Customer Lifetime Value and Customer Equity of the Machine Tool Industry in Vietnam

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Abstract

Predicting customer in current and future can help the managers make more initiatives to enhance company growth plan. Many literatures display many frameworks can predict customer lifetime value, in this paper, we applied Rust's customer lifetime value and customer equity model to calculate. The purpose of this paper is to explore the effects of service quality, product quality on customer satisfaction and predict the probability rate of customer repurchasing, customer retention, calculate customer lifetime value and customer equity. The structure of framework is evaluated from questionnaire data of machine tool company in Vietnam and calculated it for showing which elements can influence on customer equity. The results established significantly associated with two dimensions of customer satisfaction: product quality and service quality what elements influence on customer equity. Finally, this paper provided the suggestions to machine tool company how to allocate their marketing budget to each customer according to customer lifetime value.

Key Words: Machine Tool, Customer Lifetime Value, Customer Equity.

Introduction

Machine tool industry in Vietnam

Today the machine tool market in Vietnam which is using an older model with poor quality and service than other countries in the world. In the next decade, Vietnam economy will become one of the fastest economies with many trade agreement like Europe, America, ASEAN, and the large budget has been investing from Korea, Japan, Taiwan, and Europe. For that reason, the machine tool market needs an upgrade and new model machine for doing business with the demand increase every day. This paper shows the framework for helping the company examine and calculate their customer lifetime value and customer equity for allocating a marketing budget to each customer. Now, there is a rise in demand from outsourcing for high-quality manufacturing tools and solutions, which can help local companies increase their productivity and reduce costs (ACN Newswire; Singapore, 13 April 2015). For the aforementioned reason, the machine tool market has been transforming and extending new model machine tools with a high quality of product and service.

Machine tool

Machine tools are the power-driven machines which cut and/or press metal into the desired forms. There are over two hundred types, each manufactured in a variety of sizes with different work or tool-holding attachments. The major groups of machine tools are the drilling and boring machines, grinding machines, turning machines (including lathes), milling machines, planers and presses (including shears), and forging machines. Traditional machine tools are machining centers, including the lathe, drilling, grinding, milling, press, and bending machines (Kumar, 2003). In today's world of emerged technology, the computer numerical control (CNC) machine tool plays an important role that completes the production tasks to achieve the targeted goals of the organization. A CNC machine is considered as cost-effective equipment that can be used to perform repetitious, difficult, and unsafe manufacturing tasks with a high degree of accuracy, not only in increased production and delivery, but also in improved product quality, increased product flexibility, and enhanced overall productivity (Athawale and Chakraborty, 2010).

Many studies researched about customer lifetime value and customer equity (Berger and Nasr, 1998; Rust, Lemon, and Zeithaml, 2004; Pfeifer, Haskins and Conroy, 2005) but the previous researchers rarely experimented in Machine tool market. The purpose of this paper is to find what the factors are useful in customer equity in Vietnam's machine tools market through a framework that was demonstrated by Rust, Lemon, and Zeithaml (2004). In the context of the research field, the researchers rarely used the machine tool market for their experiments. In a recent trend, the studies have focused on a long-term value rather than a short-term customer. The marketing manager can calculate their customer lifetime value, customer equity and predict marketing budget for future profit.

Literature Review

Customer satisfaction is evaluated through the response of their needs and expectations in product or service (Bitner and Zeithaml, 2003). As for the relationship of price to satisfaction, Zeithaml, and Bitner, (1996), indicated that the extent of satisfaction was subject to the factors of service quality, product quality, price, situation, and personal factors. However, the price has not, as yet, been fully investigated in previous empirical studies (Bei and Chiao, 2001).

Service quality

Service quality is defined as the difference between the customer service expectations and the actual performance (Parasuraman, Zeithaml and Berry, 1985; Parasuraman, Zeithaml and Berry, 1988; Lehtinen and Lehtinen, 1991; McDonald, Sutton and Milne, 1995). The SERVQUAL scale is a 22-item scale which is measured in five components: assurance, empathy, reliability, responsiveness, and tangibles (Parasuraman et al., 1988). SERVQUAL has already demonstrated its usage in many service industries (Zeithaml et al., 2006).

