PLS Equation Model of Student Loyalty based on Gender in IR 4.0 Environment

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***Abstract*— Students loyalty and attrition is an important issue for university authorities. Earlier studies have discovered that many factors influencing student loyalty towards their higher learning institutions such as student satisfaction, university image, student trust, and service quality. However, these factors have high relationship correlated with each other. Therefore, this study used the Partial Least Square (PLS) to create a path model which shows the relationship between all factors related to student loyalty. The results from this study revealed that student satisfaction is the most important factors that influence student loyalty, followed by image of university and student commitment. Analysis based on gender shows that female student model have a same pattern with overall student loyalty model but the male student loyalty model is simpler just consist student satisfaction. On the other hand, factors technology, social environment and quality of instructor gave a great influence towards student satisfaction. Therefore, in order to improve student loyalty, university should keep on improving to satisfy students' requirement.**

***Keywords*—** *Partial Least Squares, Structural equation Modelling, Student Loyalty, Undergraduate Students*

1. Introduction

It is vital for university management to know what factors lead to student loyalty based on gender. This study is important due to it is important issues for higher institution that facing such as the budget constraints, accommodation, competitors with other universities and reduction in student enrolment. Therefore, student loyalty is an important issue to be considered by the university authorities on long-term strategic planning. Beside that perceptions of student loyalty varied significantly among student of different background such as ages, ethnic background and those studying different courses.

Student attraction and anti-attrition can help management of higher education institution to make better decisions concerning the allocation of resources. Hence, the insight concerning these factors become a crucial issue for determining the most appropriate strategic management in order to ensure long term successful performance for higher education. Past studies indicated that when students were satisfied with their institution, they would display positive attitudes and behaviour towards the institution. However, there are still a high percentage of Malaysian students who decide to pursue their degree in foreign countries. According to UNESCO, Malaysia was one of the top ten countries which have most students study abroad. It is estimated that almost 60,000 Malaysian students choose to study abroad in 2014. With the increasing competition in higher education sector, the university authorities should come out with a strategy not to only attract new students, but also retain the current students.

Thus, building up the student loyalty based on gender is the most important key for any successful higher education institutions. Therefore, this research will explore student loyalty model based on gender in IR4.0 environment.

2. Literature Review

Higher learning institutions is critical to the development of a country and the student is the major human capital for the nation [1]. As such the student loyalty is influenced by many factors such as student satisfaction, service quality and university image [2]. In IR 4.0 environment, the student satisfaction can be defined in many ways,

depending on the requirements of students on the university. Service quality is defined as the extent that the service provided fulfils the customer's expectation. University image is an impression that a student has about their university. Its image has a direct influence in student loyalty ([3], [4].

[4] indicates that student loyalty is the intention to continue education at the same university and also prefer the same institute for future educational needs. Student loyalty have an attitudinal component such as cognitive, affective and conative [5], [6]. Their behaviours were manifest variables about commitment such as repurchase, patronize, recommendation of the university to others, returning to repeat in the institution such as pursuing another level of study, and returning to join activity with the institution under Alumni. Meanwhile, student satisfaction or dissatisfaction leads quit which in turn leads to student attrition [7]. This means that student satisfaction has an important antecedence and a major driver of student loyalty[8].

In higher educational institutions, satisfaction may increase loyalty predictor of student loyalty. [3] on their study has indicates that student satisfaction has the highest degree of association with student loyalty both directly and totally, representing total effect about three times higher than the effect of image university. [9] indicates that just like any form of business, factors related to satisfaction levels and students' perceptions of quality will attract and retain students.

There are many analytical methods that could be used to analyse the relationships between factors, for instance, multiple linear regression, canonical correlation analysis and principal component analysis. However, the partial least squares (PLS) path model is proposed by [10] can also be implemented to analyse the relationship between variables. It has been widely used in many fields, such as safety and health [11], marketing ([12], organization [13], management information system [14], behavioural sciences [15], business strategy [16], etc. PLS are more appropriate when the interest is in prediction and theory development rather than in theory testing [12], [14]. Thus, there is a significant need to further study on factors influencing student loyalty based on gender in higher education.

