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Big Data Analysis Optimization to Enhance High Speed Internet Customers' Loyalty (An Indonesian Perspective)

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Abstract: Revenue growth of High Speed Internet (HSI) in a Telco Company in Indonesia tends to bestagnant, it was not in line with the sales growth occurred in each month. This was an indication that there was a number of customers who warechurn and did not pay the service thus, the revenue from sales was not in line with the sales growth. It is necessary to do research related to customer loyalty in order to reduce the level of churn that occured. This research utilized customers data resulted by optimized churn prediction tool from big data project that remain loyal yet had been predicted to be churned. This research used customer loyalty model which has corporate image, service quality, customer satisfaction, commitment, perceivedvalue, switching cost or trustas independent variables that had positive influence to customer loyalty. Data were collected through questionnaires distributed to 929 customers through on line (using google form and phone) and off line (customers' visits). The 929 customers were selected based on result of churn prediction by big data project that kept loyal for the next 3 months. From all questionnaire collected, only 482 customers gave valid respons. The 482 valid data were analyzed by using SmartPLS 3.0. The result indicated that service quality, customer satisfaction, commitment, perceived value, switching cost and trust had positive influence to customer loyalty. While the corporate image factor did not have positive influence on customer loyalty at 95% of significant level. Commitment was found to be the most critical factor in affecting customers' loyalty. Since, commitment variable had the highest score of influencing customer loyalty whereas commitment was affected by customer satisfaction through service quality, this research suggested to increase customer loyalty trough increasing service quality. Based on descriptive result in order to give a good service quality, the company must give better service than other operators trough increasing speed and stability of HSI, repairing HSI interferenc equickly and accurately, giving service in accordance with service level guarantee and giving service as promised in term of time and quality.

Key words: Customer loyalty, high speed internet, commitment, big data analysis, indonesia

INTRODUCTION

Fixed phone had become the main revenue contributor for telco companies in the past in Indonesia but nowadays it tends to decline. At the same time, the revenue of High Speed Internet (HSI) as second revenue contributor tends to stagnant although the sales were growth. It indicated that there were a number of customer who churned thus they did not pay for the service which was already consumed. The churned of customers indicate that the customer loyalty to the product in this case is HSI is low.

Based on previous research, there were factors that might affected customer loyalty such as corporate image, service quality, customer satisfaction, commitment, perceived value, switching cost and trust (Luarn and Lin, 2013; Cheng *et al*., 2008; Amin *et al*., 2012; Bobalca, 2014). In line with objective to retain HSI customers, a project which utilized big data had been conducted to predict customers' loyalty. This was a new way in observing customers' behaviour. The customer data were grouped into 3 categories, namely: loyal customers, churned customers and customer that were predicted to churn.The third group is the group which was predicted to be churned, that divided by two categories there were became churn and fortunately they were still using the HSI service. These customers that predicted to churn but fortunately they were still using the HSI service was of course good for the company and knowing the reasons or factors that made them become loyal were important. Based on the condition of business revenue and churn customer, the problem statements are as follows:

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- HSI as second revenue contributor tended to stagnant although, the sales were still growth. It indicated that there were a number of customers who churn, thus revenue was stagnant. Because of it, retaining HSI customers became one of important factors to keep revenue for company. Knowing factors that make customers become loyal is very important
- Churn predictive data resulted by big data project was a new model of churn prediction for telco company in Indonesia. Optimizing the churn prediction to evaluate factors that might affect customers loyalty was a new thing which had never been done before in Indonesia

Related to the problem statements, the research questions of this study are how much are the rate of corporate image, service quality, customer satisfaction, commitment, perceived value, switching cost and trust based on HSI customer's perspective and do the corporate image, service quality, customer satisfaction, commitment, perceived value, switching cost and trust influence HSI customers' loyalty, can the proposed model in this study be used for predicting customers' loyalty.

The objectives of this research were to measure the rate of corporate image, service quality, customer satisfaction, commitment, perceived value, switching cost and trust based on HSI customer's perspective to test the positive influence of corporate image, service quality, customer satisfaction, commitment, perceived value, switching cost andtrust to HSI customers' loyalty and to test if the proposed model in this study can be used for predicting customers' loyalty.

