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Market segmentation based on customer satisfaction-loyalty links

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Abstract There exist different views and opinions on the links between customer satisfaction and loyalty. This paper suggests that the impact of customer satisfaction on loyalty varies across customers. This study choose the cell phone industry in China as an example and segmented customers with a novel method of clusterwise linear regression, based on the association between customer satisfaction and loyalty. Results revealed sample heterogeneity in relation to the two factors. The loyalty of some subgroups is positively related to satisfaction significantly, while that of other clusters is independent of satisfaction.

Keywords customer satisfaction, loyalty, clusterwise linear regression, market segmentation

1 Introduction

The relationship between customer satisfaction and loyalty has been subject to a number of investigations over the past two decades. Both marketing academics and professionals have agreed that customer satisfaction has a positive effect on loyalty (Zhang et al., 2003; Wang et al., 2003; Han and Wei, 2001; Wang et al.,

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2001; Fornell, 1992; Anderson and Sullivan, 1993). A strong interest in this field has evolved because loyalty is regarded as the source of profits. Companies could get returns on loyalty from diminishing transition cost (Reichheld and Sasser, 1990), reducing product price elasticity (Anderson, 1996), and increasing repurchase behavior (Rust and Zahorik, 1993; Rust et al., 2004). In a word, customer satisfaction affects the financial performance of a company through loyalty.

Satisfied customers have a high intention to buy the same product, and loyal customers must be satisfied with the product. Customer satisfaction certainly is one of the primary ingredients that creates customer loyalty, although it is not equal to loyalty (Wu and Shao, 2003). Reichheld (1996) from Bain & Co. stated that between 65 percent and 85 percent of customers who were satisfied or very satisfied with their former suppliers will nevertheless change their suppliers. Satisfaction scores 85 percent to 95 percent in average in the automotive industry while only an average of 40 percent of the customers will buy the same product. The phenomenon of high satisfaction and low loyalty is called “satisfaction trap” (Jones and Sasser, 1995).

To avoid the customer satisfaction trap, we need to know our customers well. In fact, what matters is not how satisfied the customers are, but how many satisfied and profitable customers you keep. The relationship between customer satisfaction and loyalty should be considered as the heterogeneity between the academic literature and practical statistics. Companies could benefit by segmenting their customers based on this relationship, seeking sincere customers who will repurchase the products only because they are satisfied, and targeting these customers with some relevant mixed marketing plans.

At present, most of the market segmentation methods are based on the demographics and geographics of the customers or the preferences in their decision making. The present paper applies a novel clusterwise linear regression model to the segmentation of customers according to their satisfaction and loyalty, and is aimed at identifying customers who will repurchase the same products because they are satisfied and the customers whose loyalty is independent of their satisfaction.

2 Literature review

The modeling of loyalty has a long history. Researches on brand loyalty can be traced back to early 1920s (Copeland, 1923). In regard to the link between customer satisfaction and loyalty, the literature can be classified into three categories (Homburg and Giering, 2001).

In the first category, a group of authors provided empirical evidence of a positive relationship between customer satisfaction and loyalty as stated before, that is, customers will be loyal with the products or service if they are satisfied (Fornell, 1992; Anderson and Sullivan, 1993).

Other studies examined the effects of moderator variables on the relationship between the two factors, such as consumer emotions, involvement, switching cost, trust and commitment (Bloemer and Ruyter, 1999; Garbarino and Johnson, 1999; Yang and Peterson, 2004). It was found in some researches that personal characteristics would moderate the link between customer satisfaction and loyalty (Homburg and Giering, 2001).

The third category is of researches on the functional form of the relationship between customer satisfaction and loyalty. Academic researches stated that the relationship between customer satisfaction and loyalty is nonlinear. Oliva et al. (1992) used a catastrophe model to describe the nonlinear relationship of a service loyalty customer–response surface. There is a “zone of indifference” between perceived service and customer satisfaction. Customers in this area will not necessarily purchase the product/service of the same brand or recommend them to others even if they are satisfied. Customers will be loyal only if their satisfaction reaches a certain level (Wang et al., 2003).

Also some articles demonstrated that the association between the two constructs is inequable across categories (Anderson, 2000; Johnson and Auh, 1998). Miller-Williams Inc. examined 33 market-leading companies across six industries based on interviews with 12,277 active customers from those industries between November 2001 and October 2002. The result shows that in some industries as satisfaction increases, so does the loyalty, while in others the opposite is true. The relationship between the two constructs varies tremendously across industries. This phenomenon was also verified by other studies (Wang and Zhao, 2003; Lars et al., 2000).

The key factor in the relationship between customer satisfaction and loyalty is customers. From the previous research, we suggested that the association should be heterogeneous in different consumer groups. Therefore, we could segment the market based on the link between customer satisfaction and loyalty, and target the subgroups the satisfaction of which will significantly affect their loyalty.

