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

Indrawati and D. Indriasari
Telkom University (Tel-U), Jakarta, Indonesia

Email: indrawati@telkomuniversity.ac.id and devyi@telkom.co.id

Revenue growth of High Speed Internet (HSI) in a Telco Company in Indonesia tends to bestagnant, it wasnot in line with the sales growth occurred in each month.Thiswas an indication that there was a number of customerswho warechurn and did not pay the service, thus the revenue from sales was not in line with the sales growth.Itis necessary to do research related to customer loyalty in order to reduce the level of churn that occured. This research utilized customers dataresulted by optimized churn prediction tool from Big Data Project, that remain loyal yet had been predicted to be churned. This research used customer loyalty modelwhich 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 customersthrough on line (using google form and phone) and off line (customers' visits). The 929 customerswere selected based on result of churn prediction by Big Data Project that kept loyal for the next three month. 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 HS Iinterferencequickly and accurately, giving service in accordance with service level guarantee, and giving service as promised in term of time and quality.

Keywords: Customer loyalty; High Speed Internet; Commitment; Big Data Analysis, Indonesia

1.0 Introduction

Fixed phone had become the main revenue contributor for Telco Company 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, Lai, and Yeung, 2008 ; Amin, Ahmad, and Hui, 2012; and Bobâlcă, 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 (1) became churn and (2) 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 :

1) 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.
2) Churn predictive data resulted by Big Data Projectwas 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 (1) 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 (2) do the corporate image, service quality, customer satisfaction, commitment, perceived value, switching cost, and trust influence HSI customers' loyalty.

The objectives of this research were(1) to measure the rate of corporate image, service quality, customer satisfaction, commitment, perceived value, switching cost, and trust based on HSI customer's perspective, and (2) to test the positive influence of corporate image, service quality, customer satisfaction, commitment,perceived value, switching cost, and trust to HSI customers' loyalty.

2.0 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 three 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 & 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, Lai & Yeung (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, Ahmad & Hui (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.

3.0 Methodology

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 of Luarn & Lin (2003) and Amin (2012), this study considered to combined the variables and there were two other variables that should be added to the model of Cheng et al. (2008), namely trust and commitment. The proposed conceptual model is shown in Figure 1.

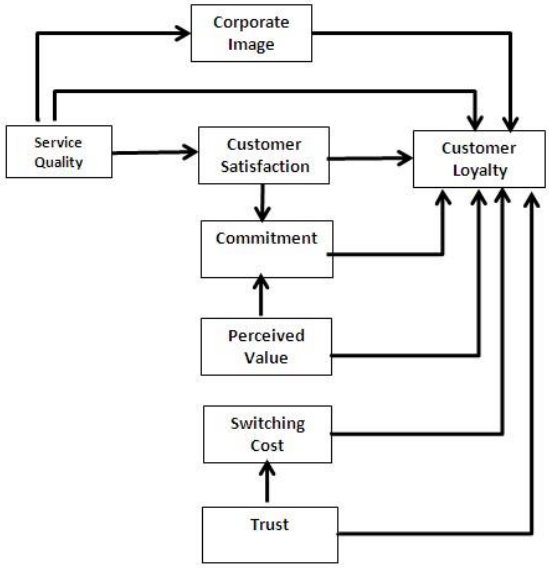

Figure 1 Proposed Conceptual Loyalty Model

Based on the Figure 1 above, 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.

Table 1 Operationalization of Variables

Variable	Variable Definition	Indicator
Corporate Image (CI)	Customer perception about the company fisically and behavioural	1.The impression about company 2.Experience of using HSI 3.The impression compared with other operator 4.Positive thoughts towards HSI 5.Believe that company will give a better product than other operator
Service Quality (SQ)	Gap between customer expectation and perception to HSI service performance.	1.Easy access to contact center 2.Service time that appropriate with the company promise 3.HSI service are reliable 4.The company promptly correct if HSI impaired 5.Call Center staff very helpfull to give solution 6.HSI Service is better than before 7.HSI Service is currently better than other operator
Customer Satisfaction	Gap between customer expectation and the	1.Satisfaction of using HSI 2.Believe that has selected the appropriate HSI service