The service quality and customer satisfaction were highly related to that what was found by Sureshchandar et al., (2002). The service quality is also an important antecedent of customer satisfaction (Ladhari 2009; Dahiyat et al., 2011; Same et al., 2013). Lee, Lee, and Yoo, (2000), suggested that service quality and customer satisfaction had a positive effect in the multi-industry.

Product quality

Garvin (1984, 1987) proposed the eight dimensions to identify product quality: performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived. Garvin (1984) also suggested a company can position itself in the marketplace by influencing or varying any one, or more, of these eight

dimensions of quality. Each dimension can be ranked high on one dimension and low on another for the achieved company purpose.

Didier (2003) found that the ability of product quality was positive to satisfy the customer's requirements. These suggested that maintaining good product quality will provide satisfaction to customers, and further generate customer loyalty (Chumpitaz and Paparoidamis, 2004; Kotler et al., 2005). Perceived product quality seems to play an important role in consumer satisfaction (Tsiotsou, 2006).

Customer Satisfaction, Customer Retention

Satisfied customers are less price-sensitive, purchase the product more frequently, and in larger volume than non-satisfied customers, and are more likely to purchase other products offered by the firm (Reichheld and Sasser, 1990; Bolton et al., 2008). Satisfaction has been known as a key determinant in the customers' decisions to continue or terminate a business relationship (e.g., Bolton 1998; Rust, Zahorik, and Keiningham 1995). Reichheld (1996), indicated that the satisfaction effect on models of customer retention was up to 40% of the variance. High levels of customer satisfaction generally are considered essential to customer retention. Kotler (2003) concludes that the higher the customer satisfaction, the higher the retention.

Customer Lifetime Value

Kofler (1974) defined customer lifetime value as the present value of the future profit stream expected over a given time horizon of customer transactions. Customer lifetime value is evaluated as the long-term value of customers with the company (Wu, Liu & Li, 2005). Pfeifer, Haskins & Conroy (2005), defined customer lifetime value as the present value of the future cash flows associated with a customer.

The customer lifetime value framework measures how changes in customer behavior (e.g., increased purchase, retention) could influence on customers' future profits, or their profitability to the firm (Zhang et al., 2010), or by their making a bridge between marketing and finance. Berger and Nasr (1998) argued better retention leads to increased customer lifetime value and customer equity (Blattberg and Deighton, 1996).

Customer Equity

Customer equity has been defined by Blattberg and Deighton (1996) as, "the measure of each customer's expected contribution toward offsetting the company's fixed costs over the expected lack of that customer." Customer equity has become one of the key marketing objectives of today's business organizations due to its ability to assess individual customers and customer segments from a value perspective (Rust et al., 2000). Customer equity is a combination of the value of a firm's current and potential customer assets (Hogan, Lehmann, Merino, Srivastava, Thomas and Verhoaf, 2002). This includes the value of a firm's entire customer base or the aggregation of an individual customer's lifetime values (Bruhn, Georgi, and Hadwich, 2008). In point of fact, it is viewed as the basis for a new strategic framework to build more powerful and customer-centric marketing programs that are financially accountable and measurable (Lemon et al., 2001).

The long-term value of a firm is largely determined by the value of their customer relationships, which result in the firm's customer equity (Aravindakshan et al., 2004). The concepts of customer lifetime value and customer equity are related and sometimes are considered equivalent in the literature. While there is a general agreement on the definition of the first, there are different definitions of customer equity. For some authors, customer equity is the average customer lifetime value less the acquisition cost (Berger and Nasr, 1998; Blattberg and Deighton, 1996; Blattberg et al., 2001). In particular, Berger and Nasr (2001) explained that the difference between customer equity and customer lifetime value is that customer equity

takes the acquisition cost into consideration. Rust, Lemon and Zeithaml (2004) defined customer equity as the total of the discounted lifetime values summed up over all of the firm's current and potential customers.

Methodology

The authors used the customer equity concept model and applied it to the machine tools market in Vietnam. This can help the marketing manager predict the return on marketing, and improve the marketing decisions for their product and service in the Vietnam machine tools market. The modeling of the customer lifetime value requires additional modeling of the switching matrix for each individual customer. The authors model each customer's switching matrix and then estimate the model parameters that will enable the modeling of the customer lifetime value at the individual customer level (Rust, Lemon and Zeithaml, 2004).