Literature review: The object of this study was HSI customers who had been predicted to churn in November 2014 but fortunately they kept loyal until the next 3 months. The predicted churn customers are predicted by big data churn prediction. To predict churn of HSI customer, big data project used factors such as the number of interference, number of complaint, payment of customer, network quality, customer usage and customer surfing habits.

Research by Luarn and Lin (2003) showed that combination of trust, customer satisfaction and perceived value has significant influence to customer commitment. If each factor linked to customer loyalty, the result indicates that commitment is more significant than others. The finding shows that commitment become a crusial intervening factor which explained relationship between customer satisfaction and perceived value to customer loyalty.

Cheng *et al.* (2008) studied about ISP customer loyalty in Hongkong, they founded that customer satisfaction, switching cost and price perception had positively influenced customer's loyalty. Although, service quality had big impact to customer satisfaction but it did not significantly influenced customer loyalty. Furthermore, the study also found that corporate image did not significantly influence customer loyalty.

Research by Amin *et al.* (2012) showed that there were positif influence between switching cost, trust, corporate image and perceived service quality to customer loyalty. Perceived service quality became the most important factor that affected customer loyalty.

MATERIALS AND METHODS

This research used model from Cheng *et al.* (2008) with five variables corporate image, service quality, customer satisfaction, switching cost and price perception, since had similarity with the object of research in internet service provider. Beside that, based on research by Luarn and Lin (2003) and Amin *et al.* (2012), this study considered to combined the variables and there were two other variables that should be added to the model by Cheng *et al.* (2008), namely trust and commitment. The proposed conceptual model is shown in Fig. 1.

Based on the Fig. 1, there are seven variables that directly influence the HSI customers loyalty, namely corporate image, service quality, customer satisfaction, commitment, perceived value, switching cost and trust. The operationalization variables are shown in Table 1.

In line with the definition of each variable and the schematic relationship among variables as shown in Fig. 1, the hypotheses of this present research as follows:

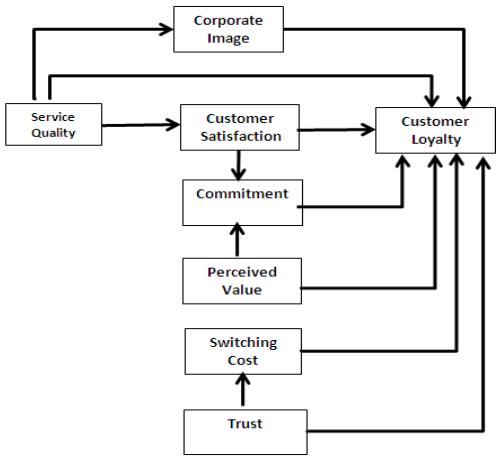

Fig. 1: Proposed conceptual loyalty model

Table 1: Operationalization of variables

Variables	Variable definition	Indicator	Sources
Corporate Image (CI)	Customer perception about the company fisically and behavioural	The impression about company experience of using HSI The impression compared with other operator Positive thoughts towards HSI Believe that company will give a better product than other operator	Cheng *et al.* (2008); discussion result with experts
Service Quality (SQ)	Gap between customer expectation and perception to HSI service performance	Easy access to contact center Service time that appropriate with the company promise HSI service are reliable The company promptly correct if HSI impaired Call center staff very helpfull to give solution HSI Service is better than before HSI Service is currently better than other operator	Cheng *et al.* (2008); discussion result with experts
Customer Satisfaction (CS)	Gap between customer expectation and the reality that they experienced about HSI	Satisfaction of using HSI Believe that has selected the appropriate HSI service HSI service has met expectations The company has served well HSI services is outstanding	Cheng *et al.* (2008), Luarn and Lin (2003) discussion result with experts
Commitment (CM)	Customer psychological conditions to keep their plans to use HSI service	to use HSI service commitment to keep using HSI service Believe in service of HSI Desire to recommend HSI service Thinking to have desire to switch to other operator	Luarn and Lin (2003); discussion result with experts
Perceived Value (PV)	Customer perception about price and benefit HSI service	The price offered within limits Cost incurred is worth with the service The perceived benefits greater than the sacrifices that must be paid HSI service is profitable	Luarn and Lin (2003); discussion result with experts
Switching Cost (SC)	Loss that happened because of switch to other service provider	To switch take a long time To switch need cost To switch require replacement devices To switch need time to adapt To switch taketime to learn To switch need the device replacement cost	Cheng *et al.* (2008); hasil discussion result with experts
Trust (TR)	Belief in the promise of the company for being honest true and can provide the expected performance .	The trustworthy company The company attention to its customers The company honesty The company keeps promise Stability of HSI services in accordance with the promised deals Speed of HSI service will be in accordance with the promised deals	Luarn and Lin (2003); discussion result with experts
Customer Loyalty (CL)	The tendency of customers to continue using the HSI service	HSI Services is very valuable Commitment to continue using the HSI service in 12 months The will to recommend HSI service Always speak positively about the HSI service The commitment not to use the with services of other operators	Cheng *et al.* (2008); discussion result with experts

