Volume 4 No.12, December 2014 ISSN 2224-3577
International Journal of Science and Technology

http://www.ejournalofsciences.org

Measuring Student Loyalty towards Residential College using Structural Equation Model

Azme Khamis, Nursyazwani Binti Md Said
Department of Mathematics and Statistics
Faculty of Science, Technology and Human Development
Universiti Tun Hussein Onn Malaysia (UTHM)

ABSTRACT

The objective of this study is to identify the factor that effect the student loyalty towards residential college. Students who live in residential colleges at UTHM are the subject of this study. Students are stratified according to their residential college and then random sample was chosen. The dependent variable is student loyalty towards residential college, while the independent variables are facilities, management and staff performance. The causal relationships were established by structural equation modelling (SEM) method using SPSS and AMOS statistical software. It is shows that facilities, management and staff performance have significant and direct effect toward student loyalty.

Keywords: *student loyalty, residential college, structural equation modelling*

1. INTRODUCTION

Residential college may be used to refer to an institution that houses its student on-campus. The term residential college also may be used interchangeably with terms such as living-learning center, and residential learning community [1]. Student loyalty is one of the major goals of educational institutions. A loyal student population is a source of competitive advantage with outcomes such as positive word of mouth communication, retention and repeat. The creation and the delivery of superior customer value become important in creating a sustainable advantage in the highly competitive international education market [31]. Service quality, as a key performance measure for excellence in education and is a major strategic variable for universities as service providers [13], with enduring effects on the institution and the students it serves. Performance measurement is so critical for all organizations, and educational institutions are no exception. With the competitive costs of education across the globe, there are increasing levels of scrutiny by students, parents and prospective employers of the value delivered by the educational institutes [53].

Research on staff or employees' loyalty has been conducted in services sector to investigate a relationship marketing perspective such as in life insurance [10] and [36], banking [43] and [50], utilities [39]; restaurants [20], and airlines [4] and [41]. Loyalty is also important in any business. Customer loyalty helps in building satisfaction and trust toward our service and products. When customers are loyal to our business, there will be an assurance that these customers will patronize our products, thus increasing our sale and avoiding bankruptcy.

Meanwhile, although many authors support the ideas that higher education institutions can be considered as service organizations [12],[25],[31,][32] and [55], a relational approach has only recently been applied to this specific field of services marketing. [40] studied service quality at hypermarket in India and found that there is a significant positive effect on service quality of the hyper markets to customer behavioural intention and conclude that service quality highly influences customer behavioural intention and purchase preference.

[21] studied on the relations between higher education institutions and their students have focused on adapting Morgan and Hunt's commitment-trust theory to an educational context. Meanwhile, research done by [26],[35] and [28] are focused on the student satisfaction construct and the marketing tools necessary for increasing student satisfaction, and on the optimization of the design of a university's internet presence from a relationship marketing perspective.

The customer loyalty is manifested in different ways including a commitment to re buy or patronizes a preferred product or service [38],[44] and [11]. Student loyalty has both short term and long term impact on the educational institution. Research done by [45] found that loyal students are influencing teaching quality positively through active participation and a committed behavior. Probably they are good advocates, recommending the institution to others. Besides, a growing number of former students are returning to higher educational institutions in order to update their knowledge [34]. Student satisfaction is supposed to be positively related to student loyalty [2], [47] and [33] and it is seen as a potential antecedent of customer loyalty [14][37] and [46].

Research done by [31], [56] and [19] showed that customer loyalty is supposed to be positively related to customer satisfaction and to the performance of a business unit. This link between customer satisfaction and the performance or profitability of a business unit forms the cornerstone of the marketing concept [17].

There are seven residential colleges provided by University Tun Hussein Onn Malaysia (UTHM), under Pusat Perumahan dan Pengangkutan (P2P) which are Residential College of Tun Syed

Nasir, Tun Fatimah, Tun Dr. Ismail, Pewira, Melewar/ Kelisa, Taman Universiti, and Taman Manis 5. The facilities available in each residential college, which are comfortable cafeteria services, restroom facilities, a reading room and a student activity room, internet access or Wi-Fi, computer laboratory, cleaning supervision, student development program and the implementation of development and maintenance of the college physical.

The objectives of this study is to investigate the effect or relationship of facilities provided by the university, managements and staff performance to student loyalty toward residential college. The questionnaires are developed and answered by the students who live in residential colleges at UTHM on semester II, session 2013/2014. Data is collected from undergraduate students' from various programmes such as engineering, technology engineering, technology management, computer sciences and science and technology the main campus of Universiti Tun Hussein Onn Malaysia, Malaysia. A total of 363 students answered the questionnaire and it consists of 167 (46%) males and 196 (54%) females.

2. RESEARCH METHODOLOGY

2.1 Introduction to Structural Equation Model (SEM)

The two main components of SEM are the path model and the measurement model. The path model or path analysis quantifies specific cause-and-effect relationships between observed variables [7][24]. The measurement model quantifies linkages between hypothetical constructs that might be known but unobservable components and observed variables that represent a specific hypothetical construct in the form of a linear combination. Structural equation model or SEM was developed as a unifying and flexible mathematical framework to specify the computer application [9][[6]. Analysis of moment structure (Amos) integrates an easy-to-use graphical interface with an advanced computing engine for this type of analysis. Amos also provides very clear and easy representation of path diagrams in SEM models for students and fellow researchers. The numeric methods implemented in Amos are among the most effective and reliable available [1].