3. Methodology

3.1 Data Collection

The data for this study is collected through a paper questionnaire. The questionnaire used for this study will be modified from past studies such as [17]. It will consist of demographic information of students, perception on student satisfaction based on instructor, administration, curriculum, physical environment and technology, perception of students loyalty based on student's satisfaction, university's service quality, university image and student's commitment.

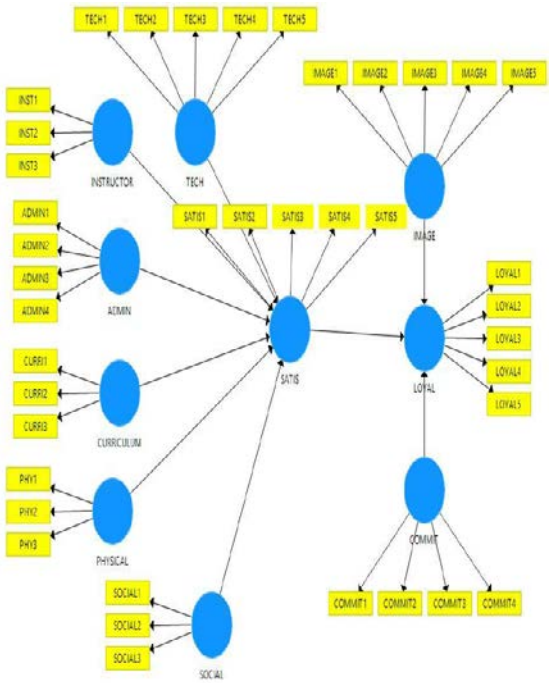

Figure 1. Proposed Student Loyalty Model

Therefore, the 9 following hypotheses have been formulated:

H1. Student satisfaction will have an effect on student loyalty.
H2. University image will have an effect on student loyalty.
H3. Student commitment will have an effect on student loyalty.
H4. Instructor will have an effect on student satisfaction.
H5. Administration quality will have an effect on student satisfaction.
H6. Curriculum will have an effect on student satisfaction.
H7. Physical environment will have an effect on student satisfaction.

H8. Social environment will have an effect on student satisfaction.
H9. Technologies facility will have an effect on student satisfaction.

3.2 Method of Data Analysis

A PLS structural equation modelling is a statistical method which used to create structural models of the relationships between every variables simultaneously. The aim to conduct PLS to reduce the number of variables to a smaller set of uncorrelated components and performs least squares regression on these components. Therefore, PLS method can be applied to theory development, as it tests and validates exploratory models and can estimate complex models with several latent and manifest variables [12], [18], [19].

The PLS path model is defined by 2 sub-models: (1) a measurement model to assess and develop the reliability and validity of the instrument and testing the goodness of measure and (2) a structural model to assess the hypothesized relationship among constructs in the conceptual model. There are a few assumptions to be checked before using PLS method, which are indicator reliability, internal consistency reliability, convergent validity and discriminant validity. This study will use a software named SmartPLS to test the relationship between variable and to create the PLS path model.

4 Results and Discussion

4.1 Descriptive Analysis

Initially, results from description of respondents show that 69.5% of respondents were females and 30.5% were male students. Besides that, 98.7% of the respondents are Malaysian and 1.3% are Non-Malaysian. Respondents of the questionnaire survey are represented by various ethnicities. 64.7% of the respondents were Malay, with the rest of the sample being 24.1% Chinese, 6% Indian and 2.6% others. 61.8% of the respondents are employed while 38.2 are unemployed.

Path coefficient and Hypothesis Testing

This study proposed 9 research hypotheses testing, which were analysed using PLS structural model. The path significance levels are estimated by the bootstrapping method using SmartPLS 3.0. The results for *t*-statistics are shown in Figure 2. Table 1 indicates the results for path coefficient for each hypothesis. Based on Table 1, 6 out of 9 hypotheses were supported. The results show that hypotheses H1, H2, H3, H4, H8 and H9 are significant.