- H_{7a}: trust has a positive significant influence on customer loyalty
- H_{7b}: trust has a positive significant influence on switching cost

To test the hypotheses, this research collected data by using questionnaire. The validity and reliability of the questionnaire were assessed to ensure that questionnaire accurately measured the constructs. The reliability test determines the consistency of a developed instrument in measuring its target construct and can be conducted using an inter-item consistency reliability test. Among the types of this test, the most popular for multipoint-caled is the Cronbach's Alpha (CA) coefficients with values ring from 0.6- 0.7 are deemed as the lower limit of acceptability; thus, a minimum value of 0.7 is necessary to indicate reliability. The Composite Realiability (CR) can similarly measure construct reliability and required a minimum CR value of 0.7 (Nunnally, 1978).

- H_1: corporate image has a positive significant influence on customer loyalty

- H_{2a}: service quality has a positive significant influence on customer loyalty
- H_{2b}: service quality has a positive significant influence on customer satisfaction
- H_{2c}: service quality has a positive significant influence on corporate image
- H_{3a}: customer satisfaction has a positive significant influence on customer loyalty
- H_{3b}: service quality has a positive influence on commitment
- H_4: commitment has a positive significant influence on customer loyalty
- H_{5a}: perceived value has a positive significant influence on customer loyalty
- H_{5b} perceived value has a positive significant influence on commitment
- H_6: switching cost has a positive significant influence on customer loyalty

To determine the effectiveness of the developed instrument in measuring its target construct, this research used content or logical validity; Criterion-relate validity which is categorized into predictive and concurrent validity and construct validity which can be measured by convergent and discriminant validity that explained by computing Factor Loadings (FL) (Sekaranand Bougie, 2010). An item in construct has convergent validity if the value of FL minimal 0.5 (Hair *et al*., 2010). To test the validity and reliability of the questionnaire used, this research distributed the questionnaire to 30 respondents. The collected data were analyzed by using IBM SPSS statistics 22 Software. All 42 items of 8 construct are valid and ready to distributed to the respondents. Table 2 shows the valid and reliable items of the questionnaire used in this research.

Having finish with testing the valid and reliable questionnaire, this research used census method to HSI

