A Case Study of Customer Loyalty in Canteen Usage

Inpong P. Luanglath

Abstract

The objective of this paper is to present a case study of customer loyalty involving food services in a university canteen. The purpose is to provide a practical tool for modeling customer loyalty by using logistic function. Prior literature employed linear equation to model customer loyalty. This paper feels the gap in the literature by showing how logistic function could more accurately predict customer loyalty measurement. The data used in this paper came from 100 written surveys. The instrument employed non-Likert scale (0,1,2,3) to collect quantitative data. Nine variables were tested for their significant relationship to customer loyalty: *service quality, customer satisfaction, trust, commitment, switching cost, corporate image, service recovery, emotion, and communication*. Linear equation was used as the basis for the logistic function to construct a predictive model. The PDF and CDF of the logistic function were used to verify the validity and reliability of the new model. It was found that trust and emotional commitment are only two factors that significantly contributed to customer loyalty (ANOVA F = 40.33). The predicted model under logistic function showed a mean $\overline{CDF}$ of 0.60 ± 0.47 with mean residual of 0.50 ± 0.10 or pValue between 0 – 0.10. This study extends Kahneman-Tversky's prospect theory from risk analysis to customer loyalty study.

Keywords: customer loyalty, logistic function, prospect theory

* Faculty of Marketing, International College, Bangkok University
119 Rama 4 Road, Klong-Toey, Bangkok 10110, THAILAND.
E-mail: inpong.l@bu.ac.th

กรณีศึกษาความภักดีของลูกค้าเกี่ยวกับการใช้บริการในโรงอาหาร

อินทร์พงษ์ หลวงราช*

บทคัดย่อ

วัตถุประสงค์ของบทความนี้คือการนำเสนอกรณีศึกษาความภักดีของลูกค้าเกี่ยวกับการให้บริการอาหารในโรงอาหารของมหาวิทยาลัย บทความนี้มีจุดมุ่งหมายเพื่อค้นคว้าหาเครื่องมือในการสร้างแบบจำลองความภักดีของลูกค้าโดยใช้ฟังก์ชันโลจิสติก ก่อนหน้านี้ได้ใช้สมการเชิงเส้นตรงเพื่อสร้างความภักดีของลูกค้า บทความนี้แสดงให้เห็นช่องว่างในวรรณกรรมโดยแสดงให้เห็นว่าฟังก์ชันโลจิสติกสามารถทำนายความจงรักภักดีของลูกค้าได้แม่นยำมากขึ้น ข้อมูลที่ใช้ในบทความนี้มาจากการสำรวจเป็นแบบสอบถาม 100 ฉบับ เครื่องมือนี้ใช้มาตรวัดที่ใช้ Non-Likert (0,1,2,3) เพื่อรวบรวมข้อมูลเชิงปริมาณ ตัวแปรเก้าตัวได้รับการทดสอบความสัมพันธ์ที่มีนัยสำคัญกับความภักดีของลูกค้า คือ คุณภาพ, ของบริการ, ความพึงพอใจของลูกค้า, ความไว้วางใจ, ความมุ่งมั่น, ค่าใช้จ่ายจากการเปลี่ยนยี่ห้อ, ภาพลักษณ์, การกู้คืนลูกค่าที่เสียไป, ความรู้สึกและการสื่อสาร สมการเชิงเส้นตรงถูกใช้เป็นพื้นฐานสำหรับฟังก์ชันโลจิสติกเพื่อสร้างแบบจำลองการทำนาย PDF และ CDF ของฟังก์ชันโลจิสติกได้ถูกนำเอามาใช้เพื่อยืนยันความถูกต้องและความน่าเชื่อถือของโมเดลใหม่ พบว่าความไว้วางใจและความมุ่งมั่นทางอารมณ์เป็นปัจจัยสองประการที่มีนัยสำคัญต่อความภักดีของลูกค้า (ANOVA F = 40.33) แบบจำลองที่คาดการณ์ไว้ภายใต้ฟังก์ชันโลจิสติกส์มีค่าเฉลี่ยของ CDF = 0.60 ± 0.47 โดยมีค่าเฉลี่ยความคลาดเคลื่อนเท่ากับ 0.50 ± 0.10 หรือค่า pValue ระหว่าง 0 ถึง 0.10 การศึกษานี้ขยายทฤษฎีโอกาสของ Kahneman-Tversky จากการวิเคราะห์ความเสี่ยงไปสู่การศึกษาความภักดีของลูกค้า

คำสำคัญ: ความจงรักของลูกค้า สมการเส้นโค้งแบบโลจิสติก ทฤษฎีเกี่ยวกับโอกาส

* สาขาวิชาการตลาด วิทยาลัยนานาชาติ มหาวิทยาลัยกรุงเทพ
เลขที่ 119 ถนนพระราม 4 เขตคลองเตย กรุงเทพมหานคร 10110
E-mail: inpong.l@bu.ac.th

Case Summary

The intended use of this case study is to serve as a teaching tool in marketing where the issue of customer loyalty is involved. This case employs the canteen usage as a focal point of the study. The purpose is to provide a practical tool for modeling customer loyalty by using logistic function. Prior literature employed linear equation to model customer loyalty. This case study shows how logistic function could more accurately predict customer loyalty measurement. The data used in this case came from 100 written surveys. Nine variables were tested for their significant relationship to customer loyalty: *service quality, customer satisfaction, trust, commitment, switching cost, corporate image, service recovery, emotion, and communication*. It was found that trust and emotional commitment are only two factors that significantly contributed to customer loyalty. This finding is limited to this case study of canteen usage. It should not be interpreted as a general finding for customer loyalty, but they are specific finding for a case study of canteen usage in a private university in Thailand. The educational relevance of this finding is that customer loyalty study in different setting may produce different results depending on the target population, products or services involved, and how long the study was carried out. This case study is a result of a one time survey; there was no follow up to track changes in behavior of customers.