Structural Equation Modeling (SEM) is an alternative method for testing our understanding of complex relationship in social sciences. SEM is a collection of procedures that tests hypothesized relationships among observed variables [7][15][48]. Complex interactions are first translated into a network of directional paths linking variables and are then evaluated against multivariate data [7]. These paths postulate direct and indirect effects among components, as well as spurious associations between variables that may be attributable to common causes. A direct effect describes direct regulation of a response or effect variable by a causal variable, while an indirect effect implies that the regulation is mediated through other variables. Hence, SEM is often related to causal modeling [27].

It is philosophically a confirmatory data analysis, but its application extends to testing alternative a priori models or to model building (Jöreskog, 1993), and can therefore be regarded as blending confirmatory and exploratory analyses [29]. The key to successful SEM rests on the competence of a researcher to posit initial cause-and-effect models drawing from accumulated knowledge, prior experience, and published results.

2.2 Model Estimation

The structural equation model framework can be summarized into three matrix equations, two for the measurement model component and one for the path model component [7][29]. For the measurement model component,

$$\mathbf{x} = \boldsymbol{\Lambda}_x \xi + \boldsymbol{\delta} \quad (1)$$
$$\mathbf{y} = \boldsymbol{\Lambda}_y \boldsymbol{\eta} + \boldsymbol{\varepsilon} \quad (2)$$

where $\mathbf{x}$ is a p x 1 vector of observed exogenous variables, and it is a linear function of a j x 1vector of exogenous latent variables ξ and a p x 1vector of measurement error $\boldsymbol{\delta}$. $\boldsymbol{\Lambda}_x$ is a p x j matrix of factor loadings relating $\mathbf{x}$ to ξ. Similarly, $\mathbf{y}$ is a q x 1vector of observed endogenous variables, $\boldsymbol{\eta}$ is a k x 1 vector of endogenous latent variables, $\boldsymbol{\varepsilon}$ is a q x 1 vector of measurement error for the endogenous variables, and $\boldsymbol{\Lambda}_y$ is a q x k matrix of factor loadings relating $\mathbf{y}$ to $\boldsymbol{\eta}$. Associated with equation (1) and equation (2), respectively, are two variance-covariance matrices, $\boldsymbol{\Theta}_\delta$ and $\boldsymbol{\Theta}_\varepsilon$. The matrix $\boldsymbol{\Theta}_\delta$ is a p x p matrix of variances and covariances among measurement errors $\boldsymbol{\delta}$, and $\boldsymbol{\Theta}_\varepsilon$ is a q x q matrix of variances and covariances among measurement errors, $\boldsymbol{\varepsilon}$. The path model component as relationships among latent variables and can be written as;

$$\boldsymbol{\eta} = \mathbf{B}\boldsymbol{\eta} + \boldsymbol{\Gamma}\xi + \zeta \quad (3)$$

where is $\mathbf{B}$ a k x k matrix of path coefficients describing the relationships among endogenous latent variables, $\boldsymbol{\Gamma}$ is a k x j matrix of path coefficients describing the linear effects of exogenous variables on endogenous variables, and ζ is a k x 1 vector of errors of endogenous variables. Associated with equation (3) are two variance-covariance matrices: $\boldsymbol{\Phi}$ is a j x j variance-covariance matrix of latent exogenous variables, and $\boldsymbol{\Psi}$ is a k x k matrix of covariances among errors of endogenous variables.

SEM has been typically implemented through covariance structure modeling where the variance-covariance matrix is the basic statistic for modeling. Model fitting is based on a fitting function that minimizes the difference between the model-implied variance-covariance matrix $\boldsymbol{\Sigma}$ and the observed variance-covariance matrix $\mathbf{S}$,

$$min\ f(\boldsymbol{\Sigma}, \mathbf{S}) \quad (4)$$

where $\mathbf{S}$ is estimated from observed data, $\boldsymbol{\Sigma}$ is predicted from the causal and noncausal associations specified in the model, and

Volume 4 No.12, December 2014 ISSN 2224-3577
International Journal of Science and Technology

http://www.ejournalofsciences.org

$f(\boldsymbol{\Sigma}, \mathbf{S})$ is a generic function of the difference $\boldsymbol{\Sigma}$ between and S based on an estimation method that follows. As [49] concisely stated, causation implies correlation; that is, if there is a causal relationship between two variables, there must exist a systematic relationship between them.

Hence, by specifying a set of theoretical causal paths, one can reconstruct the model-implied variance-covariance matrix $\boldsymbol{\Sigma}$ from total effects and unanalyzed associations. [7] outlined a step-by-step formulation under the mathematical framework, specifying the following mathematical equation for $\boldsymbol{\Sigma}$:

$$\boldsymbol{\Sigma} = \begin{bmatrix} \Lambda_y \Lambda(\Gamma\Phi\Gamma + \Psi)\Lambda'^{\Lambda'_y} + \Theta_\varepsilon & \Lambda_y \Lambda\Gamma\Phi\,\Lambda'_x \\ \Lambda_x \Phi\Gamma'\Lambda'\Lambda'_y & \Lambda_x \Phi\Lambda'_x + \Theta_\delta \end{bmatrix} \quad (5)$$

where $\boldsymbol{\Lambda} = (\mathbf{I} - \mathbf{B})^{-1}$. Note that in **equation (5)** the derivation of $\boldsymbol{\Sigma}$ does not involve the observed and latent exogenous and endogenous variables (i.e. $\mathbf{x}$, $\mathbf{y}$, ξ and $\boldsymbol{\eta}$).

