Modeling Quality of Life of University Students using Structural Equation Model

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***Abstract*- This study is attempted to investigate factors influencing on Quality of life (*QoL*) of university student toward the satisfaction on academic aspect (AA), social aspect (SA) and facilities (FC) by using Structural Equation Model (SEM). The data used in this study is primary data. The data is obtained from self- administrative questionnaires that distributed randomly to 248 students within Universiti Tun Hussein Onn Malaysia (UTHM). The data was analyzed using SPSS for preliminary analysis while AMOS 18 was used for Structural Equation Modeling (SEM). This study found that the satisfaction on academic aspect (AA) and facilities (FC) have significantly affected to Quality of life of UTHM students while there is insignificant effect of satisfaction on social aspect (SA) toward Quality of life of UTHM students.**

Index Terms – quality of life, structural equation model

I. INTRODUCTION

The quality of life is the sum total of all welfare services that safeguard an individual's well-being within the society. There is no specific acknowledged definition for the quality of life. The common idea that generally agrees is that quality of life plays an important role in all aspects of human life including spiritual, material and social life. Quality of life had become well-known among different study of field. Some of study had been conducted on patients 'quality of life'. In fact, there are several thinks that person wellbeing is the important elements, but it is a common idea that health is the fundamental element toward a high quality life (Pasandedeh, 2007). It is requirement to define and measure not only health-related quality of life, health condition of an individual, but also conditions of quality of life from political, economic, and social point of view, as well as individual life satisfaction. The world Health Organization has defined Quality of life in term of physical, psychological, social and environment condition (Skevington *et al*., 2004). It is suggested that those who have a higher quality of life are less under stress and high in life satisfaction (Chen *et al*, 2007).

Hagerty *et al*, (2001), Layard (2007) and Veenhoven (2009) had analyzed quality of life and its measurement. Their study had examined factors determining quality of life and complication of their measurement. Besides, the another study had indicated that quality of life and psychological factors such as stress, social capital, and self- esteem are interrelated (Asadi Sadeghi Azar *et al*., 2006; Pasandedeh, 2007; Chen *et al*., 2007; Roslan *et al*., 2010). Pucci *et al*. (2012) analyzed the association between leisure time physical activities with quality of life. The quality of life factors consists of physical, social relations, environmental and psychological. The result indicated that there is a positive relationship between leisure time physical activity and quality of life, although the association between variables different according to the type and intensity.

Vaez *et al*. (2004) found a positive relationship between perceived QOL and self-rated health of college students. Another study by Cha (2003) found relationships between subjective well-being and personality constructs such as self-esteem, collective self-esteem, and optimism. Pilcher (1998) conducted a study showing how affect and daily events predict life satisfaction among college students. Chow (2005) found that there is significant relationship between many of these other domains and life satisfaction of students at a university in Canada. Mohamadkhani and Kazemi (2011) studied the relationship among variables such as stress, social capital, self-esteem and the locus of control that affect the high school students' quality of life in Fars province, Iran and the result indicate that Locus of control plays an important role in the students' quality of life.

Besides, there are studies focuses on developing well-being measures specially adapted for college students. For example, Disch *et al*. (2000) developed the Student Quality of Life and Satisfaction (SQOLAS) measurement. The SQOLAS consists of 10 domains that directly related to students' concerns and anxiety which they are drug and alcohol consumption, social and sexual behavior, use of time, consumer and finance issues, physical and mental issues, multicultural and gender issues, learning style, career and employment issues, crime and violence issues, and living issues. Sirgy *et al*. (2007) had developed a well-being measure that can efficiently measure the Quality of College Life (QCL). The author had claims this measure is not an overall QOL measure of college students but it is lead to practical concern.

The objective of this study is to investigate the factors that influence on Quality of life (QoL) of university student toward the satisfaction on academic aspect, social aspect and facilities provided by University. The data is obtained from self-administrative questionnaires that distributed randomly to 248 students within UTHM and analyzed using SPSS version 9 and AMOS version 18.