1. Introduction

This writing is a case study of customer loyalty in food service. A canteen in one private university was used as a proxy to test customer loyalty model under logistic function. Two research questions are presented: (i) what are determinants of customer loyalty in food service, and (ii) how could customer loyalty be modeled and tested?

To answer the first question, we tested nine dependent variables from the current literature. To answer the second questions, we propose to use the PDF and CDF of the logistic function based on the prospect theory (Kahneman and Tversky, 1979, p. 263). The rationale for using logistic function or the S-curve as a model

is that customer loyalty depends on attitude and emotion. These two factors could not appropriately be modeled by linear equation because these aspects of psychometrics show asymptotic maximum and minimum.

We may begin this case with an anecdotal story of a customer in a restaurant. Upon arrival to a restaurant, the customer expects a bowl of soup that is tasty, clean and good service. Instead the customer received a bowl of soup that is cold, bad taste, and poor service. The customer complains and the store manager replaces the cold bowl of soup with a hot bowl of soup that was freshly made. Although unhappy about the first bowl of soup, the customer was glad to receive the new bowl of soup and appreciated that the manager had made an effort to make up for the disappointment caused by the first serving. After the meal, the customer paid the bill upon which the store manager apologized for the first bowl of soup and had hoped that the customer was satisfied with the meal. The customer thanked the manager for replacing the bowl of soup with a freshly made one and left the restaurant. The manager is left wondering: "Will the customer return to patronize the restaurant?" This story is a story of customer satisfaction and customer service. More importantly, it is about customer loyalty. Will an unsatisfied customer return to the same establishment? If an unsatisfied customer had been successfully reclaimed by the seller's effort, will that produce customer loyalty? Can customer loyalty be expected from one visit to the establishment? What are relevant factors required to produce customer loyalty? Are these factors the same for all types of customers and businesses? How can customer loyalty be more effectively measured, modeled, and tested?

This case study has two purposes: (i) we want to test the determinant factors for customer loyalty, and (ii) we want to present an alternative modeling method for measuring customer loyalty by using logistic function. To achieve the first purpose, we rely on nine factors identified in the literature as significantly relevant to customer loyalty. These nine factors include: *service quality, customer satisfaction, trust, commitment, switching cost, corporate image, service recovery, emotion, and communication*. We tested these factors by asking 100 respondents in a written survey to score the level of importance for each factor. To achieve the

second purpose, we present a logistic function as alternative to the generalized linear equation in modeling customer loyalty. These two purposes contribute marketing study of customer loyalty. This case study employed the canteen usage in one private university as a proxy business to test customer loyalty.

This case study has educational value in two respects. On the one hand, this case study breaks away from the common research practice in studying customer loyalty under linear regression modeling by adopting logistic function as a modeling tool. On the other hand, marketing students will benefit from this case study in their learning of customer loyalty in various contexts. This case study presents one context of customer loyalty: food service. This case study is beneficial to marketing studies on customer loyalty in that it teaches us that different transaction types, and product or service types may produce different answer to the questions of "what are significant factors for customer loyalty?" The literature may identify up to nine different factors as significant to customer loyalty; however, as this case study shows, only two are significant (trust and emotional commitment). While other seven factors failed in this case, they might serve as critical and significant factors in other circumstances.

2. Theoretical Background of Customer Loyalty

2.1 Factors Affecting Customer Loyalty

Numerous books claimed that firms see the importance of customer loyalty by adopting customer focused policy (Brown 2000; Kalakota and Robinson 1999; Peppers and Rogers 1997). There is a practical reason for loyalty research because customer loyalty increases revenue stream over time (Gremler and Brown, 1999). A practical model to accurately measure customer loyalty is useful to stakeholders. One objective of this case study is to construct a predictive model for customer loyalty by using logistic function.

Customer loyalty is defined as a "deeply held commitment to rebuy or repatronize a preferred product/service consistently in the future, thereby causing repetitive same brand or same brand-set purchasing *despite* situational influence

and marketing efforts having the potential to cause switching behavior." (Oliver, 1997, p. 392). The literature identified nine relevant determinants of customer loyalty: *service quality, customer satisfaction, trust, commitment, switching cost, corporate image, service recovery, emotion, and communication* (Uncles *et al.*, 2003). This case study puts these nine factors to the test on the context of canteen usage. These nine factors may be put in the context of three lines of literature, namely attitude, revealed behavior, and intervening factors (Uncles, 1994) as summarized in Table 1.

Table 1: Nine factors affecting customer loyalty and its literary category

Factors affecting Customer Loyalty	Literary Classification		
	Attitude	Revealed Behavior	Intervening Factor
Service quality			✓
Customer satisfaction		✓	
Trust	✓		
Commitment	✓		
Switching cost		✓	
Corporate image			✓
Service recovery		✓	
Emotion	✓		
Commitment	✓	✓	

2.2 Customer Loyalty Literature

2.2.1 Attitude as an Aspect of Customer Loyalty

Attitude literature claims that there is an emotional element to loyalty. The customer has positive feeling towards the product, service or brand (Dick and Basu, 1994). Continued emotional commitment leads to attitude formation. In order for loyalty to exist, the customer must have attitudinal commitment (Day, 1969, Jacoby and Chestnut, 1978; Mellens *et al.*, 1996). As evidence of attitudinal commitment, customers generally are less susceptible to negative information.