The Switching Matrix and Customer Lifetime Value

The authors proposed the Markov chain switching matrix approach to model customer retention, customer lifetime value, and the probability of repurchase. Markov chain model has been used for modeling the probability of repurchase customer in many articles (Pfeifer and Carraway, 2000; Rust, Zeithaml, and Lemon, 2004). This probability is widely used in Customer Lifetime Value models which include retention probabilities for all brands and models the customer's probability of switching from any brand to any other brand (Rust et al., 2004).

Using Markov chain method, the authors calculate the probability of customer i buys brand j in purchase t. In the example, the customer recently purchased from Brand A and the probability of customer purchasing Brand A in the next purchase is 0.6, the probability of purchasing Brand B is 0.4. So the probability of purchasing Brand A is (0.6×0.6 + 0.4×0.5)=0.56 and Brand B is (0.6×0.4 + 0.4×0.5)=0.44. We can simply calculate the probabilities of purchase for Brand A and Brand B as many purchases by the switching matrix.

The utility formulation can be conceptualized as:

$$U_{ijk} = \beta_{0k}\, LAST_{ijk} + X_{ik}\, \beta_{1k} + \varepsilon_{ijk}$$

U_{ijk}:   the utility of brand k to individual i, who most recently purchased brand j

$LAST_{ijk}$: is equal to one if j = k and is equal to zero otherwise

X_{ik}:   row vector of drivers

β_{0k}:   logit regression coefficient corresponding to inertia

β_{1k}:   column vector of logit regression coefficients corresponding to the drivers

ε_{ijk}:   random error term that is assumed to have an extreme value (double exponential) distribution, as is standard in logit models.

The Customer Lifetime Value is calculated by the formula:

$$CLV_{ijk} = \sum_{t=0}^{T_{ij}} (1 + d_j)^{-t/f_i\, V_{ijt}\pi_{ijt}B_{ijt}}$$

T_{ij} :   the number of purchases customer i is expected to make before firm j's time horizon

d_j: represents firm j's discount rate

f_i :   the passenger's average purchase rate of passenger

v_{ijt}:   customer's expected purchase volume in a purchase of brand j in purchase t

π_{ijt} :   the expected contribution margin per unit of firm j from customer i in purchase t

B_{ijt} :   the probability that customer i buys brand j in purchase t

Customer Equity can be estimated from a representative sample of the customers in the market (Rust et al. 2004).

$$CE_j = mean_i \, (CLV_{ij}) \times POP$$

Mean (CLV) is firm j's average lifetime value for customers i across the sample, and POP is the total number of customer in the market.

The probability of customer repurchase

Using the resulting factors as independent variables, the authors tested Parameter estimates analysis for predicting the probability of customer will repurchase in the future.

$$Y_p = \beta_1 F_1 + \beta_2 F_2 + \beta_3 F_3 + \ldots + \beta_n F_n$$

Y_p: The probability of repurchase customer in the future
F_n: Factor loadings
β_n: The score of Factor loadings

Data and Sampling

The authors distributed 156 questionnaires in Vietnam and 129 customers completed. The total of 129 respondents was 123 male and 6 female. Then we used Statistica version 10 software and MS-Excel spreadsheet program for testing the data. The researcher used two part of questionnaires. Firstly, we collect the opinions of the important survey in the machine tool market in the Vietnam. Secondly, we provided satisfied scale to the customer for researching.

Results

Factor analysis

According to Rust, Lemon, and Zeithaml (2004), the authors applied factor loadings greater than 0.50 to complete loading on the factor. Kaiser (1960) proposed the 1.0 eigenvalue cutoff is typically employed in marketing. Nunnally (1978) argued that instruments used in basic research should have the reliability of .70 or better. The minimum Cronbach's alpha value generally accepted for newly developed scales is 0.60. Table 1 shows the loading on the rotated factors, we have identified six factors with eigenvalues cutoff which are over 1.0. Cronbach's alpha in Factor 6 was the lowest at 0.647 and others were over 0.70.