Maximum likelihood (ML) is most popular method in SEM for estimating parameters. In ML, the algorithm iteratively searches for a set of parameter values that minimizes the deviations between elements of $\mathbf{S}$ and $\boldsymbol{\Sigma}$ [16]. This minimization is accomplished by deriving a fitting function, $f(\boldsymbol{\Sigma}, \mathbf{S})$ based on the logarithm of a likelihood ratio, where the ratio is the likelihood of a given fitted model to the likelihood of a perfectly fitting model. The maximum likelihood procedure requires the endogenous variables to follow a multivariate normal distribution, and $\mathbf{S}$ to follow a Wishart distribution. [18] described the steps in the derivation and expressed the fitting function F_{ml} as

$$F_{ml} = \log|\boldsymbol{\Sigma}| + \mathrm{trace}(\mathbf{S}\boldsymbol{\Sigma}^{-1}) - \log|\mathbf{S}| - \mathrm{trace}(\mathbf{S}\mathbf{S}^{-1}) \quad (6)$$

where trace ( ) refers to the trace of a matrix $\boldsymbol{\Sigma}$ and $\mathbf{S}$ are defined as above. Proper application of equation (6) also requires that observations are independently and identically distributed and that matrices $\boldsymbol{\Sigma}$ and $\mathbf{S}$ are positive definite [18]. After minimizing equation (6) through an iterative process of parameter estimation, the final results are the estimated variance-covariance matrices and path coefficients for the specified model.

2.3 Model Assessment

[48] and [30] provided a comprehensive listing of indices and criteria to assess model fit, but four basic fit statistics are summarized here. The goal of model assessment is to test the causal implications of a model [49]. The first is the overall model chi-square test based on a test statistic that is a function of the mentioned fitting function F_{ml} in equation (6) as follows:

$$\chi_v^2 = (n - 1)F_{ml} \quad (7)$$

where n is sample size and χ_v^2 follows a chi-square distribution with degree of freedom df_v as defined above. Subsequently, a p value is estimated and evaluated against a significance level.

The chi-square test is only applicable for an overidentified model, that is, when $df_v > 0$. A just-identified model ($df_v = 0$), for example, a path model representation of a multiple regression, does not have the required degrees of freedom for model testing [49]. The null hypothesis associated with the test is that there is no difference between model estimates and the data, and the alternative hypothesis is otherwise. Therefore, failure to reject the null hypothesis is the ultimate objective of the modeling process.

Although it may seem to be contrary to the intent of common hypothesis testing in ANOVA, this approach is consistent with the accept-support context where the null hypothesis represents a researcher's belief [51]. Nonetheless, as with common hypothesis testing, failure to reject the fitted model does not prove the specified causal relationships in the model. One should be particularly aware of existing equivalent models, that is, models that have different hypothesized causal relationships but fit the data equally well.

The second fit statistic to consider is the Root Mean Square Error of Approximation (RMSEA), which is parsimony-adjusted index that accounts for model complexity. The index approximates a noncentral chi-square distribution with the estimated noncentrality parameter as:

$$\hat{\delta}_v = max(\chi_v^2 - df_{v,0}) \quad (8)$$

where χ_v^2 is computed from equation (7) and df_v is defined above. The magnitude of $\hat{\delta}_v$ reflects the degree of misspecification of the fitted model. The RMSEA is then defined as:

$$\text{RMSEA} = \sqrt{\frac{\hat{\delta}_v}{df_{v(n-1)}}} \quad (9)$$

Thus, RMSEA measures the degree of misspecification per model degree of freedom, adjusted for sample size. RMSEA also reflects the view that the fitted model is an approximation of reality, so that RMSEA measures the error of approximation [42]. [8] suggested that RMSEA $\leq$ 0.05 indicates a close approximation or fit, a value between 0.05 and 0.08 indicates a reasonable approximation, and a value $\geq$ 0.1 suggests a poor fit.

The CFI is that performs well even when sample size is small [52]. This index was first introduced by [5] and subsequently included as part of the fit indices in his EQS program [29]. This statistic assumes that all latent variables are uncorrelated (null/independence model) and compares the sample covariance matrix with this null model. The values for this statistic range between 0.0 and 1.0 with values closer to 1.0 indicating good fit. From this, a value of CFI $\geq$ 0.95 is presently recognised as indicative of good fit [5][22].

Volume 4 No.12, December 2014 ISSN 2224-3577
International Journal of Science and Technology

http://www.ejournalofsciences.org

A problem with the Bentler-Bonett index is that there is no penalty for adding parameters. The Tucker-Lewis index (TLI), another incremental fit index, does have such a penalty. Let χ^2/df be the ratio of chi square to its degrees of freedom, and the TLI is computed as follows:

$$\frac{\left[\frac{\chi^2}{df_{(null\ model)}}\right] - \left[\frac{\chi^2}{df_{(proposed\ model)}}\right]}{\left[\frac{\chi^2}{df_{(null\ model)}}\right]}$$

If the index is greater than one, it is set at one. It is interpreted as the Bentler-Bonett index. Note that for a given model, a lower chi square to *df* ratio (as long as it is not less than one) implies a better fitting model.

The Goodness of Fit Index (GFI) is a measure of relative amount of variances and covariances jointly accounted for by the model, and it is defined as [23]

$$GFI = 1 - \frac{\text{trace}(\boldsymbol{\Sigma}^{-1}\mathbf{S} - \mathbf{I})^2}{\text{trace}(\boldsymbol{\Sigma}^{-1}\mathbf{S})^2} \qquad (10)$$

where ***I*** is identity matrix. GFI ranged from 0 to 1.0 with 1.0 indicating the best fit.