Attitude is the mental outlook of a person towards some thing or someone (Perloff, 2016). It has been specifically defined as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly and Chaiken, 1998). It is sometimes referred to as a discrete emotion or arousal towards an object (Ajzen, 2001). Experience or knowledge from the past or present may form the basis for attitude. Studies of attitude in consumer behavior is common (Kahle, 2012; Minton and Kahle, 2014). Some studies suggest that one individual may hold more than one attitude towards the same object (Wood, 2000).

Attitude measurement model involves three components: cognitive, affective and behavior. Cognitive component refers to beliefs. Affective component refers to feelings. Behavior component refers to past behavior as an expression of attitude towards an object (Tang and Liu, 2012; Tang and Sutaro, 2013; Chen *et al.*, 2013). These elements had been modeled under *linear equation* (Krosnick *et al.*, 2005). Common measurement tool is the Likert scale (Buhmester *et al.*, 2011).

2.2.2 Revealed Behavior as an Aspect of Customer Loyalty

Revealed behavior literature looked to patterns of purchasing behavior over time as evidence of loyalty (Ehrenberg 1988; Fader and Hardie 1996; Kahn *et al.,* 1988; Massy, Montgomery and Morrison 1970). According to revealed behavior literature, motivation and emotional commitment are secondary. Evidence of past behavior research showed that there is no 100% loyalty; few customers are monogamous (Uncles *et al.*, 1994). Since there is no single brand loyalty, then loyalty is defined as a propensity to buy short listed brands for any given category of products (Ehrenberg and Scriven, 1999). This argument is supported by evidence that when a particular brand is out of stock, consumers would find a functionally equivalent substitute (East 1997; Ehrenberg *et al.,* 1997). The revealed behavior literature warned that true loyalty does not exist (Arnould *et al.*, 2002; Oliver, 1999).

2.3.3 Intervening Factor as an Aspect of Customer Loyalty

Intervening factor literature sees purchasing as a behavior; this behavior is manifested only after an attitude has been formed. However,

between attitude formation and behavior output, there may be an intervening factor that could moderate the behavior (Belk 1974, 1975; Blackwell *et al.* 1999; Fazio and Zanna 1981). These moderators may include individual characteristics and purchasing situation.

A moderator is a third factor that affects the relationship of X and Y. In this case study, Y is customer loyalty, X1 is *trust* and X2 is *emotional commitment*. The moderation represents a third factor that contributes to the level of response Y (Cohen *et al.*, 2003). The moderator may be categorical data, such as demographic factors: sex, education or ethnicity, or quantitative data, such as the scaled response to certain indicator. Moderation could be an interaction between the independent variable X and the underlying condition of X (Baron and Kennedy, 1986, p. 1174). The interaction between two independent variables may also serve as a moderator (Dawson, 2003). If significant interaction between independent variables serves as moderation, there might be a risk of omitted variable bias (Clarke, 2005; Greene, 1993). Modeling customer loyalty under the intervening factor may be accomplished by linear regression. The weakness of this modeling approach lies in the assumption that customer loyalty is linear. Since customer loyalty is a consequence of attitude and emotion, this assumption is faulty because attitude and emotion are not linear (Kahneman and Tversky, 1979).

Whether customer loyalty is analyzed on the basis of attitude, reveal behavior or intervening factor, all claims of customer loyalty must be supported by empirical evidence. Hypothesis testing through the use of a predictive model may represent an effective tool to verify which factors are significant determinants of customer loyalty. The three lines of literature summarize customer loyalty model as a result of three factors: antecedent past behavior, contingency factors and consequences of updated attitudes, intentions and actual purchase behavior (Uncles *et al.*, 2002, p. 9). Here lies the gap in the literature. The testing of x1 requires analysis of past behavior. The attempt to recollect past information introduces the risk of inaccurate recollection. Data for contingency factors and consequential elements may be obtained through survey where respondents may be asked

about hypothetical situations. This approach limited the modeling to linear equation and, thus, does not reflect the non-linear nature of psychometrics.

In this case study, we use the nine factors from the literature as the starting point: *service quality, customer satisfaction, trust, commitment, switching cost, corporate image, service recovery, emotion, and communication*. By asking consumers to respond to a proxy product sold at a given place and time, we intend to verify which among these nine factors significantly influence customer loyalty. A second research question we ask is whether customer loyalty could be measured by non-linear model? We explore logistic function as a possible alternative to linear equation.

3. Data and Methodology

The location for this case study is a food canteen at Bangkok University, City Campus. The canteen has about 25 to 30 individual food stalls. The canteen is used by students, teachers, and employees of the university. It is opened when the university is in session.

Survey collection was accomplished during the month of August 2017. The target population for the survey was students in the International College. The campus has both Thai and non-Thai students. Since the survey was written in English, only English speakers in the International College were targeted for the study. The English speaking population was about 500 students. Convenience sampling method was used because we selected only English speaking students for the study. To ensure uniformity in population, faculty members and other employees were excluded.

