STUDENT'S SATISFACTION INDEX (SSCT MODEL): AN APPLICATION OF STRUCTURAL EQUATION MODEL

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Abstract

This study scrutinizes the student's satisfaction towards the co-curricular trainers in Universiti Utara Malaysia (UUM), Malaysia. The underlying principle is that to provide positive information to the trainers to grant students better quality of co-curricular service in boosting up their satisfaction level. The theoretical framework of students' satisfaction (SSCT model) was developed based on relevant literatures and theoretical considerations adopted from the American Customer Satisfaction Index (ACSI) Model. A survey was distributed to 400 co-curricular students with 90.5% response rate. Six latent variables: student's expectation towards the trainer, perceived quality, perceived value, students satisfaction (SSCT), trainers image and students confidence were asked in the survey. Data was analyzed using structural equation modeling technique, to estimate the fit indices for all the latent variables. Results conjectured that students' satisfaction (SSCT model) is analogous to the existing model (ACSI model). Thus, the SSCT model can be implemented as a stuctured model for measuring students' satisfaction towards the co-curricular trainers as the fit indices of the model is having a good fit. Further investigation revealed that all index scores for each Co-curricular Unit are above 65% except for the index score by Music Arts Unit.

Keywords: Higher Education, Co-Curricular Trainer, Students' Satisfaction, Structural Equation Modeling, Index.

Introduction

Students' opinions about all aspects of academic life are now sought by educational institution worldwide, generally in the form of a satisfaction feedback questionnaire (Douglas, Barnes & Douglas, 2006; Navarro, Iglesias & Torres, 2005; and Athiyaman, 1997). Douglas, Barnes & Douglas (2006) believe that keeping customer satisfied leads to customer loyalty. While Navarro, Iglesias and Torres (2005) have found that the teaching staff, enrollment and course organization are the elements that have an impact on student's satisfaction. Most of previous research papers on student's satisfaction are concentrated on the academic courses and using a discrete rating scale in their questionnaire to collect a data. (Ngware & Ndirangu, 2005; Nasser & Abouchedid, 2005; Rivera & Rice, 2002; Butler, Whitehead & Winkleman, 2001; and Athiyaman, 1997).

According to Martens and Prosser (1998), the high quality of teaching is fundamentally about affording high quality student learning. The quality of teaching and learning is now high on university agenda. Surveys on teaching evaluation have been conducted by many universities including University Teaching and Learning Center (UTLC) in UUM. The purpose of those surveys is to gather information about the student course experience, performance and rating of the lecturer, and satisfaction of the students.

Problem Statement

Co-curricular course have been introduced in UUM since 1984 and it is a compulsory for the UUM's students to take the courses. The Co-curricular Center is responsible to monitor the co-curricular activities, syllabuses, modules and trainers. Co-curricular Centre has to appoint part time trainers for conducting 16 co-curricular courses (Table 1) every semester. Thus, it is appropriate and high time to Co-curricular Centre to perform the trainer evaluation because the information on trainer evaluations can provide (1) feedback to the trainer for correction and improvement, and (2) as benchmark to make a decision regarding promotion and tenure or others. Therefore, it is also hoped that the results of this study will provide some feedback and input to Co-curricular Centre in its attempt to redesign the questionnaires for trainer's evaluation. The management of Co-curricular Centre and their coordinator can also refer to the

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results of this study as a benchmark to help them identify and choose their trainer.