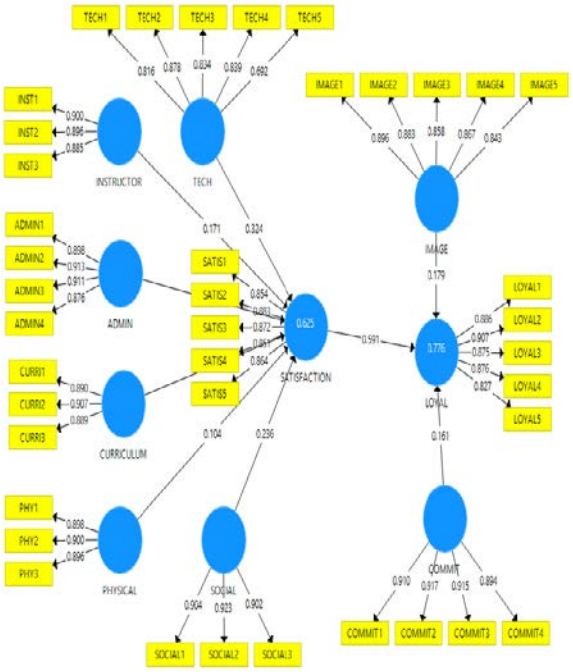

Figure 2. The Structural Model and Path Analysis between Constructs.

Table 1. Path Coefficients and Hypothesis Testing.

		Mean	Standard Deviation	T Values	*p*-values
H1	Satisfaction -> Loyalty	0.59	0.059	10.02	0
H2	Image -> Loyalty	0.179	0.049	3.681	0
H3	Commitment -> Loyalty	0.163	0.058	2.764	0.006
H4	Instructor -> Satisfaction	0.17	0.062	2.761	0.006
H5	Admin -> Satisfaction	0.078	0.049	1.602	0.109
H6	Curriculum -> Satisfaction	0.033	0.046	0.726	0.468
H7	Physical -> Satisfaction	0.105	0.059	1.774	0.076
H8	Social -> Satisfaction	0.237	0.052	4.547	0
H9	Technology -> Satisfaction	0.323	0.053	6.136	0

Based on Table 1, 3 hypothesis for student satisfaction were significant which are instructor, social environment and technology since the *p*-values were less than 0.05. However, factors such as administration, curriculum and physical environment are not significance. Thus, the final

PLS model is constructed again after remove insignificant factors, as given in Figure 3. Figure 3 also give the R^2 value for satisfaction, student commitment and university image. The R^2 value for student loyalty is 0.777 suggest that 77.7% variation in student loyalty can be explained by student satisfaction, university image and student commitment. These R^2 value of student loyalty path showed a good predictive ability to describe the behaviour of student loyalty. Meanwhile, the R^2 of student satisfaction value is 0.625. Therefore only 62.5% variation in student satisfaction is explained by instructor, social environment and technology.

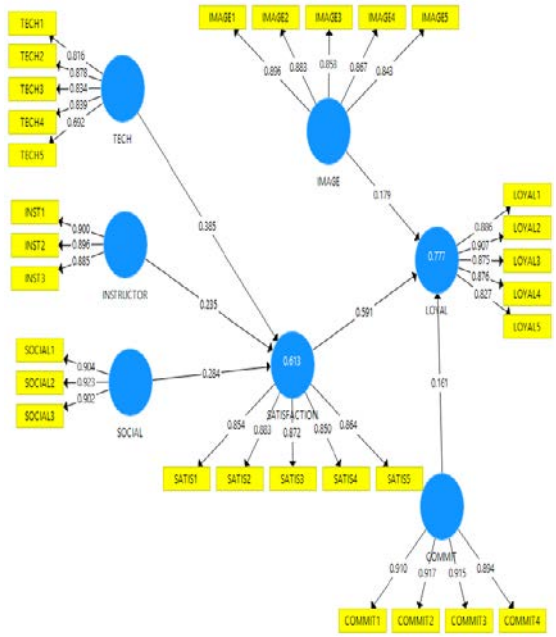

Figure 3. The Structural Model and Path Analysis between Constructs.