3 Research model

There is general agreement that customer satisfaction should be conceptualized as multidimensional construct (Homburg and Giering, 2001). Multiple measurable variables were used to scale the latent constructs of customer satisfaction and loyalty. Thus, we need to calculate the scores of customer satisfaction and loyalty first, and then segment the market based on the link between customer satisfaction

and loyalty, and finally describe the markets with demographic variables. The framework is presented in Fig. 1.

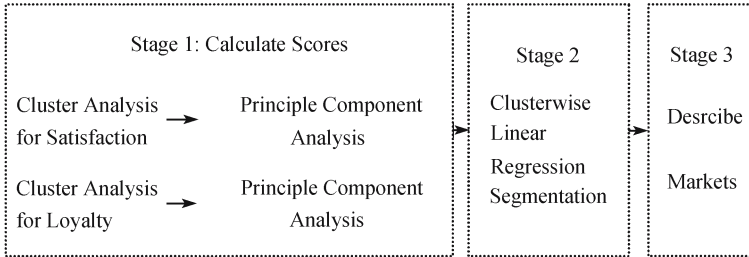


Fig. 1 Research framework

The objective of the study is to reflect the heterogeneity of customers. First, the measurable variables of customer satisfaction and loyalty were analyzed respectively by means of cluster analysis, considering the repugnant weights among different subgroups. Principle component analyses were employed for each subgroup to compute the scores of customer satisfaction and loyalty of each case.

The second step is the main part of this study, which is to segment the market based on the relationship between customer satisfaction and loyalty. We did not take the most commonly used method such as cluster analysis and multidimensional scaling because we were trying to divide the market according to the relationships instead of variables. This paper will adopt a new clusterwise linear regression method to solve this problem.

The term of “clusterwise regression” was first used by Spath (1979). DeSarbo and Cron (1988) proposed a conditional mixture maximum likelihood methodology to estimate this kind of clusterwise regression. In contrast with unconditional approaches (e.g. K-means and hierarchical cluster analysis), conditional mixture models allow for the simultaneous probabilistic classification of observations into underlying segments, and estimation of regression models explaining the means and variances of the dependent variable within each of those segments. We will apply this model to the relationship between loyalty and customer satisfaction in latent classes.

Assume y_i is the loyalty of customer I , where $i = 1, \dots, I$; cluster/group $k = 1, \dots, K$; the independent variable $j = 1, \dots, J$; X_{ij} is the value of the j th independent variable for respondent i ; b_{jk} is the j th regression coefficient for cluster/group k ; σ_k^2 is the variance term for the k th cluster/group; λ_k is the mixing proportion for the k th cluster/group.

DeSarbo and Cron (1988) gave a model of y_i as a finite mixture of conditional univariate normal densities

$$\begin{aligned}
y_i &\approx \sum_{k=1}^K \lambda_k f_{ik} (y_i | X_{ij}, \sigma_k^2, b_{jk}) \\
y_i &= \sum_{k=1}^K \lambda_k (2\pi\sigma_k^2)^{-1/2} \exp \left[\frac{-(y_i - \underline{X}_i b_k)^2}{2\sigma_k^2} \right] \\
\sum_{k=1}^K \lambda_k &= 1 \quad 0 < \lambda_k < 1
\end{aligned} \tag{1}$$

Given a sample with I respondents, the likelihood expression becomes

$$\begin{aligned}
L &= \prod_{i=1}^I \left[\sum_{k=1}^K \lambda_k (2\pi\sigma_k^2)^{-1/2} \exp \left[\frac{-(y_i - \underline{X}_i b_k)^2}{2\sigma_k^2} \right] \right] \\
\ln(L) &= \sum_{i=1}^I \ln \left[\sum_{k=1}^K \lambda_k (2\pi\sigma_k^2)^{-1/2} \exp \left[\frac{-(y_i - \underline{X}_i b_k)^2}{2\sigma_k^2} \right] \right]
\end{aligned} \tag{2}$$

Given values of K , y , and X , λ_k , b_{jk} and σ_k^2 can be estimated to maximize L or $\ln L$. Then, we can assign respondent i to cluster k (conditioned on these estimates) using Bayes's rule via the estimated posterior probability resulting in a fuzzy clustering of the I respondents in K clusters. Thus we can estimate the mixing proportions (λ_k), coefficients (b_{jk}), variances (σ_k^2), and posterior probabilities of membership (P_{ik}), given a value of K , y , and X .

$$\hat{P}_{ik} = \frac{\hat{\lambda}_k f_{ik} (y_i | X_{ij}, \hat{\sigma}_k^2, \hat{b}_{jk})}{\sum_{k=1}^K \hat{\lambda}_k f_{ik} (y_i | X_{ij}, \hat{\sigma}_k^2, \hat{b}_{jk})} \tag{3}$$