II. Materials and Methods

2.1 Data

The questionnaires consist of five parts which are Respondent Background,Satisfaction on Academic aspect, Satisfaction on social aspect, Satisfaction on facilities and Quality of life using likert skill 1 to 10. There are three latent exogenous constructs, namely academic aspect (AA), social aspect (SA) and university facilities (FC) and one endogenous construct which is quality of life (QoL). The AA construct is measured by 6 items which are satisfaction with teaching method (*X1*), time table arrangement (*X2*), credit hour of subject (*X3*), classroom environment (*X4*), student workload (*X5*) and academic reputation (*X6*), the SA construct is measured by 6 items which are satisfaction with international programs and services (*X7*), spiritual programs and services (*X8*), club and parties (*X9*), recreational activities (*X10*), entrepreneurship activities (*X11*) and volunteer activities and program *(X12)*. Meanwhile, FC construct is measured by 8 items which are library services (*X13*), transportation and parking services (*X14*), healthcare services (*X15*), book store (*X16*), telecommunications (*X17*), recreation center (*X18*), security safety (*X19*) and internet speed and coverage, (*X20).*

The QoL student is observed using physical (*Y1*), physiological (*Y2*), social relationship (*Y3*) and university environment (*Y4)*. In addition, the items of AA, SA and FC construct are based on the study by Sirgy *et al.* (2007). The authors had study the relationship between the *AA*, *SA* and *FC* construct toward quality of college life (QCL). However, this study is attempt to identify the relationship between this three construct toward QoL items which is based on WHOQOL domains factors which is consists of physical, physiological, social relationship and environment factor (Skevington *et al.* , 2004).

2.2 Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) is a type of structural equation modeling (SEM) that deals specifically with measurement models which is the relationships between observed measures or indicators and latent variables or factors (Brown, 2006). This is where the set of theoretical relationships between measured variables and their respective latent constructs is tested. Furthermore, CFA procedure need to perform simultaneously for all latent constructs. The measurement model can be assessing based on unidimensionality, validity, and reliability. Unidimensionality can be achieved when measuring item have acceptable factor loading for the individual latent construct. Factor loadings lower than 0.6 should be deleted from the latent constructs in the model to ensure unidimensionality is satisfied (Brown, 2006; Zainudin, 2012). If the all the factor loadings are greater than 0.6, unidimensionality for the model has been achieved. The redundant or correlated items in the model should be examined through the Modification Index (MI). The Modification Index (MI) which higher than 15 indicates that the items had correlated. So the items will be deleted or set as free parameter to achieve the fitness of the model.

Validity is the ability of instrument to measure what it supposed to be measured for a construct. This requirement could be achieved through the processes like convergent validity, construct validity and discriminant validity. The reliability requirement could be achieved through the processes such as internal reliability, construct reliability (CR) and Average Variance Extracted (AVE).

2.3 Structural Equation Modeling (SEM)

Structural equation model or SEM was developed as a unifying and flexible mathematical framework to specify the computer application (Byrne, 2001; Blunch, 2013). The two main components of SEM are the structural model and the measurement model. The path model or path analysis quantifies specific cause-and-effect relationships between observed variables (Bollen, 1989; Jöreskog, 1993). The measurement model quantifies linkages between (i) Hypothetical constructs that might be known but unobservable components and (ii) Observed variables that represent a specific hypothetical construct in the form of a linear combination.