Table 2. Path Coefficients for Male Student Loyalty Model

	Mean	Standard Deviation	T Values	*p*-values
Admin -> satisfaction	-0.135	0.084	1.671	**0.095**
Commitment -> loyalty	0.119	0.103	1.068	**0.286**
Curriculum -> satisfaction	0.160	0.109	1.483	**0.138**
Image -> loyalty	0.098	0.100	1.020	**0.308**
Instructor -> satisfaction	0.118	0.088	1.439	**0.150**
Physical -> satisfaction	0.185	0.078	2.280	**0.023**
Satisfaction -> loyalty	0.698	0.111	6.342	**0.000**
Social -> satisfaction	0.267	0.082	3.245	**0.001**
Technology -> satisfaction	0.381	0.069	5.518	**0.000**

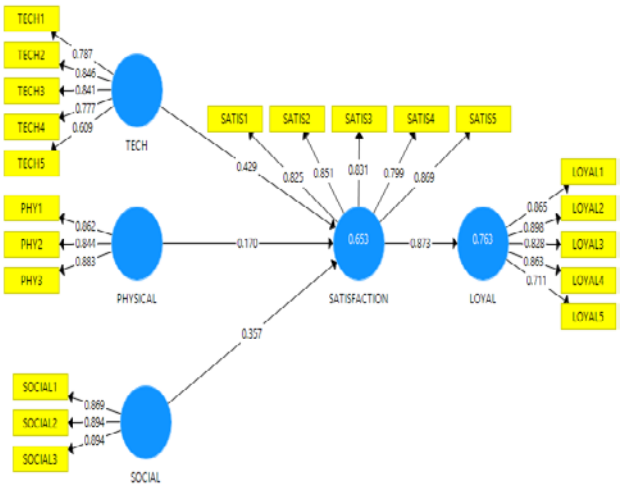

Figure 4. The Student Loyalty Model for Male.

Student loyalty Model based on Gender

Previously, we model the overall student loyalty model. Next, we look for different student loyalty model based on their gender. Figure 4 and 5 display the student loyalty model for male and female, respectively. Their path coefficients are given in Table 2 and 3 for male and female, respectively. Based on Table 2, for male student loyalty model, 4 paths are statistically significant, where only path student satisfaction is statistically significant to student loyalty. Although only path student satisfaction is significant, this path model still give a high R^2 value, which is 0.772. Meanwhile, the R^2 value for satisfaction path model is 0.676.

On the other hand, female student loyalty model more complicated compared to male student loyalty model. Figure 5 display the student loyalty model for female. The path coefficients for female model are given in Table 3. For female student loyalty model, all 3 paths towards student loyalty are statistically significant with R^2 is 0.78. This R^2 value is slightly difference with R^2 for male model. The R^2 value for male is 0.763 compared to female is 0.78, although the model for male is simpler compared to female model. In addition, male model consist only student satisfaction instead of all 3 factors. On the other hand, for paths female student satisfaction, the value of R^2 is 0.62 that consist of administration, social environment, technology and physical environment. Again, male model is simple to female model that consist only 3 factors which are technology, social, and physical environment.

Table 3. Path Coefficients for Female Student Loyalty Model

	Mean	Standard Deviation	T Values	*p*-values
Admin -> satisfaction	0.138	0.058	2.392	**0.017**
Commitment -> loyalty	0.177	0.071	2.473	**0.013**
Curriculum -> satisfaction	0.001	0.048	0.027	**0.978**
Image -> loyalty	0.201	0.056	3.602	**0.000**
Instructor -> satisfaction	0.210	0.077	2.739	**0.006**
Physical -> satisfaction	0.096	0.073	1.338	**0.181**
Satisfaction -> loyalty	0.558	0.070	7.970	**0.000**
Social -> satisfaction	0.194	0.066	2.938	**0.003**
Technology -> satisfaction	0.301	0.069	4.307	**0.000**