The dependent variable used was Y = customer loyalty. Independent variables include nine factors identified by the literature: x1 = service quality, x2 =customer satisfaction, x3 = trust, x4 = commitment, x5 = switching cost, x6 = corporate image, x7 = service recovery, x8 = emotion, and x9 = communication. These nine factors were identified by Uncles *et al.*, 2003. Respondents were asked to score the

level of importance for each variable in a scale of (0,1,2,3) where 0 – none, 1 = low, 2 = medium, and 3 = high.

3.1 Sample Size and Data Distribution

Using the survey response choice as the basis for Monte Carlo simulation to obtain the number of iterations (N), the minimum sample size is about 31.61 ± 2.33 (Table 2). This number is consistent with the literature advocating minimum sample size to be 30 (Smith and Wells, 2006) where the properties of the central limit theorem may be manifested (Agresti and Myn, 2003).

The Monte Carlo number of iterations may be determined by: $N = (3\sigma_w/E)^2$ where $E = ((\max–\min) / 2) \div 50$. The minimum sample size is obtained simply by: $n^* = 0.23(|\ln(N) \div Z_{nk}|)$, where N = Monte Carlo iterations, and Z_{nk} is the NK landscape simulation for optimization (Kaufman and Weinberger, 1989) obtained from: $Z_{nk} = (F(X)–0.50) \div \sqrt{1/12N}$. The term $(F(X)$ is the mean value of the cumulative distribution function (CDF) of $\ln(N)$ for each survey scale type. The minimum sample size calculation according to types of survey scales used is summarized in Table 2. In this case study, we met minimum sample size requirement by collecting 100 surveys.

Table 2: Minimum sample size according to the type of survey

Type of Scale Used in Survey	N Iterations in Monte-Carlo Simulation	Minimum Sample Size	
		Log-Monte-Carlo	$n = N^2\sigma^2/SE^2$
(0,1,2,3)	158,548	29.08	20.02
(1,2,3,4,5)	281,864	30.48	27.78
(1,2,3,4,5,6,7)	634,195	32.45	48.40
(1,2,3,4,5,6,7,8,9,10)	1,426,938	34.42	91.40
	Mean	31.61	46.90
	Standard deviation	2.33	31.99

3.2 Logistic Function and Its Test Statistic

The building of the predictive function for customer loyalty in this case study consists of two steps. In step 1, a multiple linear regression was obtained. Among the 9 independent variables, only two variables proved to be valid, namely trust (x_3) and emotion (x_8). In this first step, the multiple regression produces: $Y = 0.29 + 0.27x_1 + 0.56x_2$ where we substituted $x_3 = x_1$ and $x_8 = x_2$.

Table 3: Testing the significance of nine factors

Nine Variables	Significance*	Not Significance
Service quality		✓
Customer satisfaction		✓
Trust	✓	
Commitment		✓
Switching cost		✓
Corporate image		✓
Service recovery		✓
Emotion	✓	
Commitment		✓

* Significance level was tested at p ≤ 0.05 under GLM. Variables that passed the significance test were passed through the second stage in fitting into the logistic function.

In step 2, the linear model is used as a component for the logistic function to model customer loyalty. The logistic function is given as:

$$Y = A + \left(\frac{(K - A)}{(1 + Q\exp(-z))^{1/v}} \right)$$

where A = lower asymptote, K = upper asymptote, Q = intercept of the linear equation, $z = 0.29 + 0.27x_1 + 0.56x_2$, and v = value near the maximum asymptote.

In this case study, the survey has a scale of (0,1,2,3). The lowest asymptote is 0; thus, the term A is dropped from the predictive function. In the original logistic function, the term K is the upper asymptote, which is 3 in the scale. In this case, $\bar{Y} = 3$.

This modification allows us to minimize value inflation to achieve better fit in the predictive function. In the general case, the use of maximum likelihood of logistic function may be used (Czepiel, 2002).

4. Findings and Discussion

Among nine factors listed by the literature, our field survey of 100 users of university canteen shows that only two factors are significantly relevant; these factors are trust and emotional commitment. We explain that "trust" is a significant factor because the main subject matter of canteen usage has to do with food quality. Therefore, when it comes to food quality, such as taste and cleanliness, "trust" is important since it relates to health and wellbeing of canteen customers. As for the second factor: "emotional commitment", since expectation over food quality, taste, and health are sensitive issues. Positive or negative experience will affect customer's attitude towards the seller. Attitude is evident of emotional commitment. Thus, meeting or failure to meet these expectations may produce emotional experience for both customers and sellers.

4.1 General Findings

The literature listed the following variables as relevant factors for customer loyalty: *service quality, customer satisfaction, trust, commitment, switching cost, corporate image, service recovery, emotion, and communication*. Our survey of 100 customers at a canteen reveals that only two of these factors are significant: trust and emotional commitment. We disclaim that this finding is confined to this case study of canteen usage in a private university. As a case study produced by a survey of 100 canteen users at one time, we did not have the opportunity to do a follow up study and verify how loyalty is formed or changed over time.

With respect to our modeling, from the proposed predictive model under logistic function: $Y = A\ ((K - A) / (1 + Qe^{-bx})^{1/v}$, we found that the predictive function from the empirical data is:

$$Y_{loyalty} = \frac{3}{1 + 0.29\exp(-(0.27x_1 + 0.56x_2))^{1/3}}$$

The precision of the predictive function was evaluated by (i) residual mean and (ii) CDF of the residual. The residual mean is $\overline{R} = 0.04$ with a CDF of 0.50 ± 0.10. The threshold of the precision test is $\Phi(x) = 0.04.$ The result of the predictive function is within the range of 0.40 – 0.60 from the observed value of 0.50 ± 0.10. This finding may be compared with the value under the linear regression. Under the linear model, the residual's CDF is 0.01 ± 0.74 or a precision of less than 1%. This finding implies that linear regression is not an accurate tool for predicting evaluative judgment or expression of intent, such as loyalty. The use of the logistic function in this case is consistent with Kahneman-Tvertsky's approach to modeling evaluative judgment under the prospect theory (Kahneman and Tvertsky, 1967, p. 263).