The structural equation model framework can be summarized into three matrix equations, two for the measurement model component and one for the structural model component (Grace, 2006). The measurement model for exogenous (***x***) and endogenous (***y***) latent variables can be written as;

$$\boldsymbol{x} = \boldsymbol{\lambda\xi} + \boldsymbol{\delta} \quad (1)$$
$$\boldsymbol{y} = \boldsymbol{\gamma\eta} + \boldsymbol{\epsilon} \quad (2)$$

where,
$\boldsymbol{x}$ is a observed exogenous variables
$\boldsymbol{\xi}$ is a exogenous latent variables
$\boldsymbol{\delta}$ is a measurement erro
$\boldsymbol{\lambda}$ is a factor loadings relating **x** to $\boldsymbol{\xi}$
$\boldsymbol{y}$ is a observed endogenous variables,
$\boldsymbol{\eta}$ is a endogenous latent variables,
$\boldsymbol{\epsilon}$ is a measurement error for the observed endogenous variables
$\boldsymbol{\gamma}$ is a factor loadings relating $\boldsymbol{y}$ to $\boldsymbol{\eta}$

The structural model component as relationships among latent construct variables can be written as;

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

where, $\boldsymbol{\beta}$ is a path coefficient describing the relationships among endogenous latent variables.
$\boldsymbol{\Gamma}$ is path coefficients describing the linear effects of exogenous variables on endogenous variables
$\boldsymbol{\zeta}$ is a errors of endogenous variables.

For estimation process, most SEM computer programs and most structural equation models are estimated by using maximum likelihood estimated method. Indeed, use of an estimation method other than maximum likelihood estimation requires clear justification (Hoyle, 1995).

2.4 Model Assessment

The goal of model assessment is to test the causal implications of a model (Kelloway, 1998; Shipley, 2000). Hair *et* *al.* (2010) recommends the use of at least three fit indexes by including at least one index from each category of model fit. The three fitness indexes categories are (i) *absolute fit* (Disprency Chi Square, Chisq; Root Mean Square Error Approximation, RMSE and Goodness of Fit Indexes, GFI), (ii) *incremental fit* (Adjusted Goodness of Fit Indexes, AGFI; Comparative Fit Indexes, CFI and Tucker- Lewis Index, TLI), and (iii) *parsimonious fit* (Chi Square/Degree of Freedom, Chisq/df).

Barrett (2007) suggested that Chi-Square value can be used to evaluate overall model fit and a good model fit if the *p*-value is greater than 0.05. Steiger and Lind (1980), Browne and Cudeck (1993) and Raykov and Marcoulides (2000) suggested that RMSEA less than 0.05 indicates a close approximation or fit, a value between 0.05 and 0.08 indicates a reasonable approximation, and a value higher than 0.1 suggests a poor fit. GFI and AGFI are used to measure the relative amount of variances and covariance's jointly accounted by the model and if the value is greater than 0.85, it indicated good fitting (Jöreskog and Sörbom, 1986.

Comparative Fit Indexes (CFI) was first introduced by Bentler (1990). The value index ranges from zero to one with higher values indicating better fit. The value of index which greater than 0.97 is indicate of good fit relative to the independence model, while values greater than 0.95 may be interpreted as an acceptable fit (Hu and Bentler, 1990). The Tucker-Lewis index (TLI) which also known as Non-Normed Fit Index (NNFI) had ranges in general from zero to one, but as this index is not normed, values can sometimes leave this range, with higher NNFI values indicating better fit. The value of index which is greater than 0 .97 is indicative of good fit relative to the independence model, whereas values greater than 0.95 may be interpreted as an acceptable fit. Lastly for parsimonious fit test, the practice by dividing the chi square test statistic by its degree of freedom is early alternative measure for overall model fit and the appropriate value of model for this test is should be less than 5 (Wheaton *et al*, 1977).

