that of the traditional regression analysis to the studied problem for the industry.

The research is limited to Taiwanese container shipping industry. Although the generalization of the finding results are not possible among all types of services taken together, however, this paper provides important insights pertaining to the studied industry; managers of this industry can consider these findings when designing service delivery. The authors believe that the methods used to approach customers and build relationships with customers will make a contribution to managers and the empirical research in this field.

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