Table 1 : Co-curricular Courses by Co-curricular Unit

No.	Co-curricular Unit	No.	Co-curricular Unit
1.	**Emergency Aids**	7.	**Co-Mechanic**
	Red Cross		Co-Mechanic
	S. John Ambulance		Go Kart
	Fire Brigade	8.	**Field, Water and Air Sports**
	Civil Defence		Soccer, Hand Ball, Softball, Hokey, Rugby,
2.	**Living Skills**		Golf, Archery, Lawn Bowling, Sepak Takraw,
	Kembara		Volley Ball, Basket Ball, Futsal, Swimming,
	Scouts		Tennis, Badminton, Ping Pong, Squash,
3.	**Vocal Arts**		Sprinting, Cycling and Para motor.
	Choir	9.	**Science And Recreational Sports**
	Islamic Art		Sport Science
	Public Speaking		Sport and Recreational Management
	Tarannum Bil Quran	10.	**Mass Technology and Creativity**
4.	**Music Arts**		Media Technology
	Traditional Music		Creativity
	Orchestra	11.	**Social Work**
	Angklong		Community Development
	Brass Band		Women Development
	Cak Lempong	12.	**Agro Business**
	Bagpipe		Aquaculture
	Gamelan		Horticulture
	Keroncong		Veterinary
5.	**Performance Arts**	13.	**Entrepreneurship**
	Acting		Student Business
	Panting		Franchise
	Carving		Catering
	Malay Dance		Beauty and Make up
6.	**Martial Arts**		Interior Design
	Silat Cekak		Apparel and Dressmaking
	Silat Gayong	14.	**Leadership**
	Silat Olahraga		Counseling
	Karate Do		Leadership
	Taekwondo (ITF)		Spirituality
	Taekwondo (WTF)	15.	**PALAPES**
		16.	**SUKSIS's Corps**

Significance of the Study

The rationale for measuring student's satisfaction index is to help Management of UUM to understand the perspective of student's towards UUM's co-curricular trainer. This research gives the answer for the following questions; (1) The satisfaction level of student towards the trainer, (2) The performance (perceived quality) of trainer from the eyes of the student's, (3) The image and reputation of trainer from the eyes of the student's, (4) Student's trust or confidence towards the trainer, and (5) The perception of the student's on trainer.

Methodology

Population

The population for this research is all the registered co-curricular students in Semester II excluding (1) the first semester students, (2) PALAPES, and (3) SUKSIS's Corps students. It is assumes that first semester students are not being able to evaluate and voice out their opinion since they are still new and just in six weeks of class. With lack of experience and knowledge, it is possible for them to evaluate their trainer.

Sample

Sample size should not be small as Structural Equation Model (SEM) relies on tests, which are sensitive to sample size, as well as to the

magnitude of differences in covariance matrices. Garson (2008) summarized as follows;

i. Loehlin (1992) recommends at least 100 cases, preferably 200.
ii. Hoyle (1995) also recommends a sample size of at least 100 - 200.
iii. Kling (1998) considers sample sizes under 100 to be "untenable" in SEM.
iv. Schumacker and Lomax (2004) surveyed the literature and found sample sizes of 250 to 500 to be used in "many articles" and "numerous studies that were in agreement" that fewer than 100 or 150 subjects was below the minimum.

A sample of 150 is considered too small unless the covariance coefficients are relatively large. With over ten variables, sample size under 200 generally means parameter estimates are unstable and significance tests lack power. One rule of thumb found in the literature is that sample size should be at least 50 more than 8 times the number of variables in the model. Mitchell (1993) advances the rule of thumb that there be 10 to 20 times as many cases as variables. Another rule of thumb, based on Stevens (1996), is to have at least 15 cases per measured variable or indicator. Bentler and Chou (1987) allow as few as 5 cases per parameter estimate (including error terms as well as path coefficients) if one has met all data assumptions. Taking into consideration, a total number of 400 questionnaries has been sent to the co-curricular trainers. From the sample, a total of 385 questionnaries were returned back and only 362 questionnaries was satisfied the researcher for data analysis. Sstratified sampling technique has been used to obtain a sample from the sampling frame.

Data Collection Technique

At the questionnarie design stage, six factors of measurement of students satisfaction were considered. The items (also known as indicators) were adopted from the Rosna & Victor (2003) and some were also developed by the researcher herself, based on the experience as a Co-Curricular Coordinator in UUM (Table 2). Informal interviews were also carried out during questionnaire development.

The continuos rating scale was used for the items measurement. In a graphic rating scale respondents rate the objects by placing a mark at the appropriate position on a line that runs from one extreme of criterion variable to the others (Malhotra,1996). This scale has the advantage of allowing the researchers to choose any interval they wish for purpose of scoring (Zikmund, 2003). Table 2 are the items of questionnarie. A pilot study has been conducted in order for the researcher to test the reliability and the validity of the items. All items displayed composite reliabilities in excess of the 0.60 recommended value for exploratory studies (Churchill, 1979) except for item 'have good vocal delivery' which had a reliability value of 0.367. Thus, other items is accepted in this study since the cronbach's alpha values are between 0.607 and 0.925.