(CS)	reality that they experienced about HSI.	3.HSI service has met expectations 4.The company has served well 5.HSI Services is outstanding
Commitment (CM)	Customer psychological conditions to keep their plans to use HSI service.	1.Commitment to keep using HSI service 2.Believe in service of HSI 3.Desire to recommend HSI service 4.Thinking to have desire to switch to other operator
Perceived Value (PV)	Customer perception about price and benefit HSI service.	1.The price offered within reasonable limits 2.Cost incurred is worth with the service 3.The perceived benefits greater than the sacrifices that must be paid 4.HSI service is profitable
Switching Cost (SC)	Loss that happened because of switch to other service provider	1.To switch take a long time 2.To switch need cost 3.To switch require replacement devices 4.To switch need time to adapt 5.To switch taketime to learn 6.To switch need the device replacement cost
Trust (TR)	Belief in the promise of the company for being honest, true, and can provide the expected performance.	1.The trustworthy company 2.The company attention to its customers 3.The company honesty 4.The company keeps promise 5.Stability of HSI services in accordance with the promised deals 6.Speed of HSI service will be in accordance with the promised deals
Customer Loyalty (CL)	The tendency of customers to continue using the HSI service	1.HSI Services is very valuable 2.Commitment to continue using the HSI service in 12 months 3.The will to recommend HSI service 4.Always speak positively about the HSI service 5.The commitment not to use the services of other operators

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

Table 2 Research Hypotheses

Hypothesis
H1 *Corporate image* has a positive influence on *customer loyalty*
H2a *Service Quality* has a positive influence on *customer loyalty* H2b *Service Quality* has a positive influence on *customer satisfaction* H2c *Service Quality* has a positive influence on *corporate image*
H3a *Customer satisfaction* has a positive influence on *customer loyalty* H3b *Service Quality* has a positive influence on *commitment*
H4*Commitment* has a positive influence on *customer loyalty*

H5a*Perceived value* has a positive influence on *customer loyalty*
H5b *Perceived value* has a positive influence on *commitment*
H6 *Switching cost* has a positive influence on *customer loyalty*
H7a *Trust* has a positive influence on *customer loyalty*
H7b *Trust* has a positive 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 ranging from 0,6 to 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 (Indrawati, 2015).

To determine the effectiveness of the developed instrument in measuring its target construct, this research used (1) content or logical validity; (2) criterion-relate validity, which is categorized into predictive and concurrent validity; and (3) construct validity, which can be measured by convergent and discriminant validity that explained by computing factor loadings (FL) (Sekaran& Bougie (2010)). An item in construct has convergent validity if the value of FL minimal 0.5 ((Hair, Black, Babin, & Anderson (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 3 shows the valid and reliable items of the questionnaire used in this research.

Table 3 Items of the Questionnaire

Variabel	Item	Reference
Corporate Image	1. I have good impression to telco operator 2. I have good experience of using HIS 3. The telco operator has better impression compared with other operator 4. Everytime I heard the company, i have positive thoughts 5. I believe that company will give a better product than other operator	Cheng *et al* (2008); discussion result with experts
Service Quality	1. The telco operator gives easiness to access the contact center 2. The telco operator gives service time that appropriate with the company promise 3. HSI service are reliable 4. If HSI impaired, the company will immediately promptly correct 5. Call Center staff very helpfull to give solution 6. HSI Service is better than before 7. HSI Service is currently better than other operator	Cheng *et al* (2008); discussion result with experts
Customer Satisfaction	1. I am satisfied using HSI 2. I believe that I has selected the appropriate HSI service 3. HSI service has met my expectations	Cheng *et al* (2008); Luarn & Lin (2003); discussion

	4. I'm happy that the telco operator has served me well 5. I feel that HSI Services is outstanding	result with experts
Commitment	1. I commit to keep using HSI service 2. I believe in service of HSI 3. I keep commit using HSI although my close friend recomend other operator 4. I have to a deep thinking if i want to switch to other operator	Luarn & Lin (2003); discussion result with experts
Perceived Value	1. The price offered within reasonable limits 2. Cost incurred is worth with the service 3. The perceived benefits of HSI greater than the sacrifices that must be paid 4. HSI service is profitable for me	Luarn & Lin (2003); discussion result with experts
Switching Cost	1. It takes a long time to switch other operator 2. It needs cost to switch other operator 3. It requires replacement devices to switch other operator 4. It needs time to adapt to switch other operator 5. It takes time to learn to switch other operator 6. It needs the device replacement cost to switch other operator	Cheng *et al* (2008); hasil discussion result with experts
Trust	1. The company is trustworthy 2. The company gives attention to its customers 3. The company is honest 4. The company always keeps the promise 5. The stability of HSI services is accordance with the promise 6. Speed of HSI service will be in accordance with the promised deals	Luarn & Lin (2003); discussion result with experts
Customer Loyalty	1. I commit to use HSI Services, because it very valuable 2. I commit to continue using the HSI service in 12 months 3. I will recommend HSI service to anyone that ask me 4. I will always speak positively about the HSI service 5. I will not using the services of other operators	Cheng *et al* (2008); discussion result with experts

Having finish with testing the valid and reliable questionnaire, this research used census method to HSI Customers who were predicted to be churned 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 to 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.