The number of clusters K is required in the present model. The original paper of DeSarbo and Cron (1988) suggested the Akaike information criterion (AIC) for estimating the number of clusters. The use of the Bayesian information criterion (BIC) was advocated by Wedel and DeSarbo (1995). Assume N is the degree of freedom, the number of clusters was estimated via the BIC in this study

$$\begin{aligned}
N_k &= (K - 1) + JK + K \\
BIC_k &= -2 \ln L + N_k (\ln I)
\end{aligned} \tag{4}$$

Finally, in the third step, multivariate correspondence analysis was used to analyze the association among consumer demographics and segments, and to identify each subgroup for the corporations.

4 Empirical analyses

4.1 Data

We adopted the model for the cell-phone industry to segment the customers according to the relationship between their satisfaction and loyalty. The data were provided by a national customer satisfaction index survey in 2004. People aged more than 18 years and having purchased a cell-phone within three years were selected to have a telephone review. 2708 people participated in the research.

The latent variable customer satisfaction was measured through four indices (Anderson and Fornell, 2000). First, overall satisfaction was measured with a question “Considering all your experience of company *X*, how satisfied are you in general?” on a 10-point scale from 1 “very dissatisfied” to 10 “very satisfied”. This approach is perhaps the most commonly used in customer satisfaction measurement practice. Second, satisfaction was measured by a question of this type: “To what degree did company *X* fulfill your expectation?” on a 10-point scale from “much less than expected” to “much more than expected”. Third, satisfaction was measured in a relative manner: “Comparing with other brands, how satisfied are you with company *X*?” on a 10-point scale from “very dissatisfied” to “very satisfied”. Fourth, an ideal-point scale was used to ask “Imaging a company which is perfect in all aspects, how close to this ideal do you consider the company *X* to be?” on a scale from “very far away” to “very close”.

The latent variable loyalty was measured by two indices: the customer’s repurchase intention on a 10-point scale from “not willing to purchase” to “willing to purchase”; and the customer’s willingness to pay or price tolerance in the next purchase on a 10-point scale from “not willing to purchase this brand products even if the discount is 50 percent” to “willing to purchase this brand products even if the price increased 50 percent”.

The descriptive statistics of the variables is presented in Table 1. It indicates that significant relationships exist among customer satisfaction measurable variables and loyalty measurable variables respectively ($p < 0.0001$).

4.2 Scores of customer satisfaction and loyalty

Two-step cluster analyses and principle component analyses were employed to calculate the customer satisfaction and loyalty scores (Tables 2 and 3). The weights of general satisfaction (*S1*) and satisfaction relative to expectation (*S2*) were inconsistent in two subgroups in terms of weighing average customer satisfaction score. The repurchase intention (*L1*) contributes much more in subgroup 1 than in the others, while willingness to pay (*L2*) weights more in subgroup 2 in computing loyalty scores.

Table 1 Mean, standard deviation, and correlations

	<i>S1</i>	<i>S2</i>	<i>S3</i>	<i>L1</i>	<i>Mean</i>	<i>Std</i>	<i>N</i>
General satisfaction (<i>S1</i>)					7.59	1.89	2708
Satisfaction relative to expectation (<i>S2</i>)	0.78**				7.00	2.01	2708
Satisfaction relative to other brands (<i>S3</i>)	0.74**	0.72**			7.16	1.89	2708
Satisfaction relative to ideal brands (<i>S4</i>)	0.72**	0.70**	0.83**		7.07	1.86	2708
Repurchase intension (<i>L1</i>)					5.37	2.97	2708
Willingness to pay (<i>L2</i>)				0.78**	5.05	2.83	2708

* $p < 0.01$, ** $p < 0.001$ (two-tailed).

Table 2 Customer satisfaction score

Cluster analysis			Principle component analysis		
Mean	Subgroup 1	Subgroup 2	Weights	Subgroup 1	Subgroup 2
<i>S1</i>	8.62	5.90	<i>S1</i>	0.28	0.22
<i>S2</i>	8.10	5.18	<i>S2</i>	0.20	0.24
<i>S3</i>	8.26	5.36	<i>S3</i>	0.27	0.27
<i>S4</i>	8.13	5.35	<i>S4</i>	0.25	0.26
<i>N</i>	1684	1024	Contribution	54.07%	66.84%

Table 3 Loyalty score

Cluster analysis			Principle component analysis		
Mean	Subgroup 1	Subgroup 2	Weights	Subgroup 1	Subgroup 2
<i>L1</i>	7.84	2.79	<i>L1</i>	0.52	0.47
<i>L2</i>	7.40	2.60	<i>L2</i>	0.48	0.53
<i>N</i>	1382	1326	Contribution	60.64%	59.39%

Traditional linear regression analysis was performed, with customer satisfaction as the independent variable and loyalty as the dependent variable. The R^2 of the regression was 0.45, the coefficient was 1.06 ($F = 2219.19$, $p < 0.001$). Customer satisfaction affects loyalty positively.