Table 2 : Items of Question in Questionnaire

Code	Description	Latent Variable
QG1	listen carefully to what you want	Perceived quality
QG2	is positive in helping me understanding	Perceived quality
QG3	provides suitable response to student questions	Perceived quality
QG4	helps students to sort our problems with understanding	Perceived quality
QG5	shows genuine interest in and concern for student progress	Perceived quality
OG6	is sensitive to and concern with different students needs	Perceived quality
QT7	starts the lecture on time	Perceived quality
QT8	postpones or cancel lectures without any advanced notice	Perceived quality
C1	has good vocal delivery	Students expectation
C2	teaches with the appropriate intonation	Students expectation
C3	makes clear explanations	Students expectation
C4	injects appropriate humor	Students expectation
S1	state lesson objective clearly	Students expectation
S2	has a thorough knowledge, basic and current of the subject	Students expectation
S3	teaches in a systematic manner	Students expectation
S4	present materials in an interesting manner	Students expectation
M1	encourage class to participate	Students expectation
M2	show great confidence in the subject matter	Students expectation
M3	is able to stimulate my interest in the lessons	Students expectation
M4	helps increase my self confidence	Students expectation

O1	make good use of examples and illustrations to get across difficult points	SSCT
O2	make it easy for me to remember lessons as lecture contents as well summarized	SSCT
O3	is among the best trainer I have ever met	SSCT
V1	give full commitment in conducting this course	Perceived value
V2	knowledge and experiences given is valuables	Perceived value
V3	this course is very helpful and assist my self development	Perceived value
I1	has a good image and reputation	Trainer Image
I2	is innovative and forward looking	Trainer Image
I3	Imagine that you have to complaint to your trainer because of his/her bad quality of services, do you think that your trainer will care about your complaint?	Trainer Image
L1	I am very confidence with his/her ability	Student Confidence
L2	I would recommend this course to other students	Student Confidence
L3	I would like to continue this course in the future	Student Confidence
L4	I would register this course again even I did not get an 'A' for this semester	Student Confidence

Data Analysis

A descriptive and inferential statistics (Exploratory Factor Analysis, Confirmatory Factor Analysis, and Structural Equation Modelling) was used in this study. To conduct SEM, Statistical package (Amos 6) has been used to estimate the coefficient parameter of SEM. Any statistical hypotheses has been tested at 5% significant level.

Structural Equation Modelling

SEM is a multivariate procedure that, as defined by Ullman (1996), "allows examination of a set of relationships between one or more independent variables, either continuous or discrete, and one or more dependents variables, either continuous or discrete." SEM deals with measured and latent variable. SEM grows out of and serves purposes similar to multiple regression, but in a more powerful way which takes into account the modeling of interactions, nonlinearities, correlated independents, measurement error, correlated error terms, multiple latent independents each measured by multiple indicators, and one or more latent dependents also each with multiple indicators.

SEM is divided into two parts; a measurement model and a structural model. The measurement model deals with the relationships between measured variables and latent variables. The structural model deals with the relationships between latent variables only. One of the advantages to SEM is that latent variables are free of random error. This is because error has been estimated and removed, leaving only a common variance.

Usually, SEM will be presented in graphical diagram (known as theoretical measurement framework) for easier understanding. The seven stages in structural equation modelling are, (1) Developing a Theoretically Based Model, (2) Constructing a Path Diagram of Causal Relationships, (3) Converting the Path Diagram into a Set of Structural Equations, (4) Choosing the Input Matrix Type and Estimating the Proposed Model, (5) Assessing the Identification of the Structural Model, (6) Evaluating Goodness-of-Fit Criteria, and (7) Interpreting and Modifying the Model.