Table 4: Data distribution test to verify accuracy of model

Description	Mean ± S	PDF	CDF	Precision Test
Raw Data	1.64 ± 0.76	0.13 ± 0.01	0.50 ± 0.10	86.70%
Predicted	1.65 ± 0.03	9.01 ± 20.11	0.60 ± 0.47	99.99%
Residual	0.01 ± 0.74	0.13 ± 0.01	0.50 ± 0.10	86.70%

The predictive function that we obtained under logistic modeling: $Y_{loyalty} = 3 / \left(1 + 0.29\ \exp(-(0.27x_1 + 0.56x_2))\right)^{1/3}$ explains the intensity and role played by trust and emotional commitment in customer loyalty. Prior literature shows that trust and emotional commitment could be measured. This case study illustrates that measurement through out empirical data. Table 5 below provides a comparison between linear and logistic function on the basis of the coefficient of determination.

Table 5: Models comparison

Model Selection	Coefficient of Determination:
Linear Regression: $Y_{loyalty} = 0.29 + 0.27X_1 + 0.56X_2$ X1 = trust X2 = emotional commitment	$F = MSR \div MSE = 40.33$ $R^2 = SSR \div SST = 0.65$
Logistic Function: $Y_{loyalty} = \frac{3}{1+\exp(-(0.29+0.27X_1+0.56X_2))}$	$R^2_{McF} = 1 - \left(\frac{\ln(L_m)}{\ln(L_0)}\right) = 0.77$

4.1.1 Trust in Customer Loyalty

One factor that significantly contributed to customer loyalty was trust. Trust is defined as reliance of action towards the future (Mayer, 1995). Trust may be categorized into three levels: macro, micro and meso (Khosrowjerdi, 2016). Trust has been a research subject in economics. Trust allows economic cooperation among people (Morgan and Hunt, 1994; Zheng *et al.*, 2008). Social trust benefits the economy (Zak and Knack, 2001). It has been shown that trust positively correlates with increase profit (Resnick, 2006).

In this case study, we found that trust is a significant factor for customer loyalty in canteen usage. This finding is consistent with prior literature. However, unlike prior literature which studied trust under binary choice, such as in trust game (Cramer and Weight, 1998), gift exchange game (Fehr *et al.*, 1993) or game theory (Nash, 1951), our survey asked customers to subjectively evaluate their trust on the food's taste, quality and cleanliness by scoring on (0,1,2,3) scale based on past experience. Unlike prior economic models using probability to infer trust, we scored trust on a quantitative scale and then determined their probability in order to have it fit in a model.

Our finding shows that trust contributes positively by a factor of 0.27 to the overall customer loyalty. Despite people's general perception low quality of canteen

food, our survey shows that there is a factor of 0.27 points in consumer confidence towards canteen food. As a single factor, the contribution of trust to customer loyalty is: $Y = 0.77 + 0.54X_{trust}$ with significance and efficient of determination of $T = 5.32$ and $R^2 = 0.39$. In order to produce customer loyalty, trust works with another factor: *emotional commitment*.

4.1.2 Emotion in Customer Loyalty

A second factor that significantly contributed to customer loyalty is emotional commitment. Emotion is the experience of mental intensity in a form of pleasure or displeasure (Cabanac, 2002; Daniel, 2011). It serves as a driving force for motivation (Gaulin and McBarney, 2003). Prior research show that the following factors are relevant to emotion: cognitive appraisal, bodily symptoms, action tendencies, expression, and feelings (Sherer, 2005). Emotion may be categorized (Ekman and Friesen, 1969) and measured (Ekman, 1972, 1999). Quantitative study of emotion is called "affective computing" (Tao and Tan, 2005; William, 1884) using spatial domain method or simple survey with Likert scale. In this case study, we employed simple survey; however, instead of using Likert scale, we opted for non-Likert scale.

Our finding shows that emotional commitment to a product contributes 0.56 points to customer loyalty. The contribution of this factor is larger than that found in trust or confidence. As a single factor, the contribution of trust to customer loyalty is: with significance and efficient of determination of $T = 7.82$ and $R^2 = 0.58$.

5. Conclusion

Customer loyalty literature identified nine factors that are relevant to customer loyalty measurement. These nine factors are: service quality, customer satisfaction, trust, commitment, switching cost, corporate image, service recovery, emotion, and communication. The literature categorizes customer loyalty measurement into three approaches by looking at attitude, revealed behavior and intervening factors. In this case study, we mapped the nine factors into these three lines of literature and tested for their significance. We found that only trust and

emotional commitment are relevant to customer loyalty. These two factors were used in the logistic function to predict customer loyalty. Using the coefficient of determination as the indicator for the model's explanatory power, the logistic function could explain 77% (R-squared = 0.77) of the data while linear modeling could explain only 65% (R-squared = 0.65) of the data. The logistic modeling is more robust. This study is limited to the measuring of customer loyalty towards food products in a canteen. Therefore, we could not generalize our findings to other contexts and for different products. Nevertheless, this is one of few and early attempts to model customer loyalty by using logistic function. This attempt to avoid the linear regression modeling is consistent with the literature identifying consumer preferences as nonlinear. Among the nine factors identified by the literature, which factor may be appropriate for linear or non-linear modeling?