In general, statistical tests for the overall model fit and *p* values of parameter estimates are less important in SEM than in univariate regression models. One reason is that all parameters are simultaneously estimated in SEM, so the significance of a parameter estimate should be viewed in the context of the whole model. Second, the confirmatory aspect of the model is weakened if model modification is based on the significance of estimates rather than the theory behind the model structure. Finally, SEM is still a large-sample technique, and hypothesis testing is generally affected by sample size, especially the chi-square test and to a lesser extent RMSEA, CFI, TLI and GFI.

3. RESULTS AND DISCUSSION

3.1 Descriptive Statistic

The mean and standard deviation values for all items facilities, management and staff performance and student loyalty are shown Appendix 1. The minimum and maximum student satisfaction towards facilities provided by residential college is bus services (4.28) and cleaning supervision's (6.24). Student satisfaction towards Management and Staff Performance at residential college is between 6.11 to 6.33. The lowest mean is for item the staff hired are friendly, whereas the number of staff hired are enough item has the highest mean. The mean values for student loyalty is between 5.13 to 7.36. The lowest mean is for item affordable fee, whereas the students feel more safety to stay at residential college item has the highest mean. Skewness analysis is performan to ensure the data used follow the normality assumption. Appendix 2 indicated that all skewness value is between -1.0 and 1.0 and we can conclude that normally assumption is meet and further analysis can be done.

The Barlett's Test of Sphericity for facilities, management and staff performance, and student loyalty are significant. The Kaiser-Meyer-Olkin (KMO) values for facilities, management and staff performance, and student loyalty are 0.889, 0.904, and 0.892 respectively. The Cronbach's alpha values for facilities, management and staff performance, and student loyalty are 0.934, 0.979 and 0.899 respectively and it's shows that all items under that particular component provide a reliable measure of internal consistency.

3.2 The Confirmatory Factor Analysis (CFA)

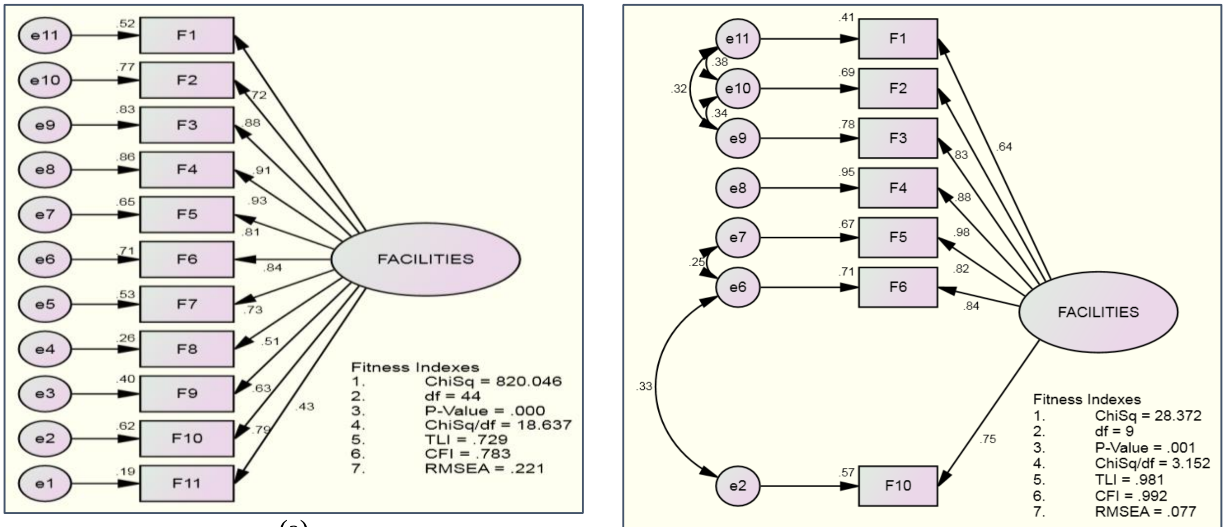
(i) CFA for Facilities

Figure 1 (a) and (b) shows the factor loading for each items and the fitness indexes for Facilities latent exogenous variable. There are two items (*F8* and *F11*) had factor loading less than 0.60 and fitness indexes in (a) shows the measurement model is insignificance due to some items have low factor loading and the errors are correlated. Thus, the respective items should be delete and also setting the another items to be "free parameter estimates" [54], Figure 1 (b) shows that the items *F7*, *F8*, *F9*, and *F11* from construct Facilities were deleted. After re-specified, all factors loading are above 0.6 and the RMSEA value is 0.077.

The next step is to examine the redundant items in the model through the Modification Index (MI). Analysis shows that item *F1*, *F2* and *F3*, *F5* and *F6*, *F6* and *F10*, are redundant due to highly correlated in the measurement errors. Item *e7* and *e9* , *e2* and *e6*, *e6* and *e7* was eliminated and re-specify the measurement model by setting the correlated pair as "free parameter estimate".