The Student's Satisfaction Measurement Framework

The theoretical framework of student's satisfaction is shown in Figure 1. Students' satisfaction measurement framework has three antecedents; perceived quality, perceived value and students' expectations.
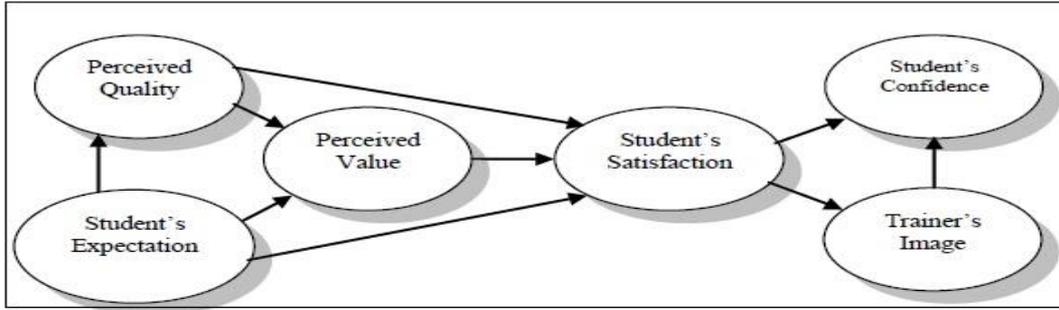
Figure 1 : Student's Satisfaction Measurement Framework (SSCT Model)

Calculation of Index

The Students Satisfaction Index represents the overall satisfaction level of that student as one number, usually as a percentage. Bhave (2002) proposed that to obtain the index of satisfaction, the satisfaction score is multiplied by the corresponding weighting factor to produce weighting score. The index of satisfaction is the sum of the weighting score.

Results and Findings

After specification of the items (indicators) for each latent variables using CFA (measurement model), it was further subjected to SEM. The positive relationship between all the latent variables were describes in Figure 1 with their arrow. Student's expectation, Perceived Quality and Perceived Value were the cause variables for the measurement of Student's Satisfaction. In other hand, Student's Satisfaction and Trainer's Image were the effect variables towards Student's Confidence.

Fit Indices for the SSCT Model

The values shown in Table 3 indicate the model was good fit. The RMSEA and CMINDF were below than the recommended indices. Similarly, the AGFI, AFI, CFI, NFI, TLI were above 0.90 respective minimum recommended values. All the indexes indicated a good fit, and RMSEA indicated a close fit of the model.

Table 3 : Fit Indices for the SSCT Model

Fit Measures	Suggested Values	SSCT Model
Chi-square	-	9.858
df	-	4
p-value	≥ 0.05	0.043
CMINDF	≤ 2.496	2.465
RMSEA	≤ 0.08	0.064
GFI	≥ 0.90	0.991
AGFI	≥ 0.90	0.953
CFI	≥ 0.90	0.988
NFI	≥ 0.90	0.997
TLI	≥ 0.90	0.993
PCLOSE	≥ 0.05	0.268

Based on Table 4, student's expectation has a strong positive relationship with perceived quality, perceived value and student's satisfaction, with the correlation values 0.893, 0.899 and 0.909 respectively.

Table 4 : Coefficient of Correlations for SSCT Model

	SE	PQ	PV	SS	IMAGE	SC
SE	1.000					
PQ	0.893**	1.000				
V	0.899**	0.816**	1.000			
SS	0.909**	0.834**	0.927**	1.000		
IMAGE	0.889**	0.805**	0.934**	0.904**	1.000	
SC	0.836**	0.773**	0.870**	0.848**	0.842**	1.000

** significant at the 0.01 level

Perceived quality also has a significantly strong relationship with the perceived value and student's satisfaction with correlation coefficient 0.816 and 0.834 respectively. Whereas, perceived quality and students' satisfaction has a strong positive relationship (correlation coefficient=0.927). Thus, the students' satisfaction was related with the students' expectation, perceived quality and perceived value.

The consequences of the students' satisfaction significantly associated with the trainers' image and the student's confidence (p-value = 0.000) and strong positive relationships with correlation value 0.904 and 0.848 respectively. The final relationship in this SEM model was between trainers' image

and students' confidence. These two latent variables have a significant strong positive relationship with a correlation value 0.842. The correlation coefficient in Table 4 illustrates that the relationship between the latent variables in theoretical measurement framework for students' satisfaction (SSCT model) corresponds to the existing model (ACSI model).