III. Data Analysis and Results

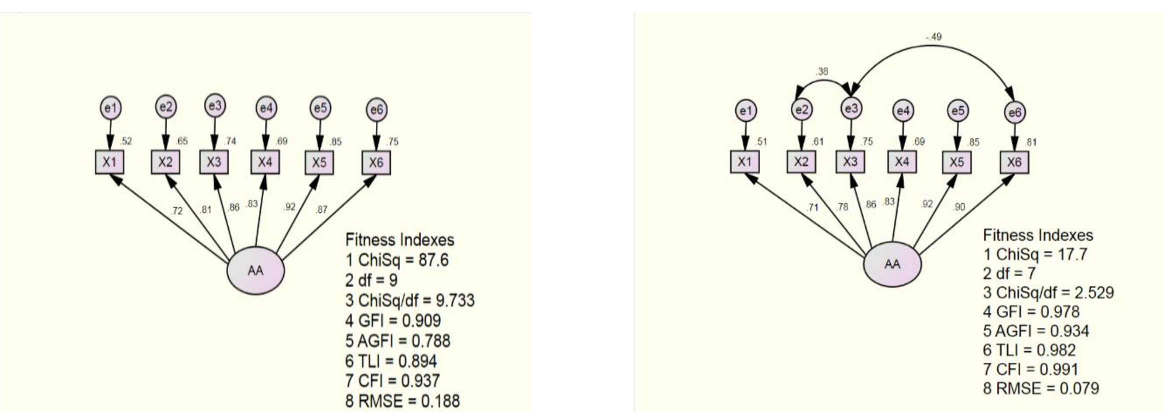
3.1 Preliminary analysis

According to the background analysis, it was found that 64.4% of the respondents are female and 35.6% male. From the result the highest respondents are 18-25 years old which is 93.6% followed by 26-33 years old which is 3.9% and lowest an age is 34 years old and above which is 2.5%. Most of the respondents are growth within sub urban surrounding which is 36.5% followed by urban which is 34.6% and rural which is 28.8%. Furthermore, 59.6% of respondents get their source of income from loan followed by source of income from scholarship which is 23.0 % and only 17.3 % of respondent have source of income which is provide by their parent. The Cronbach alpha value *AA*, *SA*, *FC* and QoL are 0.932, 0.954, 0.937 and 0.897 respectively. Since all the values of Cronbach alpha are greater than 0.7, all the variables are reliable for further analysis. For validity of data, all the KMO values are close to 1 (*AA*=0.865, *SA*=0.904, *FC*=0.887 and QoL=0.820) and was found that the all Bartlett's test are significance at 5%.

3.2 Confirmatory Factor Analysis (CFA)

3.2.1 CFA for Satisfaction of Academic Aspect (AA)

Figure 3.1 (a) and (b) shows the factor loading for each items and the fitness indexes for AA latent exogenous variable before and after re-specification. All the items had factor loading more than 0.60 so there is no items need to be deleted. However the fitness indexes in shows the measurement model is insignificance due to some items have the errors are correlated. So to achieve the fitness of model, the redundant items in the model through the Modification Index (MI) had to be examined.

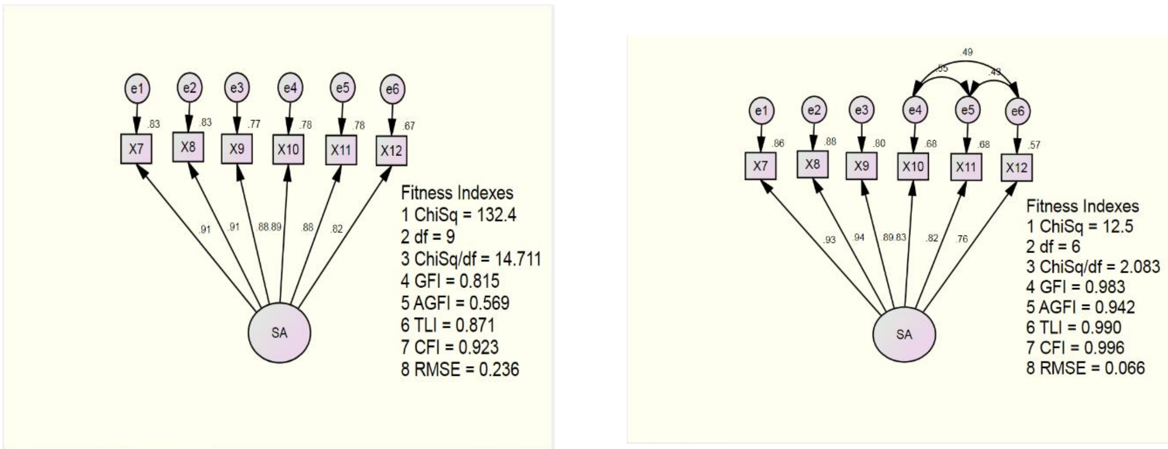


(a) (b)