Volume 4 No.12, December 2014 ISSN 2224-3577
International Journal of Science and Technology

http://www.ejournalofsciences.org



(a) (b)

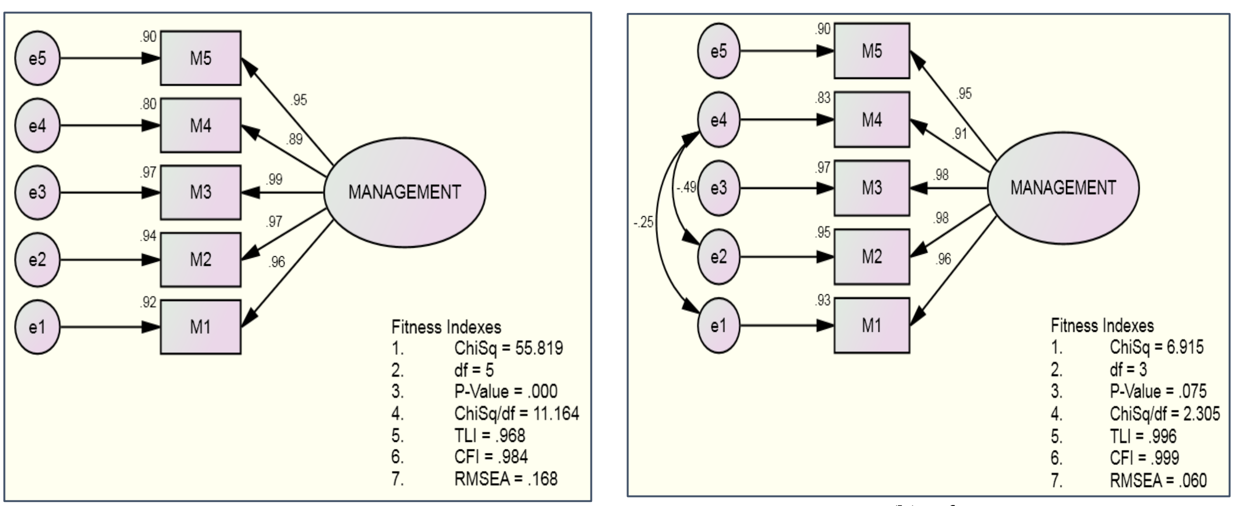
Figure 1. CFA analysis for facilities dimension (a) the full model (b) the model after re-specified measurement model

(ii) CFA for management and staff performance

Figure 2 (a) and (b) shows the factor loading for each items and fitness indexes factor management and staff performance exogenous latent variable. All factor loading is above 0.60 as shown in Figure 2 (a), but the fitness indexes are insignifinance. Modification Index (MI) can be used to examined the redundundcy in the items through correlation coefficient between the errors. It is found that, item *M1* and *M2* are redundant with *M4* and the model was re-specify by setting the correlated pair as "free parameter estimate". It resulted that the fitness indexes are significance as shown in Figure 2 (b).

(iii) CFA for student loyalty

The factor loading values for each items and fitness indexes are shown in Figure 3 (a) and (b). The fitness indexes are not significance due to correlated errors occur when two or more items are redundant and item L8 was droped form the model because of low factor loading. Thus, the respective items have to be deleted and also setting the another items to be "free parameter estimates". The re-specified model indicated that the RMSEA value is 0.084.

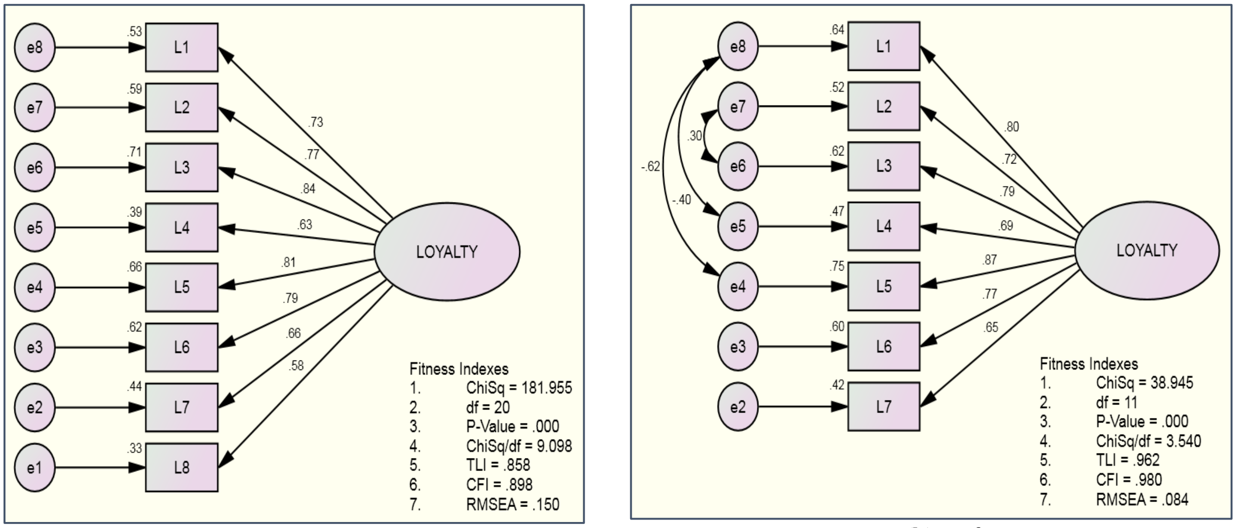


(a) Before (b) After

Figure 2. CFA analysis for management and staff performance before and after re-specified measurement model

Volume 4 No.12, December 2014 ISSN 2224-3577
International Journal of Science and Technology

http://www.ejournalofsciences.org



(a) Before (b) After

Figure 3: CFA for student loyalty before and after re-specified measurement model

3.4 The Measurement Model

Figure 4 shows the weight estimate of Facilities is 0.20, and for Management and Staff Performance is 0.58. The value of R^2 is 0.49, which indicate the contribution of construct facilities and construct management in estimating student loyalty is about 49%.

