

Factor Analysis of Students' Satisfaction with Academic Courses

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Abstract

This research aimed to distinguish the factors affecting student satisfaction at selected Seventh-day Adventist higher educational institutions in Southeast Asia. Knowing these factors could help educational leaders to thoroughly plan their strategies and better understand the determinants of student satisfaction. A questionnaire was distributed to student respondents at two higher educational institutions in the Southern Asia-Pacific region, namely Asia-Pacific International University (AIU) in Thailand and Universitas Advent Indonesia (UNAI) in Indonesia. Exploratory factor analysis was used to distinguish the underlying dimensions that drive student satisfaction and to analyze dimensions of academic courses. A sampling adequacy test yielded a value of 0.590, which was > 0.50 ; hence, the sample size was adequate for the analysis. The commonalities of all variables surpassed .40, and consequently, were helpful in the model. The results showed that several factors affected student satisfaction with academic courses at AIU and UNAI. The courses that helped them were those which developed problem-solving skills, ability to work together in teams, communication skills, the ability to plan, and those that were organized in a systematic way.

Keywords: *Satisfaction, factor analysis, higher educational institutions*

Introduction

Higher educational institutions are essential pillars in the development of society because they are actually producers of educated and well-grounded people. Likewise, higher educational institutions need to take the satisfaction of their students seriously. In this sense, young people are striving to achieve their purposes and realize their dreams in life. Their ambitions are usually in line with their talents and the knowledge they are striving to gain in their chosen fields. We can see that it is necessary for institutions to create and support particular factors that lead to student satisfaction. Young people make every effort to achieve their goals, and so satisfaction—and dissatisfaction—can lead to many things. At a certain point in their lives ahead, how will this affect students and their decisions? Will they have resentment, and will they have broken characters if they are not satisfied with the course of their academic lives? On the other hand, we see that society looks at the development of institutions, and may have a different view that is unfavorable for the university. Customer satisfaction is indeed important, and students as customers need to be satisfied for many reasons and not only for students but for customers in any kind of service institution.

Customer satisfaction is studied by many types of service institutions; for instance, Direkvand-Moghadam, Hashemian, Delpisheh, Sohili, and Sayehmiri (2014) studied patient satisfaction in emergency care units, while Yusoff, Mcleay, and Woodruffe-Burton (2015) examined various dimensions driving business students in higher educational institutions. Moreover, customer satisfaction affects their decision-making. The identification of customer decision-making goes back to early economists such as decision-making Bernoulli, von Neumann, and Morgenstern, who started to identify and point out the basis of consumer around 300 years ago (Richarme, 2005).

Previous studies conducted by Shirazi (2017), Parahoo, Harvey, and Tamim (2013), Tahar, Mokhtar, Jaafar, Zamani, Sukiman, and Ismail (2013), and Khosravi, Poushaneh, Roozegar, and

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Sohrabifard (2013) looked at student satisfaction and the factors affecting it. They concluded that satisfaction is important in one's life. Research conducted by Deshields, Kara, and Kaynak (2005), along with Helgesen and Nessel (2007), suggested that continued investigation of student satisfaction helps them in their academic achievement and moreover, contributes to the preservation and existence of higher educational institutions. Thus, they suggest, a higher educational institution should strive for a desirable image that will help to attract more young people. It should also serve them and provide them with academic satisfaction in pursuit of their educational goals.

Theoretical Foundation

The literature presents many views regarding criteria to measure satisfaction. According to Kuo (2010), students look at their education experiences in terms of their satisfaction. Therefore, this research suggests that students with satisfactory experiences will continue their studies. On the other hand, according to Chua (2004), satisfaction is a key element in business continuity and growth in the midst of competition. Moreover, Athanassopoulos, Gounaris, and Stathakopoulos (2001) see that satisfied students are also loyal students, which leads them to pursue a higher degree at the same university. In his research, Shirazi (2017) found three key indicators of academic satisfaction, namely: experienced staff, mutual respect between professors and students, and nurture of self-esteem in students by instructors and administrators. This assertion was supported by studies conducted by James (2001), as well as by Umbach and Porter's (2002). These studies claimed that higher educational satisfaction is found in students who conduct research and have good communication with their professors.