4.0 Findings 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 computed based on mean value or score of respondents' answers of each variable. The mean value than translated into several quality, the mean value which has score ranging from 20% to 36% is considered to be very low, above 36% to 52% considered to be low, above 52% to 68% considered to be medium, above 68% to 84% considered to be high, and above 84% to 100 considered to be very high. The result of scoring showed on Table 4. The table shows that the variables of corporate image, service quality, perceived value, customer satisfaction and trust had high score that means that customers have high or good perception for those variables. While, variables of customer loyalty and commitment had medium scores, these mean 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.

Table 4. Score of Variable

Variable	Mean	Score
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

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 : (1) 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 (2) 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; Franco and Cataluña 2010; Ghozali, 2008; Henseler et al.2009; Urbach and Ahlemann, 2010). For internal consistency reliability shown by Cronbach Alfa (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, Ringle and Sinkovics (2009). 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 Figure 1. SmartPLS Result of the Model.

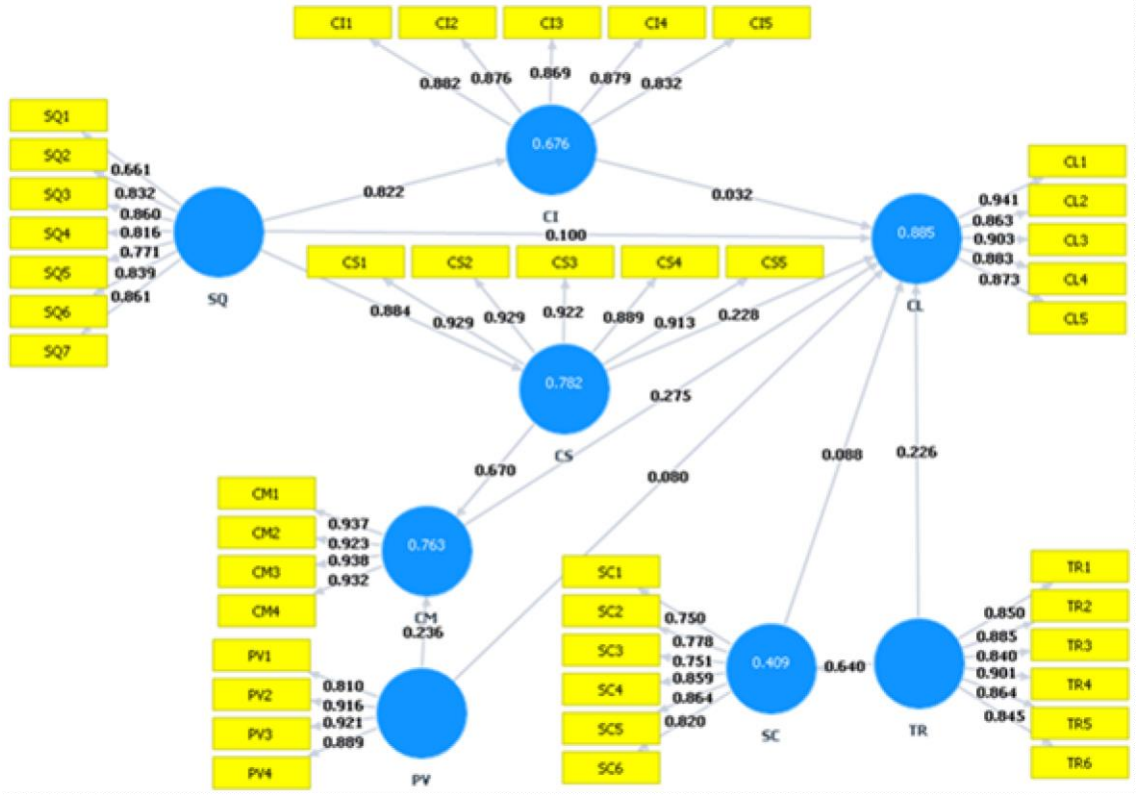

Figure 1. SmartPLS Result of the Proposed Model

Table 5 shows the 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 5. The CA, CR, and AVE Values of Each Construct

Variables	CR	CA	AVE
Corporate Image (CI)	0.938	0.918	0.918
Commitment (CM)	0.964	0.950	0.950
Customer Satisfaction (CS)	0.963	0.952	0.952
Perceived Value (PV)	0.935	0.908	0.908
Switching Cost (SC)	0.917	0.891	0.891
Service Quality (SQ)	0.929	0.911	0.911
Trust (TR)	0.947	0.932	0.932
Customer Loyalty (CL)	0.952	0.936	0.936

In PLS, the correctness of the proposed model can be measured by using Path coefficient (PC), R-squared (R^2), and Q-squared (Q^2) criterion. R^2 criterion has been applied by 105 (96%) models published in MISQ and PC criterion has been applied by 107 (98%) models published in *MIS Quarterly* in the 20-year period from 1992 through 2011 (Ringle, Sarstedt, & Straub, 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 6 shows the path coefficients and t-values of the model as a result of bootstrapping.