Table 2: Items of the questionnaire

Variables	Items	Reference
Corporate Image (CI)	I have good impression to telco operator	Cheng *et al*. (2008); discussion result with experts
	I have good experience of using HIS	
	The telco operator has better impression compared with other operator	
	Everytime I heard the company,	
	I have positive thoughts	
	I believe that company will give a better	
	product than other operator	
Service Quality (SQ)	The telco operator gives easiness to access the contact center	Cheng *et al*. (2008); discussion result with experts
	The telco operator gives service time	
	that appropriate with the company promise	
	HSI service are reliable	
	If HSI impaired, the company will immediately promptly correct	
	Call center staff very helpfull to give solution	
	HSI service is better than before	
	HSI service is currently better than other operator	
Customer Satisfaction (CS)	I am satisfied using HSI	Cheng *et al*. (2008); Luarn and Lin (2003); discussion result with experts
	I believe that I has selected the appropriate HSI service	
	HSI service has met my expectations	
	I'm happy that the telco operator has served me well	
	I feel that HSI Services is outstanding	
Commitment (CM)	I commit to keep using HSI service	Luarn and Lin (2003); discussion result with experts
	I believe in service of HSI	
	I keep commit using HSI although my close friend recomend other operator	
	I have to a deep thinking if i want to switch to other operator	
Perceived Value (PV)	The price offered within reasonable limits	Luarn and Lin (2003); discussion result with experts
	Cost incurred is worth with the service	
	The perceived benefits of HSI greater than the sacrifices that must be paid	
	HSI service is profitable for me	
Switching Cost (SC)	It takes a long time to switch other operator	Cheng *et al*. (2008); hasil discussion result with experts
	It needs cost to switch other operator	
	It requires replacement devices to switch other operator	
	It needs time to adapt to switch other operator	
	It takes time to learn to switch other operator	
	It needs the device replacement cost to switch other operator	
Trust (TR)	The company is trustworthy	Luarn and Lin (2003); result with experts
	The company gives attention to its customers	
	The company is honest	
	The company always keeps the promise	
	The stability of HSI services is accordance with the promise	
	Speed of HSI service will be in accordance with the promised deals	
Customer Loyalty (CL)	I commit to use HSI Services, because it very valuable	Cheng *et al*. (2008); discussion result with experts
	I commit to continue using the HSI service in 12 months	
	I will recommend HSI service to anyone that ask me	
	I will always speak positively about the HSI service	
	I will not using the services of other operators	

customers who were predicted to churn by big data project but still kept loyal for the next three month after the prediction time. Data were collected by using questionnaire that distributed online (by google form and phone) and offline (paper based questionnaire distributed trough visiting the respondents) from 2nd-20th April 2015. From 929 distributed questionnaire, only 686 questionnaire were returned. Out of these 686 questionnaires, 204 were discarded because three or more items in those questionnaire were not answered. Thus, the total of valid questionnaire for data analysis was 482.

RESULTS AND DISCUSSION

The 482 collected data were analyzed by using the quantitave investigation method. To know the rate of all variables based on respondent's perspective, this research used descriptive statistic. Data were computed to get the mean value or score of respondents' answers of each variable. The mean value than translated into several quality, the mean value which has score ring from 20-36% is considered to be very low, above -52% considered to be low, above 52-68% considered to be medium, above 68-84% considered to be high and above 84-100 considered to be very high. The result of scoring showed on Table 3. The table shows that the variables of corporate image, service quality, perceived value, customer satisfaction and trust had high score, these indicated that customers have high or good perception for those variables. While, variables of customer loyalty and commitment had medium scores, these indicated that the customers felt that the two variables had not good enough performance, the customers just feel that the performance of those variables are only medium.

The quantitative analysis method used in this research was the PLS Method which is a variance based technique of Structural Equation Modeling (SEM). The software used was the SmartPLS 3.0 Software which can be downloaded free from http://www.smartpls.de. Processing data by using PLS involves two steps: assesment of the measurement model to test the reliability and validity of the instrument which consist three criterias that should fullfilled: indicator reliability, internal consistency reliability and convergent validity and assesment of the structural model to test the research hypotheses. In PLS, the indicator validity is evaluated by Factor Loading (FL) with minimal value 0.5 that show that an item in construct has convergent validity (Chin, 1998; Sanchez-Franco and Rondan-Cataluna, 2010; Ghozali, 2008; Henseler *et al*., 2009; Urbach and Ahlemann, 2010). For internal consistency reliability shown by Cronbach Alpha (CA) and Composite Reliability (CR) value should be at least 0.7 and convergent validity measured by Average Variance Extracted (AVE) that should at least 0.5 (Henseler *et al*., 2009).

Table 3: Mean score of variables

Variables	Mean score (%)	Quality
Corporate image	72.1	High
Service quality	71.0	High
Perceived value	69.1	High
Customer satisfaction	68.9	High
Trust	68.9	High
Switching cost	68.2	High
Customer loyalty	67.8	Medium
Commitment	66.7	Medium

SmartPLS can directly produce the FL of each item with menu "calculation for PLS algorithm" and the results showed that all items have FL values above 0.5, indicating that each item of the questionnaire met the indicator validity requirement as can be seen in Fig. 2. SmartPLS result of the model. Table 4 shows the FL, CA, CR and AVE values of all construct resulted by SmartPLS fullfilled all the requirements. Thus, the measurement model of this research is valid and reliable.