4.3 Segmentation with clusterwise linear regression

Table 4 provides the summary statistics for $K = 1, \dots, 5$ clusters for the clusterwise linear regression model with loyalty as the dependent variable and customer satisfaction as the independent variable. Based on the BIC criteria, although the

Table 4 *BIC* and *lnL*

	One cluster	Two clusters	Three clusters	Four clusters	Five clusters
<i>BIC</i>	11540.56	11111.58	10995.60	10979.88	10996.97
<i>lnL</i>		-5528.12	-5454.33	-5430.66	

four clusters solution reached the minimum point, it did not differ from the three clusters solution significantly. We finally chose the three clusters result for practical implications.

The regression coefficients and model fit for separate subgroups were presented in Table 5. About half of the participants fell into segment *B*, in which there was significant association between customer satisfaction and loyalty. Customers would be loyal to the products if they were satisfied, and they would switch if they were unsatisfied in segment *B*. A quarter of the interviewees belonged to segment *C*, in which the link of the two constructs was not significant. And the surplus pertained to segment *A*, in which the relationship was intervenient between that of segment *B* and segment *C*.

Table 5 Regression coefficients of the segments

	Segment A	Segment B	Segment C	Total
Constant	1.65	-4.25	0.17	-2.46
Coefficients	0.77	1.33	0.33	1.06
<i>R</i> -square	0.75	0.89	0.36	0.45
<i>N</i>	683	1310	715	2708
<i>N</i> %	25.22%	48.38%	26.40%	100%

4.4 Segments description

Multivariate correspondence analysis was used to describe the segments with demographic variables as shown in Fig. 2. Most of the customers in segment *B* are aged 30 to 40 years or > 50 years, with primary or junior school education and an annual income less than 10 thousand RMB. They would like to repurchase the same brand product or tolerate the price of the product, and this would bring more profits to the company, if they were satisfied. A great number of customers in segment *A* are aged 40 to 50 years, with senior high school education and an annual income of 10 to 30 thousand RMB. Companies should pay attention to this subgroup because customer satisfaction could also positively affect loyalty in this segment. Most of the customers in segment *C* were very young, with high income and education. They would like to pursue fashion and seek variety, and whether they would purchase the same brand product or not again did not relate

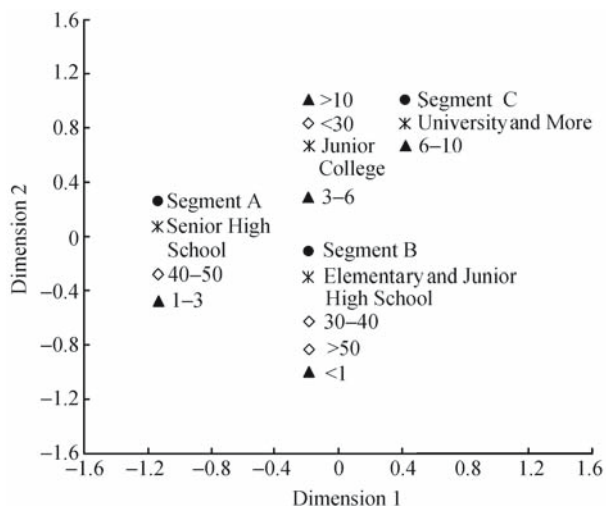


Fig. 2 Cell phone segments description

to their satisfaction. Companies should target these customers with novelty product and appeal their purchasing.

5 Discussion and implications

This study employed a new clusterwise linear regression model to investigate the sample heterogeneity in the customer satisfaction and loyalty links. The empirical analysis in cell phone industry showed that the customer satisfaction and loyalty relation varies across subgroups. Some sincere customers will be loyal to the products when they are satisfied while others' loyalty is independent from their satisfaction.

Companies could segment and target the customers based on these connections and acquire more profits from customer loyalty. Long term customer relationship could be set up for those customers whose loyalty relates to satisfaction significantly, while new fashion products could be developed for those customers whose loyalty is independent from satisfaction.

There are several limitations of the study. First, the nonlinear relationship of the two constructs in previous academic research was not explored in this study. The segmentation would be more precise if clusterwise nonlinear regression method was developed and utilized in this empirical application. Second, this paper adopted the two-step segmentation method to testify the heterogeneity in customer satisfaction and loyalty relation. We will try to integrate these models into a clusterwise structural equation model in future research.

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