Table 6. t-value for Each Variable

Path	PC	t-Value
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

Based on the Table 6 above, from 12 hypotheses, 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 less than 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 (Gujarati, 1999; Gujarati & Porter, 2010; Moran, 2006; Urbach & 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; Indrawati, 2012; Urbach & Ahlemann, 2010). Figure 1 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.

5.0 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 of Luarn & 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 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 by upgrading internet bandwidth and subtitute cooper with fiber optic to improve network quality, implementation of 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 skill of call center staff in giving solution to customer problem, giving service better than before and improving easiness to access the contact center by increasing the staff and the line of contsct center.

This research combined variables that had been used at previous researches relating with customer loyalty, and used the proposed model to customers who were predicted to churn by optimize churn predictive tool resulted by Big Data Project that was 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 customer loyalty with optimalization big data that had been implemented in some companies.

6.0 References

Amin, S. M., Ahmad, U. N. U & Hui, L. S. (2012) "*Factors Contributing to Customer Loyalty towards Telecommunication Service Provider*, The 2012 International Conference on Asia Pacific Business Innovation & Technology Management.

Bobâlcă, C (2014), *Determinants of Customer Loyalty, A Theoretical Approach*, ISSN 1314-7242, Volume 8, 2014.

Cheng, T. C. E., Lai, L.C.F and Yeung, A.C.L. (2008), *The Driving Forces of Customer Loyalty: A study Internet Service Providers in Hongkong*, International Journal of E-Business Research, 4(4), 26-42, October-December 2008.

Chin, W.W. (1998). The partial least squares approach to structural equation modeling in Modern Methods for Business Research, Marcoulides, G.A. (ed.), Lawrence Erlbaum Associates, Mahwah, NJ, 1998, (pp. I295–1336).

Franco, M., S., and Cataluña, F.J.R. (2010): Connection between customer emotions and relationship quality in online music services, *Behaviour & Information Technology*, 29:6, 633-651

Ghozali, I. (2008) *Structural Equation Modeling Metode Alternatif Dengan Partial Least Square* (PLS). Semarang Indonesia: Undip

Ghozali & Latan (2015), *Partial Least Square Konsep,Teknik dan Aplikasi Menggunakan Program SmartPLS 3.0*, Semarang : Universitas Diponegoro

Hair JR, J. F., Black, W. C., Babin, B. J., Anderson, B. R. E., (2010), *Multivariate Data Analysis*, Seventh Edition, Upper Saddle River, New Jersey : Pearson Education, Inc.

Henseler, J., Ringle, C.M., and Sinkovics, R.R (2009). The Use of Partial Least Squares Path Modelling in International Marketing, In,.R.R. Sinkovics, P.N. Ghauri (Ed) New Challenges to International Marketing (Advance in International Marketing, Volume 20) (pp.277-319). Emerald Group Publishing Limited

Indrawati (2012) Indrawati: *Behavioral Intention to Use 3G Mobile Multimedia Services in Indonesia*, Doctoral Dissertation, Multimedia University

Indrawati (2015), Metode Penelitian Manajemen dan Bisnis Konvergensi Teknologi Komunikasi dan Informasi, Bandung: Refika Aditama.

Luarn, P. and Lin, H. H. (2003), *A Customer Loyalty Model for E-Service Context*, Journal of Electronic Commerce Research, VOL. 4, NO. 4, 2003.

Ringle, C.M., Sarstedt, M., & Straub, D.W. (2012). A Critical Look at the Use of PLS-SEM in MIS

Quarterly (Editor's Comments). *MIS Quarterly*, 36(1), pp. iii-xiv

Sekaran, U. and Bougie, R (2010), Research methods for Business, A Skill Building Approach. Fifth Edition, John Wiley & Sons Inc., Singapore, 2010.

Urbach, N., and Ahlemann, F. (2010). Structural Equation Modeling in Information Systems Research Using Partial Least Squares. *Journal of Information Technology Theory and Application*. 11(2), 5-40.