Figure 3.1: CFA for AA before (a) and after (b) Re-specified Measurement Model

3.2.2 CFA for Satisfaction of Social Aspect (SA)

Figure 3.2 (a) and (b) shows the factor loading for each items and the fitness indexes for SA latent exogenous variable before and after re-specification. All the items had factor loading more than 0.60 so there is no items need to be deleted. However the fitness indexes shows the measurement model is insignificance due to some items have the errors correlated. So to achieve the fitness of model, the redundant items in the model through the Modification Index (MI) had to examine. The items with highly correlated (MI >15) in the measurement errors should be eliminated or setting the correlated pair as free parameter estimate respectively.



(a) (b)

Figure 3.2: CFA for SA latent variable (a) before and (b) after re-specified measurement model

3.2.3 CFA for Satisfaction of Facilities (FC)

Figure 3.3 (a) and (b) shows the factor loading for each items and the fitness indexes for SA latent exogenous variable before and after re-specification. The item of X13 that has error value of e1 shows the lower factor loading which is 0.58, so the item needs to be deleted from the model. After first re-specify process, all the items had factor loading more than 0.60 and there is no items need to be deleted. However the fitness indexes shows the measurement model is insignificance due to some items have the errors correlated. So to achieve the fitness of model, the redundant items in the model through the Modification Index (MI) had to examine.

(a) (b)

Figure 3.3: CFA for FC before (a) and after (b) Re-specified Measurement Model

3.2.4 CFA for Quality of Life (QoL)

The factor loading values for each items and fitness indexes are shown in Figure 3.4. All the items had factor loading more than 0.60 so there is no items need to be deleted. Besides, the fitness indexes shows the measurement model is significance and the model can be used for further analysis.

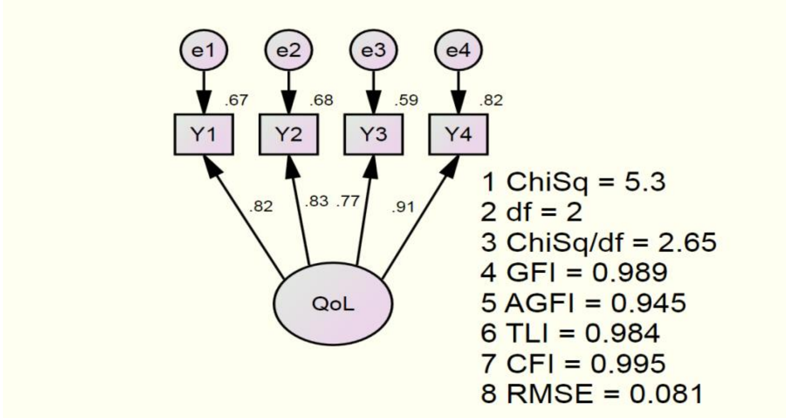


Figure 3.4: CFA for QoL Measurement Model

3.3 The Measurement Model

Figure 3.5 is the initial measurement model after the CFA analysis for each exogenous variable is done. Item reduction process was not executed since all items in respective constructs are above 0.6. Thus, the redundant items in the initial measurement model were examined through the Modification Indices (MI) table which is produced by SEM. The most highly correlated pair of items which are greater than 15 will be setting to be free parameter estimate or deleting one item respectively. The model is re-specified until unidimensionality is achieved for model fitness checking. Figure 3.6 show that the variable *X1*, *X3* and *X4* from construct *AA*, variable *X11* and *X12* from construct SA and the variable *X14*, *X15*, *X18* and *X19* from construct FC were deleted and the measurement model achieve the requirement of fitness indexes.