The values of model performance indicator such as RMSEA = 0.092, CFI = 0.970, TLI = 0.955 and Chisq/df = 4.094 and indicate that all indicators are significance and acheived the model criterions. Analysis shown that item *F2*, *F3* and *F5* are gives significance contribution to facilities, *M3*, *M4* and *M5* are gives significance contribution to management and *L1*, *L2*, *L5* and *L6* are gives significance contribution to loyalty. Analysis for individual regression weight was done and the result shows that each item indicate highly significant where the p-value is less than 0.0001.

The structural equation model can be written as;
Student loyalty = 0.20*(Facilities) + 0.58*(Management and staff performance)

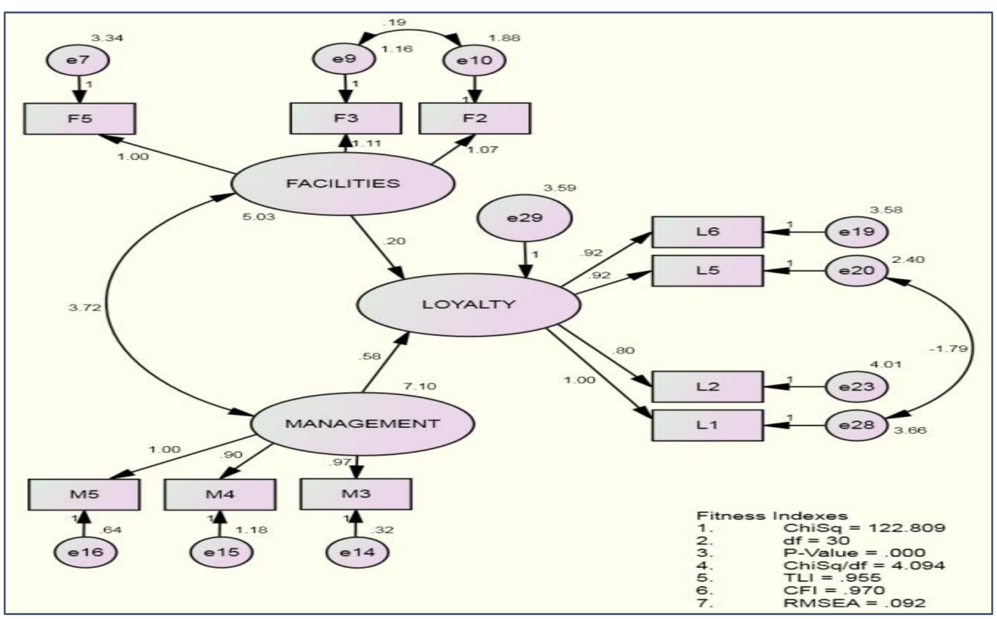


Figure 4: The coefficients of SEM for student loyalty toward residential college

4. CONCLUSION

The results indicated that facilities provided by residential college, and the management and staff performance have a significant and direct effect on student loyalty toward residential college. The value of R^2 is 0.49, which indicate the contribution of construct facilities and management in estimating student loyalty is 49 percent. The authorities who manage the residential college should upgrade their facilities such as restroom, reading room and laboratory. The staff hired should be enough, more helpful and readily available to provide services in order to provide comfortable and create conducive environment for student life in campus.

REFERENCES

[1] Arbuckle, J. L. (2012). *IBM® SPSS® Amos™ 21 User's Guide*. Amos Development Corporation, IBM Corp.

[2] Athiyaman, A. (1997). Linking student satisfaction and service quality perceptions: the case of the university education, *European Journal of Marketing*, Vol. 31 No. 7, 528 – 40.

[3] Bandas, M. (2014). *Residential Colleges - Defining Residential Colleges and Related Terms, The Classic Residential College, Benefits of Residential Colleges*. Retrieved from Education Encyclopedia - StateUniversity.com: http://education.stateuniversity.com/pages/2367/Residential-Colleges.html

[4] Bejou, D. and Adrian, P. (1998). Service failure and loyalty: An exploratory empirical study of airline customers, *Journal of Services Marketing*, 12 (1), 7-24.

[5] Bentler, P. M. (1990). Comparative fit indexes in structural models, *Psychological Bulletin*, Vol 107(2), Mar 1990, 238-246

[6] Blunch, N. J. (2013). *Introduction to Structural Equation Modeling using IBM SPS Statistics and AMOS*. second edit. Sage Publication Ltd., USA.

[7] Bollen, K. A. (1989). *Structural Equations with Latent Variables*, John Wiley & Sons, New York, NY, USA.

[8] Browne M. W. & Cudeck, R. (1993). Alternative ways of assessing model fit. in *Testing Structural Equation Models*, Bollen, K. A. and Long, J. S. Eds., pp. 136–162, Sage, Newbury Park, Calif, USA.

[9] Byrne, B. M. (2001). *Structural Equation Modeling with AMOS: Basic Concepts, Applications and Programming*. Lawrence Erlbaum Associates, Inc, New Jersey.

[10] Crosby, L. A., Evans, K. R. & Cowles, D. (1990). Relationship quality in services selling: An interpersonal influence perspective, *Journal of Marketing*, 54 (July), 68-81.

[11] Dick, A. & Basu, K. (1994). Customer loyalty: Towards an integrated framework, *Journal of the Academy of Marketing Science*, 22, 99–113.

[12] Dolinsky, A. L. (1994). A Consumer Complaint Framework with Resulting Strategies: An Application to Higher Education, *Journal of Services Marketing*, 8 (3), 27-39.