Table1: Factor analysis results

	F1	F2	F3	F4	F5	F6
The service is reliable in terms of handling faults.	**0.729**	0.147	0.195	-0.006	0.244	0.146
When you have a problem, the service employees show a sincere interest in solving it.	**0.575**	-0.240	-0.015	0.254	-0.042	-0.108
The service engineers consistently treat you in a courteous manner.	**0.618**	0.098	-0.093	0.275	0.143	0.275
The service engineers give their full attention to your service needs.	**0.680**	0.100	0.123	-0.010	0.076	0.368
The service makes use of modern equipment in repairing.	0.221	**0.786**	0.117	0.006	0.109	0.001
The service engineers appear neat and well dressed.	-0.130	**0.833**	0.012	-0.058	0.075	0.102
Performance of machine tools is important.	0.021	0.226	**0.680**	0.081	-0.074	0.170
The machine tool product needs durability.	0.273	0.065	**0.696**	0.202	0.179	-0.040
Product should operate properly over a specified period of time under stated conditions of use.	0.334	0.189	**0.600**	0.313	0.051	0.178
The seller provides additional components.	-0.076	-0.233	**0.690**	-0.112	0.175	0.132
Product's design and operating characteristics meet established standards.	0.038	-0.185	0.046	**0.796**	0.137	0.153
The product is more quite noise.	0.037	0.199	0.159	**0.820**	0.016	0.090
The machine tool product has many features.	0.198	0.096	0.177	0.173	**0.787**	0.052
The product has the same functions with my product I used.	-0.024	0.109	0.111	-0.088	**0.845**	0.038
The employees understand your specific needs.	0.449	-0.002	0.142	-0.176	-0.075	**0.608**
The employees are always willing to help customers.	-0.041	0.071	0.074	0.321	0.053	**0.760**
The scheduled service response date met your needs.	0.136	-0.017	0.226	0.134	0.165	**0.722**
Expl. Var	**2.559**	**1.840**	**2.374**	**1.988**	**1.754**	**1.898**
Eigenvalue	**4.702**	**1.837**	**1.663**	**1.587**	**1.407**	**1.218**
Cronbach's alpha	**0.718**	**0.705**	**0.708**	**0.705**	**0.705**	**0.647**
Standardized alpha	**0.711**	**0.706**	**0.720**	**0.709**	**0.705**	**0.649**

Note: Loadings greater than .5 are shown in bold. F1: Service quality, F2: Service engineer performance, F3: Product quality, F4: Product design, F5: Product function, F6: Employee service.

This study was using six factors for calculated the satisfaction analysis and combined the probability scale (0-100%) data that the customer would repurchase products in the future. And then this study found the probability of repurchase customer decision in the future in Table 2. This approach is a convenience when marketing managers want to formulate the future customer purchase decisions.

Table 2: The probability of repurchase customer

	Estimate	Standard Error	Wald Stat.	p
F1	**0.150**	**0.018**	**66.667**	**0.000**
F2	0.006	0.022	0.066	0.797
F3	**0.122**	**0.019**	**41.989**	**0.000**
F4	0.012	0.020	0.353	0.553
F5	**0.043**	**0.018**	**5.789**	**0.016**
F6	**0.102**	**0.025**	**16.920**	**0.000**
Scale	17.275	1.076		

Note: p < .05.

The authors calculated the probability of repurchase customer by the formula:

$$Y_p = 0.150F_1 + 0.006F_2 + 0.122F_3 + 0.012F_4 + 0.043F_5 + 0.102F_6$$

Four factors were F1, F3, F5, F6 showed the good results with the p-value under 0.05. However, Factor 2 ($\beta_2 = 0.006$, $p = 0.797$) and Factor 4 ($\beta_4 = 0.012$, $p = 0.553$) have not effect on the probability of repurchase customer. This results indicated four factors positively impacts on the probability of repurchase customer in the future.

Customer Lifetime Value and Customer Equity

The authors calculated customer lifetime value and Customer Equity across all respondents. Figure 1 shows the distribution of customer lifetime value in Vietnam machine tool market. The $2000–$4000 category includes more than 75% of customers. The $6000-$8000 category had only 2.3% of customers, the result indicating that the bulk of customers have medium customer lifetime value.
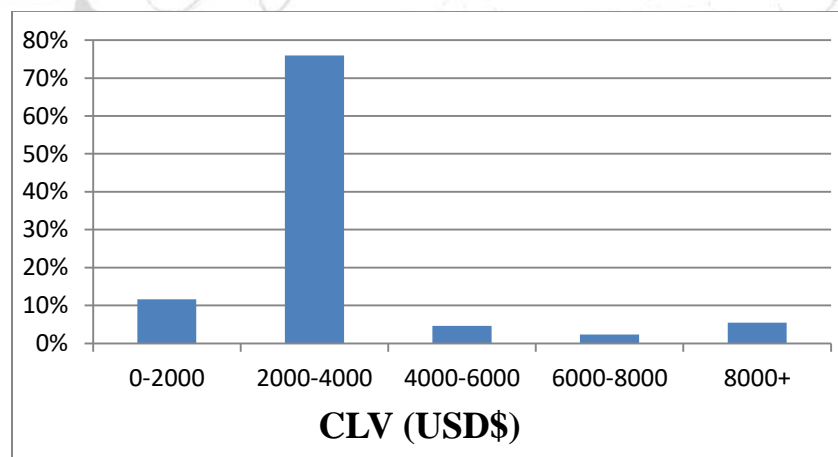