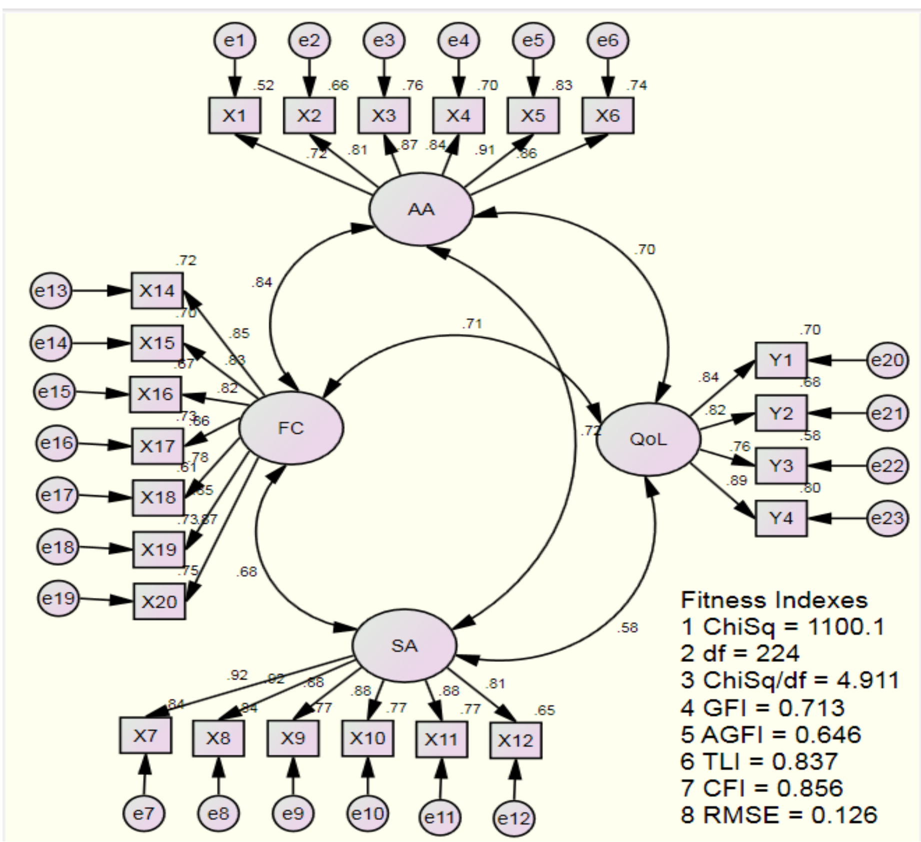


Figure 3.5: Initial Measurement Model

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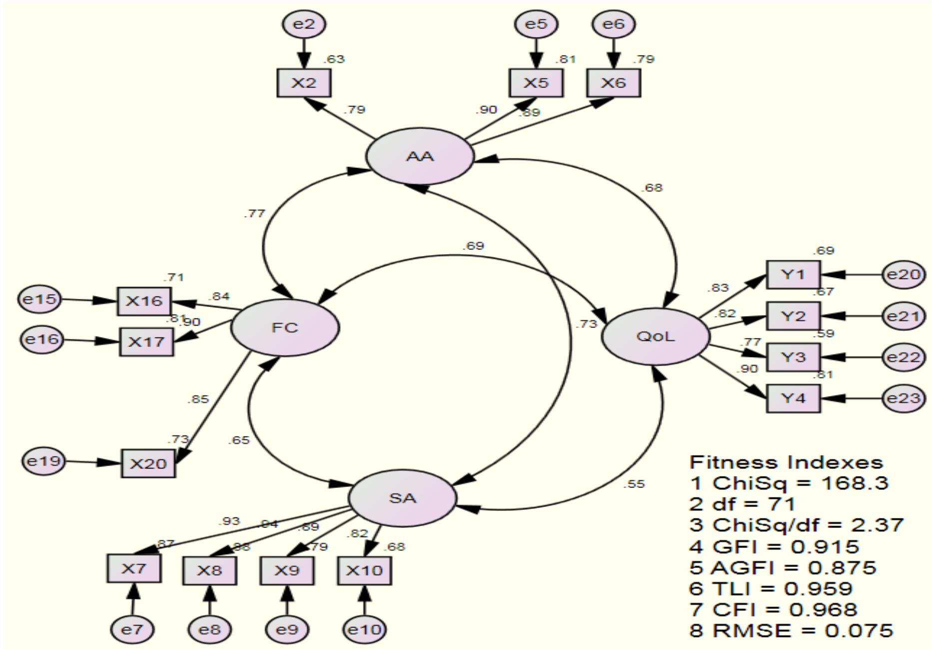