Table 4: The FL, CA, CR and AVE values of each construct

Variables	Item	FL	CR	CA	AVE
Corporate image	CI1	0.880	0.938	0.918	0.918
	CI2	0.880			
	CI3	0.870			
	CI4	0.880			
	CI5	0.830			
Service quality	SQ1	0.660	0.929	0.911	0.911
	SQ2	0.830			
	SQ3	0.860			
	SQ4	0.820			
	SQ5	0.770			
	SQ6	0.840			
	SQ7	0.860			
Customer satisfaction	CS1	0.930	0.963	0.952	0.952
	CS2	0.930			
	CS3	0.920			
	CS4	0.890			
	CS5	0.910			
Commitment	CM1	0.940	0.964	0.950	0.950
Perceived value	PV1	0.810	0.935	0.908	0.908
	PV2	0.920			
	PV3	0.920			
	PV4	0.890			
Switching cost	SC1	0.750	0.917	0.891	0.891
	SC2	0.780			
	SC3	0.750			
	SC4	0.860			
	SC5	0.860			
	SC6	0.820			
Trust	TR1	0.850	0.947	0.932	0.932
	TR2	0.890			
	TR3	0.840			
	TR4	0.900			
	TR5	0.860			
	TR6	0.850			
Customer loyalty	CL1	0.940	0.952	0.936	
		0.936			

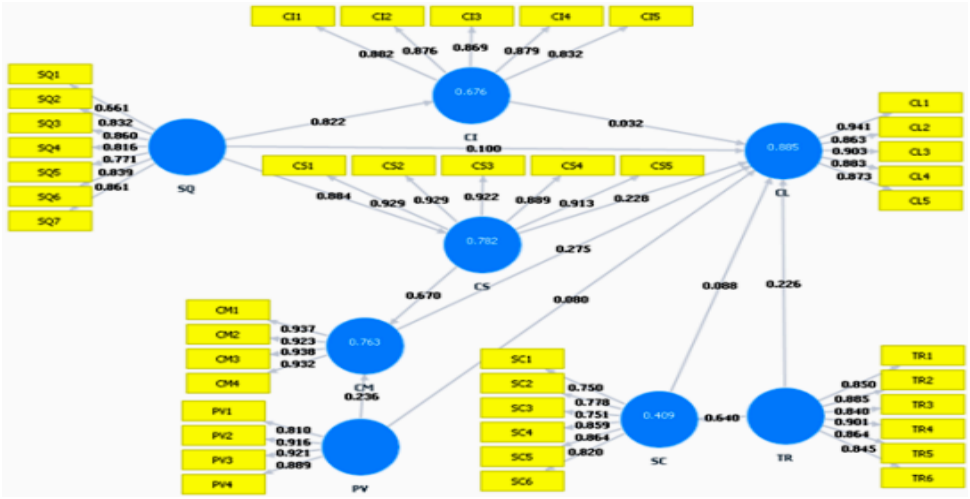

Fig. 1: SmartPLS result of the proposed model

Table 5: t-values for each variables

Path	PC	t-values
Service Quality (SQ)->Customer Loyalty (CL)	0.10	2.18*
Service Quality (SQ)->Customer Satisfaction (CS)	0.88	78.44*
Service Quality (SQ)->Corporate Image (CI)	0.82	44.18*
Customer Satisfaction (CS)->Customer Loyalty (CL)	0.23	4.77*
Customer Satisfaction (CS)->Commitment (CM)	0.67	16.35*
Commitment (CM)->Customer Loyalty (CL)	0.27	6.72*
Perceived Value (PV)->Customer Loyalty (CL)	0.08	2.18*
Perceived Value (PV)->Commitment (CM)	0.24	5.52*
Switching Cost (SC)->Customer Loyalty (CL)	0.09	3.38*
Trust (TR)->Customer Loyalty (CL)	0.23	4.81*
Trust (TR)->Switching Cost (SC)	0.64	17.64*
Corporate Image (CI)->Customer Loyalty (CL)	0.03	0.91