References

Agresti, Alan and Min, Yongyi. (2002). "On Sample Size Guidelines for Teachin Inference about the Binomial Parameter in Introductory Statistics." http://www.stat.ufl.edu/~aa/articles/ci_proportion.pdf

Ajzen, Icek. (2001). "Nature and Operation of Attitudes." *Annual Review of Psychology*, **52**: 27–58. doi:10.1146/annurev.psych.52.1.27. https://doi.org/10.1146%2Fannurev.psych.52.1.27

Arnould, E. J., Price, L. L. and Zinkhan, G. M. (2002). Consumers, McGraw-Hill, New York, NY.

Baron, R. M., and Kenny, D. A. (1986). "The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations." *Journal of Personality and Social Psychology*, **5**(6), 1173–1182 (page 1174).

Belk, R. W. (1974). "An exploratory assessment of situational effects in buyer behavior", Journal of Marketing Research, Vol. 11, May, pp. 156-63.

Blackwell, S. A., Szeinbach, S. L., Barnes, J. H., Garner, D. W. and Bush, V. (1999). "The antecedents of customer loyalty: an empirical investigation of the role of personal and situational aspects on repurchase decisions", Journal of Services Research, Vol. 1 No. 4.

Cabanac, Michel (2002). "What is emotion?" *Behavioural Processes* **60**(2): 69-83.

Camerer, C., and Weigelt, K. (1988). "Experimental Tests of a Sequential Equilibrium Reputation Model." *Econometrica*, **56**(1), pp. 1-36.

Chen, J. Q., Tang, T. L. P., Tang, N. Y. (2013). "Temptation, monetary intelligence (love of money), and environmental context on unethical intentions and cheating." *Journal of Business Ethics*, **123**: 197–219. doi:10.1007/s10551-013-1783-2.

Cohen, Jacob; Cohen, Patricia; Leona S. Aiken; West, Stephen H. (2003). Applied multiple regression/correlation analysis for the behavioral sciences. Hillsdale, N.J: L. Erlbaum Associates. ISBN 0-8058-2223-2.

Clarke, Kevin A. (2005). "The Phantom Menace: Omitted Variable Bias in Econometric Research." *Conflict Management and Peace Science*. **22**: 341–352. doi:10.1080/07388940500339183.

Czepiel, Scott A. (2002). "Maximum Likelihood Estimation of Logistic Regression Models: Theory and Implementation." Pp. 10. https://czep.net/stat/mlelr.pdf

Dawson, J. F. (2013). Moderation in management research: What, why, when and how. *Journal of Business and Psychology*. DOI: 10.1007/s10869-013-9308-7.

Daniel L. (2011). Psychology Second Edition. 41 Madison Avenue, New York, NY 10010: Worth Publishers. p. 310. ISBN 978-1-4292-3719-2.

Day, G. S. (1969). "A two-dimensional concept of brand loyalty", Journal of Advertising Research, Vol. 9, pp. 29-35.

Dick, A. S. and Basu, K. (1994). "Customer loyalty: toward an integrated conceptual framework", Journal of the Academy of Marketing Science, Vol. 22 No. 2, pp. 99-113.

Eagly, Alice H., and Shelly Chaiken. 1998. "Attitude, Structure and Function." In Handbook of Social Psychology, ed. D.T. Gilbert, Susan T. Fisk, and G. Lindsey, 269–322. New York: McGowan-Hill.

East, R. (1997). Consumer Behaviour: Advances and Applications in Marketing, Prentice-Hall, London.

Ekman, P. & Friesen, W. V. (1969). "The repertoire of nonverbal behavior: Categories, origins, usage, and coding." *Semiotica*, **1**, 49–98.

Ekman, Paul. (1972). Cole, J., ed. Universals and Cultural Differences in Facial Expression of Emotion. Nebraska Symposium on Motivation. Lincoln, Nebraska: University of Nebraska Press. pp. 207–283.

Ekman, Paul. (1999). "Basic Emotions." In Dalgleish, T; Power, M. Handbook of Cognition and Emotion (PDF). Sussex, UK: John Wiley & Sons. Archived from the original (PDF) on 2010-12-28.

Ehrenberg, A. S. C. and Scriven, J. A. (1999). "Brand loyalty", in Earl, P.E. and Kemp, S. (Eds), The Elgar Companion to Consumer Research and Economic Psychology, Edward Elgar, Cheltenham, pp. 53-63.

Ehrenberg, A. S. C., Barnard, N. R. and Scriven, J. A. (1997). "Differentiation or salience", Journal of Advertising Research, Vol. 37 No. 6, pp. 7-14.

Ehrenberg, A. S. C. (1988). Repeat-Buying: Facts, Theory and Application, Oxford University Press, New York, NY, Griffin, London.

Fader, P. S. and Hardie, B. (1996). "Modeling consumer choice among SKUs", Journal of Marketing Research, Vol. 33, November, pp. 442-52.

Fazio, R. H. and Zanna, M. P. (1981). "Direct experience and attitude behavior consistency", Advances in Experimental Social Psychology, Vol. 14, pp. 161-202.