Figure 3.6: Measurement Model after Re-specified

3.4 Structural Equation Model

The standardized regression weights explained the relationship of the each items with variable, when *AA* goes up by 1 standard deviation, *QoL* goes up by 0.332 standard deviations and when *FC* goes up by 1 standard deviation, *QoL* goes up by 0.412 standard deviations. When *SA* goes up by 1 standard deviation, *QoL* goes up by 0.042 standard deviations. The correlation between latent construct *AA*↔*FC* is estimated to be 0.766, latent construct *FC*↔*SA* is estimated to be 0.651 and latent construct *AA*↔*SA* is estimated to be 0.731. Further analysis can be continued because the model achieved the requirement of discriminant validity which the correlation between each pair of latent independent (exogenous) construct should be less than 0.85 (Byrne, 2010).

It was found that, for every one unit increase in *AA*, *QoL* increases by 0.347 units and for every one unit increase in *FC*, *QoL* increases by 0.386 units. When *SA* goes up by 1 unit, *QoL* would increase by 0.038. The relationship between *AA* and *QoL* is significantly at 0.01 levels while relationship between *AA* and *QoL* is significantly at 0.001 levels. However, there is insignificantly relationship between *SA* and *QoL*. Analysis shown that item *X2*, *X5* and *X6* are gives significance contribution to *AA*, items *X7*, *X8*, *X9* and *X10* are gives significance contribution to *SA*, items *X16*, *X17* and *X20* are gives significance contribution to *FC* and *Y1*, *Y2*, *Y3* and *Y4* are gives significance contribution to *QoL*. Analysis for individual regression weight had shown that each item indicates highly significant where the *p*-value is less than 0.0001. The covariance between *AA*↔*FC*, *FC*↔*SA* and *AA*↔*SA* are estimated to be 2.819, 2.752 and 2.770 respectively and all relationships were found to be significant since the *p*-values are less than 0.001.

It was estimated that *QoL* explains 53.4% of its variance which mean that the error variance of *QoL* is approximately 46.6% of the variance itself. Moreover, hypothesis for variance concluded that the variance for all variables in the model are significantly different from zero. So that, we can conclude the model fitted was statistically significance.

Finally, the overall fitness is assessed using Absolute Fit, Incremental Fit and Parsimonious Fit. According to Figure 3.7, the values of model performance indicator such as *RMSEA* = 0.075, *CFI* = 0.968, *TLI* = 0.959 *GFI*= 0.915 and *Chisq/df* = 2.37 indicate that all indicators are significance and achieved the model criterions.