Methodology

A modified questionnaire based on an instrument developed by Seng and Ling (2013) was distributed to student respondents at two higher educational institutions in the Southern Asia-Pacific Division, namely Asia-Pacific International University (AIU) and Universitas Advent Indonesia (UNAI). There are approximately 3,000 students studying at both higher educational institutions. A sample size of 25 students was used for the study, and the results were tested and cleared using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity. Factor analysis was used to analyze various dimensions of student satisfaction with academic courses.

The following relevant outputs of the study were as follows: descriptive statistics were used to look at the characteristics of the variables used in the study (Priyatno, 2014), and a correlation matrix was used to look at the relationship between variables used in the study (Riduwan, 2014). For factor analysis, Verma (2013) stated that the KMO and Bartlett's test may be utilized to see if the data is satisfactory for the study, as well as variance that may be shared among variables. Other relevant output includes a scree plot, component loadings, and a varimax-rotated solution. According to Verma (2013), when applying factor analysis, a test battery may be generated that shows the number of factors to be retained, and the total variance explained by these factors. In this manner, the variables in each factor which remain in the solution can be discovered, along with their relative importance. These factors can then be named according to their nature, and tests can be proposed and utilized to survey student satisfaction with the academic courses at any higher educational institution.

Results and Discussion

The results of the study provided solutions to numerous concerns related to the topic. The study used statistical software to process relevant outputs that were specifically chosen for discussion. By using the factor analysis statistical method, the various methods can determine the test battery for assessing student academic satisfaction.

Descriptive Statistics

The study used the Mean and Standard Deviation (SD) to descriptively describe the study's variables. Table 1 displays characteristics of study variables, reporting the mean and SD scores for all

variables. The results show that respondents agree and strongly agree that they are satisfied with academic courses offered in their universities.

Table 1. Descriptive Statistics ($n = 25$)

No	Variables	Mean	Std. Dev.
C 1	Courses and problem-solving skills	4.00	0.71
C 2	Courses and confidence to tackle unfamiliar problems	4.16	0.55
C 3	Courses and sharpened analytic skills	4.24	0.66
C 4	Courses and ability to work as a team member	4.40	0.65
C 5	Courses and written communication skills	4.28	0.61
C 6	Courses and ability to plan one's own work	4.24	0.52
C 7	The course content was organized in a systematic way	4.20	0.58
C 8	Flexibility in the course to suit needs	3.92	0.70
C 9	Course content is valuable	4.04	0.74

Correlation Matrix

Table 2 shows relationships between study variables. The value of "r" required for significance at the .05 level is .396, with $N - 2 = 23$ degrees of freedom. The value of "r" required for significance at the .01 level is .505.

Table 2. Correlation Matrix

Component	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9
C 1	1.00	.43*	.18	.27	.77**	.56**	.00	.59**	.64**
C 2	.43*	1.00	.46*	.75**	.48*	.58**	.16	.14	.09
C 3	.18	.46*	1.00	.64**	.24	.55**	.52**	.31	-.02
C 4	.27	.75**	.64*	1.00	.55**	.69**	.45	.26	.05
C 5	.77**	.48*	.24	.55**	1.00	.82**	.07	.34	.44*
C 6	.56**	.58**	.55**	.69**	.82**	1.00	.39	.28	.19
C 7	.00	.16	.52**	.45*	.07	.39	1.00	.56**	.08
C 8	.59**	.14	.31	.26	.34	.28	.56**	1.00	.73**
C 9	.64**	.09	-.02	.05	.44*	.19	.08	.73**	1.00

** Correlation is significant at the .01 level.

* Correlation is significant at the .05 level.