Fehr, E., Kirchsteiger, G., and Riedl, A. (1993). "Does Fairness Prevent Market Clearing? An Experimental Investigation." *Quarterly J. of Economics*, **108**, (May), pp. 437-60.

Gaulin, Steven J. C. and Donald H. McBurney. (2003). Evolutionary Psychology. Prentice Hall. ISBN 978-0-13-111529-3, Chapter 6, p 121-142.

Greene, W. H. (1993). Econometric Analysis (2nd ed.). Macmillan. pp. 245–246.

Gremler, D. D. and Brown, S.W. (1999). "The loyalty ripple effect: appreciating the full value of customers", International Journal of Service Industry Management, Vol. 10 No. 3, pp. 271-93.

Jacoby, J. and Chestnut, R. (1978). Brand Loyalty Measurement and Management, John Wiley & Sons, New York, NY.

Kahn, B. M., Kalwani, M. U. and Morrison, D. G. (1988). "Niching versus change-of-pace brands: using purchase frequencies and penetration rates to infer brand positionings", Journal of Marketing Research, Vol. 25 No. 4, pp. 384-90.

Kahneman, D. and Tversky, A. (1967). "Judgment under Uncertainty: Heuristics and Biases." *Science, New Series*, Vol. 185, No. 4157. (Sep. 27, 1974), pp. 1124-1131. http://psiexp.ss.uci.edu/research/teaching/Tversky_Kahneman_1974.pdf

Kahneman, Daniel; Tversky, Amos. (1979). "Prospect Theory: An Analysis of Decision under Risk." *Econometrica*, **47**(2): 263. ISSN 0012-9682. doi:10.2307/1914185.

Kalakota, R. and Robinson, M. (1999). e-Business, Addison-Wesley, Reading, MA.

Krosnick, J. A., Judd, C. M., and Wittenbrink, B. (2005). Measurement of Attitudes.pdf The measurement of attitudes. In D. Albarracín, B. T. Johnson, & M. P. Zanna (Eds.), The handbook of attitudes (pp. 21–76). Mahwah, NJ: Lawrence Erlbaum Associates.

Mayer, R. C., Davis J. H., Schoorman F. D. (1995). "An integrative model of organizational trust." *Academy of Management Review*, **20**(3), 709-734.

Mellens, M., Dekimpe, M. G. and. Steenkamp, J.-B.E.B. (1996). "A review of brand-loyalty measures in marketing", Tijdschrift voor Economie en Management, Vol. 41 No. 4, pp. 507-33.

Minton, E. A. and Khale, Lynn R. (2014). Belief Systems, Religion, and Behavioral Economics. New York: Business Expert Press LLC. ISBN 978-1-60649-704-3.

Morgan, Robert; Hunt, S. (July 1994). "The Commitment-Trust Theory of Relationship Marketing." *The Journal of Marketing*, **58**(3): 20–38. doi:10.2307/1252308.

Nash, John. (1951). "Non-Cooperative Games." *The Annals of Mathematics* **54**(2): 286-295.

Oliver, R. L. (1997). Satisfaction: A Behavioral Perspective on the Consumer, Irwin/ McGraw-Hill, New York, NY; p. 392.

Oliver, R. L. (1999). "Whence customer loyalty", Journal of Marketing, Vol. 63, pp. 33-44.

Peppers, D. and Rogers, M. (1997). Enterprise One to One: Tools for Competing in the Interactive Age, Currency Doubleday, New York, NY.

Perloff, Richard M. (2016). The Dynamics of Persuasion: Communication and Attitudes in the Twenty-First Century, Routledge. https://books.google.co.th/books?id=K4m_DQAAQBAJ&pg=PT176&redir_esc=y#v=onepage&q&f=false

Resnick, P. (2006). "The value of reputation on eBay: a controlled experiment." *Experimental Economics*, **9**(2), Jun 2006; pp. 79-101.

Scherer, K. R. (2005). "What are emotions? And how can they be measured?" *Social Science Information*, **44** (4): 693–727. doi:10.1177/0539018405058216.

Smith, Zachary R. and Wells , Craig S. (2006). "Central Limit Theorem and Sample Size." Case study presented at the annual meeting of the Northeastern Educational Research Association, Kerhonkson, New York, October 18-20, 2006.

Tang, T. L. P.; Liu, H. (2012). "Love of money and unethical behavior intention: Does an authentic supervisor's personal integrity and character (ASPIRE) make a difference?" *Journal of Business Ethics*, **107**(3): 295–312. doi:10.1007/s10551-011-1040-5.

Tang, T. L. P.; Sutarso, T. (2013). "Falling or not falling into temptation? Multiple faces of temptation, monetary intelligence, and unethical intentions across gender." *Journal of Business Ethics*, **116**(3): 529–552. doi:10.1007/s10551-012-1475-3.

Tao, Jianhua; Tieniu Tan. (2005). "Affective Computing: A Review." Affective Computing and Intelligent Interaction. LNCS 3784. Springer. pp. 981–995. doi:10.1007/11573548.

Uncles, M. D., Hammond, K., Ehrenberg, A. S. C. and Davis, R. E. (1994). "A replication study of two brand-loyalty measures", European Journal of Operational Research, Vol. 76 No. 2, pp. 375-84.

Uncles, Mark D.; Dowling, Grahame R.; and Hammond, Kathy. (2003). "Customer loyalty and customer loyalty programs." *Journal of Consumer Marketing*, **20**: 4, pp.294-316, https://doi.org/10.1108/07363760310483676 http://www.emeraldinsight.com/doi/full/10.1108/07363760310483676

Wood, W. (2000). "Attitude Change: Persuasion and Social Influence." *Annual Review of Psychology*, **51**: 539–570.