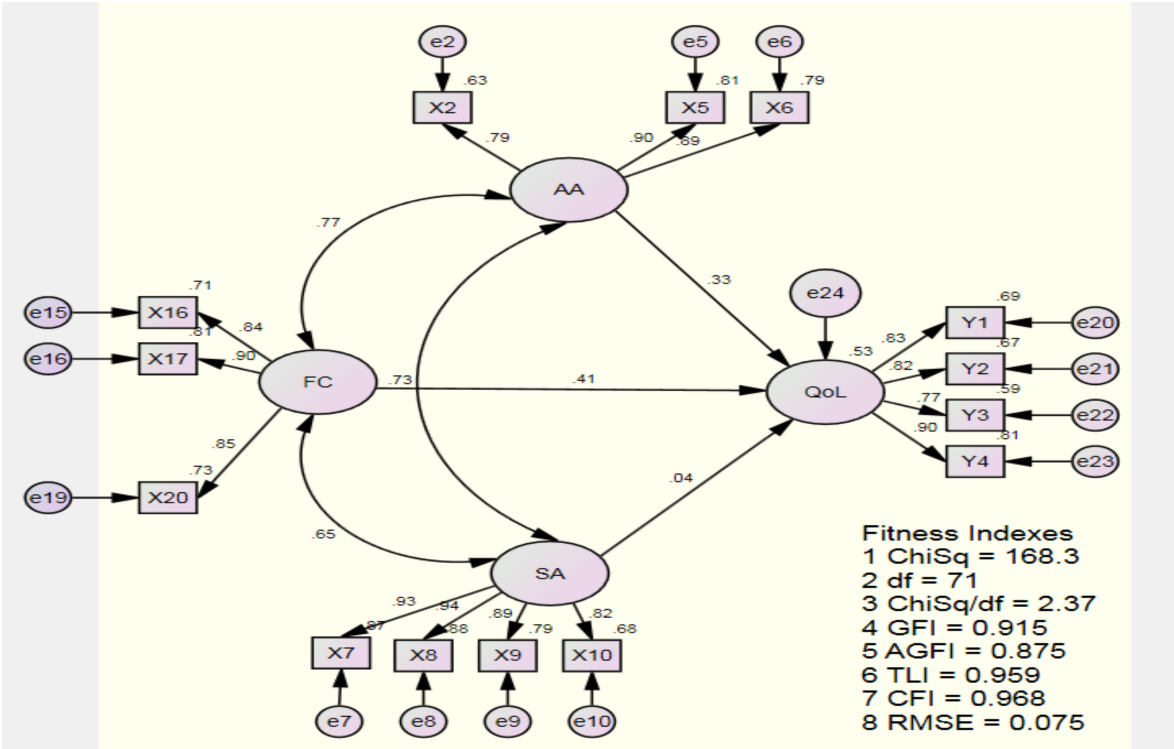

Figure 3.7: Structural Equation Model for Quality of Life

The measurement equation models identified are;

Academics aspect (exogenous)
X2 = 0.79**AA* + 0.63
X5 = 0.90**AA* + 0.81
X6 = 0.89**AA* + 0.79

Social aspect (exogenous)
X7 = 0.93**SA* + 0.87
X8 = 0.94**SA* + 0.86
X9 = 0.89**SA* + 0.79
X10 = 0.82**SA* + 0.68

Facilities (exogenous)
X16 = 0.84**FC* + 0.71
X17 = 0.90**FC* + 0.81
X20 = 0.85**FC* + 0.73

Quality of life (endogenous)
Y1 = 0.83**QoL* + 0.69
Y2 = 0.82**QoL* + 0.67
Y3 = 0.77**QoL* + 0.59
Y4 = 0.90**QoL* + 0.81

The structural equation model can be written as;

QoL = 0.33**AA* + 0.04**SA* + 0.41**FC*

IV. Conclusion and Recommendation

The results indicated that satisfaction on social aspect and satisfaction on facilities are significant and has direct effect on quality of life of UTHM students. However, there are insignificantly relationship and effect between satisfactions on social aspect toward quality of life of UTHM students. The value of R^2 is 0.534, which indicate the contribution of satisfaction on academic aspect, social aspect and facilities in estimating quality of life of UTHM student is 53.4 percent. As recommendation, the administration of university should upgrade and improve their management and planning for student academic aspect especially on timetable arrangement, student workload and academic reputation and also toward the student social aspect especially for international programs and services, spiritual programs and services, clubs and parties and also recreational activities. They also have to provide advance facilities service especially for book store, telecommunications and internet speed and coverage in order to provide the higher quality of life among the UTHM students.

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