*Represent significance at 95 confidence level

In PLS, the correctness of the proposed model can be measured by using Path Coefficient (PC), R-squared (R^2) and Q-squarred (Q^2) criterion. R^2 citerion has been applied by 105 (96%) models publised in MIS Quarterly and PC criterion has been appied by 107 (98%) model published in MIS Quarterly in the 20 year period from 1992 through 2011 (Ringle *et al*., 2012). The path coefficients should have t-values of at least 1.96 to be considered significant at the 95% confidence level. The t-values can be obtained by using re-sampling techniques, such as bootstrapping. Table 5 shows the path coefficients and t-values of the model as a result of boots trapping. Based on the Table 5 above from 12, 11 hypotheses were significant, only one hypothesys (corporate image has a positive influence on customer loyalty) is not significant at the 95% confidence level, since the t-value is <1.96.

The R^2 criterion measures a construct's percentage variation that is explained by the model or the proportion of the total variation in the dependent variable explained by the independent variables jointly (Urbach and Ahlemann, 2010). The R^2 value should be sufficiently high for the model to have a minimum level of explanatory power. Values above the cutoff of 0.670, approximately 0.333 and 0.190 or lower are deemed substantial, average and weak, respectively (Chin, 1998; Urbach and Ahlemann, 2010). Figure 2 also shows that the R^2 resulted from calculation for PLS algorithm was 0.885. This means that the model has subtantial power to predict customer loyalty.

There are two types Q-squared (Q^2): cross-validated communality and cross-validated redundancy that can be resulted by SmartPLS. Q^2 cross-validated redundancy in the dependent variables represents as an indicator of performance of a model within the sample (Chin, 1998; Sanchez-Franco and Rondan-Cataluna, 2010). The Q^2 cross-validated redundancy indicates how well the model and its parameter estimates reproduce observed values. A Q^2 cross-validated redundancy value greater than 0 suggests that the model has predictive relevance whereas a Q^2 cross validated redundancy value <0 represents that the model lacks predictive relevance (Chin, 2010; Sanchez-Franco and Rondan-Cataluna, 2010). The model of this study achieved a Q^2 cross-validated redundancy of 0.70 which indicates that the model has satisfactory predictive relevance for the endogenous variables (Sanchez-Franco and Rondan-Cataluna, 2010). This means that the model has subtantial power to predict customer loyalty, this fining is in line with the R^2 value.

CONCLUSION

The rate of variable corporate image, service quality, perceived value, customer satisfaction and trust had high score that means customers had high good perception for

variables. Customer loyalty and commitment had medium scores which indicated that the customers felt that the performance of two variables were average.

Based on the empirical result, this research concluded that HSI customer loyalty were influenced by commitment (0.275), customer satisfaction (0.228), trust (0.226), service quality (0.100), switching cost (0.088) and perceived value (0.080). Commitment variable had the highest score of influencing customer loyalty and in this research commitment variable became intervening variable that made the influence of perceived value to customer loyalty stronger than when it directly influenced customer loyalty. This finding was inline with the result by Luarn and Lin (2003).

Since, commitment variable had the highest score of influencing customer loyalty whereas commitment was affected by customer satisfaction through service quality, this research suggested to increase customer loyalty trough increasing service quality. Based on descriptive analysis result, in order to give a good service quality, the company must give better service than other operators trough increasing the speed and stability of HSI. Upgrading internet bandwidth and subtituting cooper with fiber optic are two kind of efforts that can improve network quality that in the end can improve the speed and stability of HSI. Implementing competitive service level guarantee, repairing HSI interference quickly and accurately, giving service in accordance with service level guarantee, giving service as promised in term of time and quality, upgrade skills of call center staffs in giving solution to customers' problem and improving easiness to access the contact center are efforts that should be done to increase better service.

This research combined variables that had been used at previous researches relating with customer loyalty, proposed a model and used the proposed model to predict the loyalty of customers who were already predicted to churn by optimize churn predictive tool resulted by big data project that are still new and became a trend. Thus, this research filled the gap in the literature that combined loyalty model with big data analysis. The results of this research are expected to be a great use for company to increase customers' loyalty with using optimalization big data that had been implemented in some companies.

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