[13] Donaldson, B. & Runciman, R. (1995). Service quality in further education; An insight into management perceptions of service quality and those of the actual service provider, *Journal of Marketing Management*, 11(1-3):243-256.

[14] Fornell, C. (1992). A national customer satisfaction barometer: the Swedish experience. *Journal of Marketing*, Vol. 56, 6 – 21.

[15] Grace, J. B. (2008). Structural equation modeling for observational studies, *Journal of Wildlife Management*, vol. 72, no. 1, pp. 14–22.

[16] Grace, J. B. (2006). *Structural Equation Modeling and Natural Systems*, Cambridge University Press, Cambridge, UK.

[17] Grönroos, C. (1989). Defining marketing: A market-oriented approach. *European Journal of Marketing*, 23(1), 52–60.

[18] Hayduk, L. A. (1987). *Structural Equation Modeling with LISREL: Essentials and Advances*, The John Hopkins University Press, Baltimore, Md, USA.

[19] Helgesen, O. (2006). Are loyal customers profitable? customer satisfaction, customer (action) loyalty and customer profitability at the individual level, *Journal of Marketing Management*, Vol. 22, 245 – 266.

[20] Hennig-Thurau, T & Klee, A. (1997). The Impact of Customer Satisfaction and Relationship Quality on Customer Retention: A Critical Reassessment and Model Development, *Psychology & Marketing*, 14 (8), 737-65.

[21] Holdford, D & Sandra, W. (1997). Testing commitment-trust theory in relationships between pharmacy schools and students, *American Journal of Pharmaceutical Education*, 61 (Fall), 249-56.

[22] Hu, L.T. and Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives," *Structural Equation Modeling*, 6 (1), 1-55.

[23] Jöreskog, K. G. & Sörbom, D. (1982). Recent developments in structural equation modeling, *Journal of Marketing Research*, vol. 19, pp. 404–416.

[24] Jöreskog, K. G. (1993). Testing structural equation models, in *Testing Structural Equation Models*, Bollen K. A. & Lang, J. S. Eds., pp. 294–316, Sage, Newbury Park, Calif, USA.

[25] Joseph, M. & Joseph, B. (1997), Employers' perceptions of service quality in higher education, *Journal of Marketing for Higher Education*, 8 (2), 1-13.

[26] Keaveney, S. M. & Young, C. E. (1997). The student satisfaction and retention model (SSRM), working paper, Graduate School of Business Administration, University of Colorado, Denver.

[27] Kenny, D. A. (1979). *Correlation and Causality*, John Wiley & Sons, New York, NY, USA.

[28] Kittle, B & Ciba, D. (1998). Relationship marketing in higher education via the world wide web: A follow-up study of home pages examining student recruitment strategies," paper presented at *the 9th Symposium for the Marketing of Higher Education*, San Antonio, Texas.

[29] Kline, R.B. (2005), *Principles and Practice of Structural Equation Modeling* (2nd Edition ed.). New York: The Guilford Press.

[30] Kline, R. B. (2011). *Principles and Practice of Structural Equation Modeling*, 3rd edition, The Guilford Press, New York, NY, USA.

[31] Kotler, P., & Fox, K. (2002). *Strategic Marketing for Educational Institutions*. Upper Saddle River, New Yersey: Prentice-Hall.

[32] Licata, J. & Frankwick, G. L. (1996). University marketing: A professional service organization perspective, *Journal of Marketing for Higher Education*, 7 (2), 1-16.

[33] Marzo-Navarro, M., Pedraja-Iglesias, M. & Rivera–Torres, P. (2005b). Measuring customer satisfaction in summer courses, *Quality Assurance in Education*, Vol. 13 No. 1, 53 – 65.

[34] MarzoNavarro, M., Pedraja-Iglesisias, M. & Rivera-Torres, P. (2005a). A new management element for universities: satisfaction with the offered courses, *International Journal of Education Management*, Vol. 19 No. 6, 505 – 526.

[35] McCollough, M. A. & Gremler, D. D. (1999). Guaranteeing student satisfaction: An exercise in treating students as customers, *Journal of Marketing Education*, 21 (2), 118-32.

[36] Morgan, R. F. & Chadha, S. (1993). Relationship marketing at the service encounter: The case of life insurances, *Service Industries Journal*, 13 (January), 112-25.

[37] Oliver, R. L. (1999). Whence consumer loyalty. *Journal of Marketing*, 63 (special) 33-44.

[38] Oliver, R.L. (1997). *Satisfaction: A Behavioural Perspective on the Consumer* . Irwin/McGraw Hill, New York, NY.

[39] Payne, A & Frow, P. (1997). Relationship marketing: Key issues for the utilities sector, *Journal of Marketing Management*, 13 (5), 463-77.

[40] Rajaram, R. P. C. S.. Sriram, V. P (2014). A SEM approach towards the measurement of service quality, customer satisfaction and behavioural intentions among the hypermarkets of Southern Tamil Nadu, *Indian Streams Research Journal*, Volume : IV, Issue : I, February – 2014. DOI : 10.9780/22307850.

[41] Rapp, R. (2000). Customer Relationship Marketing in the Airline Industry, in *Relationship Marketing: Gaining Competitive Advantage through Customer Satisfaction and Customer Retention*, Thorsten Hennig-Thurau and Ursula Hansen, eds. Berlin: Springer, 317-31.

[42] Raykov, T. & Marcoulides, G. A. (2000). A First *Course in Structural Equation Modeling*, Lawrence Erlbaum Associates, Mahwah, NJ, USA.