Kaiser-Meyer-Olkin Measure (KMO) of Sampling Adequacy & Bartlett's Test

Table 3 displays KMO test results, which express whether the study's sample size was adequate or not for factor analysis. Based on Table 3, the value was .59, which was greater than .50; therefore, the sample size was adequate for analysis. Further, Bartlett's test of sphericity was used to see if the correlation matrix was indeed an identity matrix (Verma, 2013), as postulated in the null hypothesis. Since the correlation matrix p -value was .000, which is less than .01 and a significant score, it was determined that the correlation matrix was not an identity matrix, and so use of the factor model was suitable.

Table 3. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.59
Bartlett's Test of Sphericity	Approx. Chi-Sq.
	168.44
	df
	36
	Sig.
	.000

Communalities Test

In this statistical test, higher levels of shared variance among variables indicated that most of the variability was explained by factors singled out in the analysis. The communality threshold for variables is .40; results below .40 are considered to be useless, and are usually removed from a model (Verma, 2013). Results from Table 4 show that the shared communalities of all variables were more than .40; therefore, all variables were useful for the model.

Table 4. Communalities Test

Variables	Initial	Extraction
C 1 Courses and problem-solving skills	1.00	.88
C 2 Courses and confidence to tackle unfamiliar problems	1.00	.71
C 3 Courses and sharpened analytic skills	1.00	.73
C 4 Courses and ability to work as a team member	1.00	.84
C 5 Courses and written communication skills	1.00	.87
C 6 Courses and ability to plan one's own work	1.00	.82
C 7 The course content was organized in a systematic way	1.00	.87
C 8 Flexibility in the course to suit needs	1.00	.95
C 9 Course content is valuable	1.00	.86

Eigenvalues

After rotation, the first, second, and third factors explained about 35.4%, 27.5%, and 20.8% respectively (please see Table 5) of the total variance. Thus, in combination, these factors accounted for 83.7% of the data's total variance. The values of factors in the table below displays that the only factors retained in the study were those with Eigenvalues of 1 or higher (Verma, 2013). Since only the first three factors had Eigenvalues that met this requirement, they were the only ones that were retained in this study.

Table 5. Total Variance Explained

Comp.	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Variance %	Cumul. %	Total	Variance %	Cumul. %	Total	Variance %	Cumul. %
	1	2	3	4	5	6	7	8	9
1	4.27	47.5	47.5	4.27	47.5	47.5	3.18	35.4	35.4
2	1.87	20.8	68.3	1.87	20.8	68.3	2.47	27.5	62.9
3	1.39	15.4	83.7	1.39	15.4	83.7	1.88	20.8	83.7
4	0.56	6.2	89.8						
5	0.40	4.5	94.3						
6	0.26	2.9	97.1						
7	0.16	1.8	98.9						
8	0.05	.6	99.5						
9	0.05	.5	100.0						

Extraction Method: Principal Component Analysis

Scree Plot

Figure 1 presents a scree plot that was constructed by plotting each factor along the X-axis toward its Eigenvalue, which is displayed along the Y-axis. This plot reveals that only three factors had Eigenvalues higher than the bend in the diagram's "elbow". Therefore, only these factors were subjected to further analysis.

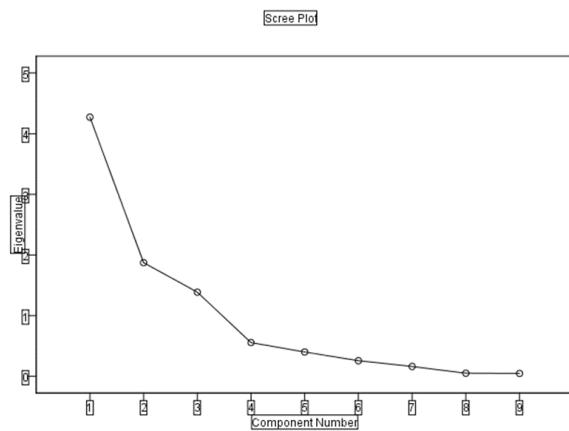


Figure 1. Scree Plot

Extracted Factors

Based on the statistical analysis, three factors were selected, and factor loadings for each variable are displayed in Table 6. This factor solution has not been rotated, and so some variables may contribute to more than one factor. To prevent this, the factors were rotated in the manner prescribed by Verma (2013), which consisted of a varimax rotation that is favored because of its efficiency.