PMID 10751980. doi:10.1146/annurev.psych.51.1.539.

Zak, P. J., and Knack, S. (2001). "Trust and growth." *Economic Journal*, **111**: 295-321.

Zheng, J. Roehrich, J. K. and Lewis, M. A. (2008). "The dynamics of contractual and relational governance: Evidence from long-term public-private procurement arrangements." *Journal of Purchasing and Supply Management*, **14**(1): 43-54. http://www.scopus.com/record/display.url?eid=2-s2.0-41049112855&origin=inward&txGid=yXIvJQ7AsPq0YyDQfJmJLCa%3a2

APPENDIX 1
CASE TEACHING NOTE

(1) What is the problem in determining relevant factors for customer loyalty? What is the value for customer loyalty research?

(a) Are the nine factors influencing customer loyalty adequate for today's business environment?

(b) Do different types of businesses, customer segment, or types of product and services require different explanatory factors for customer loyalty?

(c) How much business opportunity can customer loyalty bring to the business establishment?

(d) How important is it to differentiate brand loyalty from customer loyalty?

(e) What are possible effective tools for customer loyalty measurement and modeling?

(2) How can we effectively measure and determine the predictive model for customer loyalty?

(a) How does the inadequacy in linear modeling for non-linear data, such as the case of measuring customer loyalty, present opportunities in marketing research?

(b) Most attitude studies used the Likert scale (1,2,3,4,5), what is the advantages or disadvantages of the Likert scale compared to the non-Likert scale in a form of (0,1,2,3)?

(c) How much weight should be given to the following aspects of the explanatory factors in the study of customer loyalty: attitude, revealed behavior, and intervening factor?

(d) What are the advantages and disadvantages of (i) quantitative method, and (ii) qualitative method in the study of customer loyalty?

(e) What is an effective means to track the development and changes of customer loyalty over time?

(3) Evaluate the strength and weakness of the following types of customer loyalty model.

(a) Model 1: *Factor Analysis*

Customer loyalty has nine variables: *service quality, customer satisfaction, trust, commitment, switching cost, corporate image, service recovery, emotion, and communication.*

(b) Model 2: *Six Steps of Customer Loyalty*

Customer loyalty is developed in 6 stages. First, the customer comes to the company as a prospect, not yet a customer. Second, the prospective makes the purchase and, thus, becomes a customer. Third, the customer makes a repeated purchase and, thus, becomes a client. Fourth, the repeated customer becomes a passive supporter. Fifth, repeated association or repurchasing with the firm has transformed the supporter into an advocate where the support of the firm by the customer is more active. Sixth, the supporter becomes a partner of the firm and, thus, achieved a status of loyal customer.

(c) Model 3: *Four Stages of Customer Loyalty*

Under this model, there are four stages of customer loyalty development. Cognitive loyalty, affective loyalty, conative loyalty, and action loyalty.

First, cognitive loyalty is developed through customers responding to the firm's price discount and better offers. The offering of the firm creates the awareness in the customers and the customer responded by being attracted to the firm. At this stage, the relationship is classified as give-and-take.

Second, the customer develops the emotion bond with the brand or firm in responses to offering of benefits; however, absence of beneficial offering, at this stage the customer would not be loyal to the firm or its products. The characteristic of the customer at this stage is still a fence sitter, i.e. wait and see.

Third, customer's experience with the firm reaches highest level or frequency of recall for a particular type of produce or service. At this stage, the customer

becomes a promoter for the product or brand and influences other people to buy from the same brand or firm. The customer at this stage is classified as promoter, even without initial stimulus.

Fourth, at the last stage of customer loyalty, the customer becomes an advocate of the product or the firm. Price discount is not a motivating factor for the purchase. The customer makes repeated purchase on the basis of the trustworthiness of the brand of the product.

(a) Model 4: 2-by-2 Customer Lyalty Measurement Framework

There are two main types of loyalty: (i) emotional loyalty, and (ii) behavioral loyalty. These two types of loyalty may be measured by objective and subjective approaches.

	LOYALTY TYPES	
	Emotional	**Behavioral**
OBJECTIVE Measurement Approach	*Advocacy* Number of new customers	*Retention* -Churn rates -Renewal rates *Purchasing* -Usage metrics -Sales records

	LOYALTY TYPES	
	Emotional	**Behavioral**
SUBJECTIVE Survey Questions	*Advocacy* -Overall satisfaction -Recommendation -Purchase -Trust -Willing to forgive	*Retention* -Renew purchase -Leave *Purchasing* -Buy additional products -Expand usage

(4) What business value of customer loyalty?

(a) How can a firm determine the value of the good will generated through customer loyalty?

(b) How does customer loyalty relate to other "good will" factors in a firm, i.e. good governance, customer relationship management (CRM), or public relations?

(c) Under what functional unit should customer loyalty efforts be put in the firm's organizational structure? Should customer loyalty be an independent function in a firm?

(d) Should firms re-invest in loyal customers through rewards system, discount, etc. or should investment in loyalty be aimed at new customers with an eye towards expanding the over all customer base?

(e) What are the logistical and operational values of customer loyalty to firm?

(5) How can firms use social media channels, such as Facebook, LINE, Instagram, Twitter, etc. for customer loyalty development?