[43] Reichheld, F. F.& Kenny, D. W. (1990). The hidden advantages of customer retention, *Journal of Retail Banking*, 12 (Winter), 19-22.

[44] Reichheld, F. F.. & Sasser W. E. (1990). Zero defections: Quality Comes to services, *Harvard Business Review*, 68 (September-October), 105-11.

[45] Rodie, A.R. & Kleine, S.S. (2000).Customer participation in services production and delivery in T.A. Swartz & D. Iacobucci (eds.), *Handbook of Service Marketing and Management*, Sage, Thousand Oaks, CA, pp. 111–125.

[46] Rust, R.T. & Zahorik, A.J. (1993). Customer Satisfaction, customer retention, and market share. *Journal of Retailing*, 69, 193 – 215.

[47] Schertzer, C.B. & Schertzer, S.M.B. (2004). Student satisfaction and retention: a conceptual model. *Journal of Marketing for Higher Education*, Vol. 14 No. 1,79 – 9.

[48] Schumacker R. E. & Lomax, R. G. (2004). *A Beginner's Guide to Structural Equation Modeling*, 2nd edition, Taylor & Francis, New York, NY, USA.

[49] Shipley, B (2000). *Cause and Correlation in Biology: A User's Guide to Path Analysis, Structural Equations and Causal Inference*, Cambridge University Press, Cambridge, UK.

[50] Stauss, B. & Neuhaus, P. (1997). The qualitative satisfaction model, *International Journal of Service Industry Management*, 8 (3/4), 236-49.

[51] Steiger J. H. & Fouladi, R. T. (1997). Noncentrality interval estimation and the evaluation of statistical models," in *What if There Were no Significance Test*? Harlow, L. L., Mulaik, S. A. & Steiger, J.H. Eds., pp. 221–257, Lawrence Erlbaum Associates, Mahwah, NJ, USA.

[52] Tabachnick, B.G. & Fidell, L.S. (2007). *Using Multivariate Statistics (5th ed.).* New York: Allyn and Bacon.

[53] Thomas, S (2011). What drives student loyalty in universities: An empirical model from India, *International Business Research* Vol. 4, No. 2, pp 183-192. Canadian Center of Science and Education.

[54] Zainudin, A. (2012). *Structural Equation Modeling Using Amos Graphic*. Shah Alam: University Teknologi MARA Publication Centre (UiTM Press)

[55] Zammuto, R. F., Keaveney,S. M. & O'Connor, E. J. (1996). Rethinking Student Services: Assessing and Improving Service Quality, *Journal of Marketing for Higher Education*, 7 (1), 45-70.

[56] Zeithaml, V. A., & Bitner, M. J. (2000). Service Marketing: integrating customer focus across the firm (Second Edition ed.). USA: McGraw-Hill Companies Inc.

Appendix 1

Descriptive statistic for facilities, management and staff performance and student loyalty

Part A: Facilities	Mean	Std. Deviation
Comfortable cafeteria	5.22	2.833
Comfortable restroom	5.65	2.772
Comfortable reading room	5.56	2.717
Comfortable student activity room	5.36	2.773
Comfortable computer laboratory	5.41	2.897
The implementation of development and maintenance of the facilities	5.58	2.739
Cafeteria services	5.36	2.729
High speed internet access or Wi-Fi	4.41	2.618
Cleaning supervision	6.24	2.673
Student development program	5.77	2.798
Bus services	4.28	2.564
Part B: Management and Staff Performance		
The staff hired are friendly	6.11	2.723
The staff are knowledgeable	6.32	2.664
The staff hired are helpful	6.28	2.640
The numbers of staff hired are enough	6.33	2.630
The staff are readily available to provide service	6.13	2.787
Part C: Student Loyalty		
I will suggest my friends to stay at residential college	5.22	3.266
I am able to live with or near my friends	6.46	2.908
I am able to study where I live	6.71	2.998
Location close to campus	6.98	2.663
Privacy	6.32	2.882
I satisfied with visitation restriction and rule	6.03	3.081
I feel more safety to stay at residential college	7.36	2.785
Affordable fee	5.13	3.007

Volume 4 No.12, December 2014 ISSN 2224-3577
International Journal of Science and Technology

http://www.ejournalofsciences.org

Appendix 2

The assessment of normality for the data

		Variable	Skewness
Facilities	F1	Comfortable cafeteria	0.071
	F2	Comfortable restroom	-0.167
	F3	Comfortable reading room	-0.103
	F4	Comfortable student activity room	0.017
	F5	Comfortable computer laboratory	0.100
	F6	The implementation of development and maintenance of the facilities	-0.229
	F7	Cafeteria services	-0.187
	F8	High speed internet access or Wi-Fi	0.198
	F9	Cleaning supervision	-0.598
	F10	Student development program	-0.142
	F11	Bus services	0.314
Managements and Staff Performance	M1	The staffs hired are friendly	-0.373
	M2	The staffs are knowledgeable	-0.498
	M3	The staffs hired are helpful	-0.492
	M4	The numbers of staff hired are enough	-0.335
	M5	The staffs are readily available to provide service	-0.308
Student Loyalty	L1	I will suggest my friends to stay at residential college	0.056
	L2	I am able to live with or near my friends	-0.558
	L3	I am able to study where I live	-0.683
	L4	Location close to campus	-0.621
	L5	Privacy	-0.495
	L6	I satisfied with visitation restriction and rule	-0.394
	L7	I feel more safety to stay at residential college	-0.952
	L8	Affordable fee	0.082