Variables are normally included in a factor if their loading is .70 or more (Verma, 2013). This warrants that a factor obtains an adequate variance from that variable. However, this target may be lowered if an insufficient number of variables are detected for the factor. For this study, variables with factor loadings equal to or more than .60 were retained. For this reason, variables were grouped for each of three factors; a test battery for factors related to student satisfaction with academic courses is shown in Table 6.

Table 6. Component Matrix

Variables	Component		
	1	2	3
Courses and problem-solving skills	.74	.54	-.24
Courses and confidence to tackle unfamiliar problems	.69	-.33	-.34
Courses and sharpened analytic skills	.63	-.51	.28
Courses and ability to work as a team member	.78	-.48	-.07
Courses and written communication skills	.81	.22	-.41
Courses and ability to plan one's own work	.86	-.19	-.21
The course content was organized in a systematic way	.48	-.31	.74
Flexibility in course to suit needs	.63	.46	.58
Course content is valuable	.48	.77	.19

Extraction Method: Principal Component Analysis, 3 components extracted.

Our rotated component matrix shows that the first component was measured by:

- Courses and problem-solving skills.
- Courses and ability to work as a team member
- Courses and written communication skills
- Courses and ability to plan own work

Thus, the three components were accepted as variable labels after adding the factor scores from the data. Note that these variables all related to respondents receiving soft skills. Therefore, we interpret Component 1 as “satisfaction with soft skills in an academic course”. After interpreting all components in a similar fashion, we arrived at the following descriptions:

- Component 1 - “satisfaction with soft skills in academic courses”
- Component 2 - “satisfaction with content in academic courses”
- Component 3 - “satisfaction with the organization and systematic content of academic courses”

Table 7. Test Battery

Variables	Loadings	Factors
C 1	.74	Courses and problem-solving skills
C 4	.78	Courses and ability to work as a team member
C 5	.81	Courses and written communication skills
C 6	.86	Courses and ability to plan one's own work
C 7	.74	The course content was organized in a systematic way
C 9	.77	Course content is valuable

Test Battery

The results in Table 7 show important factors in the analysis of student satisfaction with academic courses at Asia-Pacific International University and Universitas Advent Indonesia. The following factors regarding the courses were helpful to students: problem-solving skills, working together as a team, communication skills, developing the ability to plan, course content was organized in a systematic way, and a course was valuable. These factors from the study were divided into three components, consisting of (1) satisfaction with soft skills given in the academic course, (2) satisfaction with content in the academic course, and (3) satisfaction with the organization and systematic content of the academic course.

Conclusions and Recommendations

Students as customers and recipients of academic services hold an important key to higher educational institutions. Therefore, continuous monitoring of their academic satisfaction is deemed important, as this supports their academic achievement. This is one reason that higher educational institutions should be aware of essential facts and real measures of academic satisfaction. In order to generate a battery of tests to incorporate student satisfaction with academic courses, respondents may prefer different variables among the distinctive factors. When each factor's percentage of the total variability is about the same, then one variable that includes the distinctive factor may be selected to generate a test to estimate student satisfaction with academic courses. Thus, the features shown in the results section above such as problem-solving skills, working with team members, communication skills, planning work, systematic organization, and valuable content can help administrators to maintain and enhance student satisfaction. These factors were divided into three components, namely Component 1: satisfaction with soft skills given in the academic course; Component 2: satisfaction with content of the academic course; and Component 3: satisfaction with organized and systematic content in academic courses. Administrators need to ensure that these

components are fully understood by teachers and academic staff members. School management may also identify more than one variable from some factors, depending on their plausibility.

University administrators should explain the importance of soft skills to teachers; these are comprised of problem-solving skills, ability to work as a team member, written communication skills, and ability to plan one's own work. Program managers must also ensure that course content is regularly updated and kept valuable for students, and that this content is organized in a systematic way.

The researchers recommend using confirmatory factor analysis with further data sets to investigate these questions before this tool is used to estimate student satisfaction with academic courses because this was a simulated study.

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