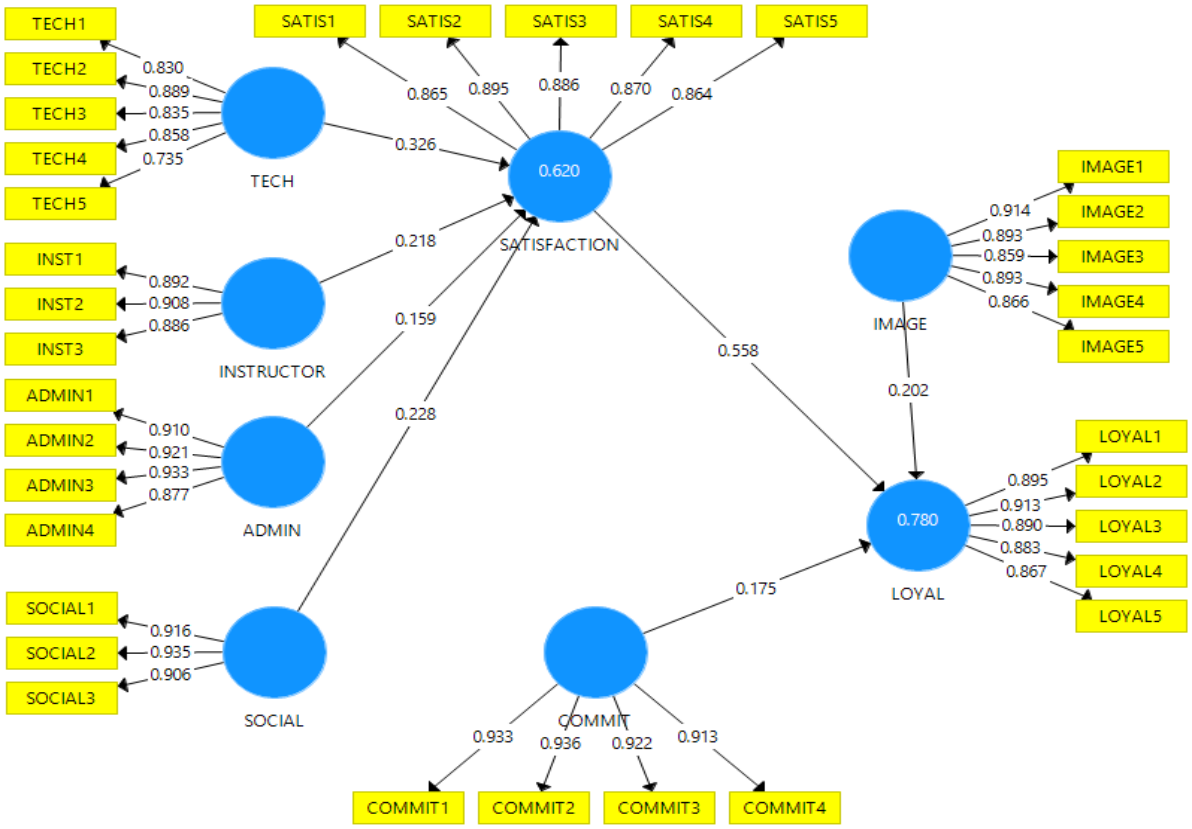

Figure 5. The Student Loyalty Model for Female

4 Conclusion

This research successfully achieves all the research objective by presenting student loyalty model using PLS. This study pursued to identify significant factors that influence student loyalty based on gender in IR4.0 environment. The results shows that the key factors of student loyalty are the student satisfaction, followed by image of university and student commitment. Female student loyalty model also have a same pattern with overall student loyalty model but the male student loyalty model is simpler just consist only student satisfaction. The outcomes also showed that the most important student satisfaction that students emphasizes is on technology, followed by social environment and quality of instructor.

Acknowledgments

The authors acknowledge to Universiti Utara Malaysia by funded this research under Research Grant (S/O Code: 13877).

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