Figure 1: Distribution of CLV: Vietnam machine Tool market

In Figure 2 the authors show the percentage of customer equity that is contributed by each customer lifetime value category. The $8000+ category though only 5.4% of customers but produces approximately 40% of customer equity, compare to 75% $2000-4000 category customer with 44% customer equity value.
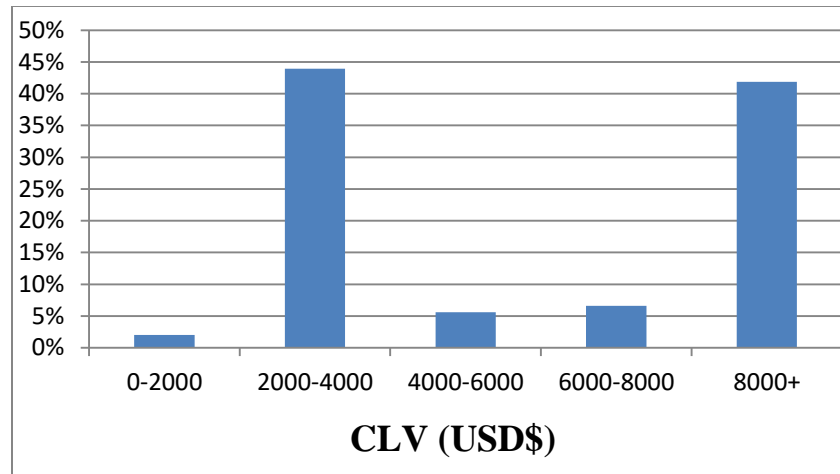
Figure 2: Percentage Customer Equity by CLV Category

The average of customer lifetime value was ($4013) by the number of the customer respondents (129), it evaluated a total customer equity for the Vietnam machine tool market in this research about ($ 517,674).

Conclusion and Discussion

According to customer equity framework which demonstrated by Rust et al. (2004), the authors examine the results of service quality and product quality dimensions impact on customer satisfaction and repurchase customer by using both surveys important and satisfied. The factors of *service quality*, *product quality*, *product function* and *employee service* positively impact on the probability of repurchase customer. This finding is agreement with previous studies by Didier (2003), Tsiotsou, (2006) and Tsiotsou (2006), Lee, Lee, and Yoo (2000) who proposed service quality and product quality positively impact on customer satisfaction. However, the factors of *service engineer performance* and *Product design* insignificantly impact on the probability of customer repurchasing product.

The data also provided open questions for calculating the customer lifetime value and customer equity in Vietnam machine tool company. The marketing manager should consider and control which elements positively impact on customer equity then they can predict future sales and marketing budget.

Recommendations

For Industry

In the machine tool industry where the product with high price product and using a long time, customer loyalty is very important. By referring the experiment, the marketing manager can know which elements of product or service will keep their customer loyalty in machine tool market then improving those elements. The marketing manager can use this framework for a long time and calculate their probability of customer repurchase in the future. If the marketing manager can predict the machine tool market, they can propose the marketing plan budget. And they also reduce their expenditure in marketing so provide the reasonable price for their customer and maximizing their profit.

For Future Research

In this study, the authors were only using data of respondents in one machine tool company because the field of machine tool market is a lack of information and limited time for researching. For extending the

research, The authors should be considering the effect of price (Zeithaml and Bitner, 1996) and culture (Hochand Deighton, 1989) on customer satisfaction, customer lifetime value and customer equity in Vietnam machine tool market. In the future, the result can offer more important information for marketing manager by demonstrated in the entire machine tool market in Vietnam.

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