The beauty of SEM is that it can be used to measure the direct-indirect effect between all the latent variables. The findings can be seen in Table 5, it shows that student's expectation has a **direct** effect on perceived quality and perceived value but the perceived quality **does not have direct** effect on perceived value. The results are summarized as follows:

i. Student's Expectation and Perceived quality have a **direct** effect on Student's Satisfaction.
ii. Student's Satisfaction has effect on Student's Confidence and Trainer's Image **directly**.
iii. Trainer's Image has a **direct** effect Student's Confidence.
iv. Student's Expectation **does not have indirect** effect on Perceived Value through Perceived Quality.
v. Student's Expectation has an **indirect** effect on Student's Satisfaction through Perceived Value.
vi. Perceived Quality **does not have an indirect** effect on Student's Satisfaction through Perceived Value.
vii. Student's Satisfaction **indirectly** affects Student's Confidence through Trainer's Image.

Table 5 : Regression Weight for SSCT Model

	Estimated	S.E	C.R	p	Results
PQ ← SE	0.957	0.025	37.63	0.000	Significant
PV ← SE	0.918	0.056	16.451	0.000	Significant
PV← PQ	0.068	0.052	1.306	**0.191**	**Not significant**
SS ← PQ	0.198	0.029	6.841	0.000	Significant
SS ← SE	0.311	0.042	7.452	0.000	Significant
SS← PV	0.650	0.031	21.126	0.000	Significant
Image ← SS	0.913	0.022	40.989	0.000	Significant
SC ← SS	0.531	0.066	8.017	0.000	Significant
SC ← Image	0.502	0.072	6.934	0.000	Significant

Note : SE=Student's expectation, PQ=Perceived quality, PV= Perceived value, SS= Student's Satisfaction, Image = Trainer's image, SC = Student's Confidence

At this point, the SSCT model can be implemented as a stuctured model for measuring students' satisfaction towards the Co-curricular trainer eventhough the perceived quality does not have a direct effect on perceived value since the fit indices of the model is good fit (Table 3).

Index of the SSCT Model
The expected value of students' expectation was computed based on standardized regression weight in CFA analysis, while the others were determined using standardized regression weight in SEM analysis. Hence, the regression equation for SSCT model are as follows:

$$E(SE) = 0.952 (C2) + 0.968 (C3) + 0.945 (C4) + 0.969 (M1) + 0.936 (M2) + 1.058 (M3) + 0.999 (M4) + 1.016 (S1) + 1.000 (S2) + 1.008 (S3) \quad \text{--- (1)}$$

$$E(PQ) = 0.893 (SE) \quad \text{--- (2)}$$

$$E(PV) = 0.839 (SE) + 0.067 (PQ) \quad \text{--- (3)}$$

$$E(SS) = 0.639 (PV) + (0.278) SE + (0.053) PQ \quad \text{--- (4)}$$

$$E(Image) = 0.997 (SS) \quad \text{--- (5)}$$

$$E(SC) = 0.500 (SS) + 0.434 (Image) \quad \text{--- (6)}$$

Table 6 illustrates the index score of SSCT model. It can be clearly seen that all of the index for SSCT are "Good" except for the Student's expectation which merely scored moderate grade.

Table 6 : Index of the SSCT Model

	Index	Grade
Student's expectation	69.83	Moderate
Perceived quality	71.29	Good
Perceived value	72.24	Good
Student's satisfaction	80.32	Good
Trainer's image	77.53	Good
Student's confidence	74.10	Good

The highest index among the SSCT's factors is student's satisfaction with a score of 80.32% followed by the trainer's image (77.53%) and student's confidence (74.10%). The another two factors which are perceived value and perceived quality have scored between 70 % and 75% with scores 72.24% and 71.29% respectively. The lowest index is students' expectation with a score of just 69.83%, where the grade falls in the moderate group.

Benchmark of Students' Satisfaction

Figure 2 shows the benchmark of students' satisfaction across the Co-curricular Unit. It can be clearly seen that all the index of Co-curricular Unit is above 70% except for the Music Arts Unit. In this study, 70% has been identified as the lowest index to classified as GOOD (Mokhtar, 2006) and it will be the lowest benchmark to determine the trainers' performance in UUM. The Coordinator or more specifically, the management of Co-curricular Centre is suggested to 'polish' the MODERATE trainer if their index score are from 60% to 70%. It is a more serious case for trainers acquiring index below than 60% because it is a warning limit 'mark' and is classified as LOW, and a correction needs to be implemented. All the index of Co-curricular Units is above than 70% which give a sign of GOOD grade except for the Music Arts Unit.
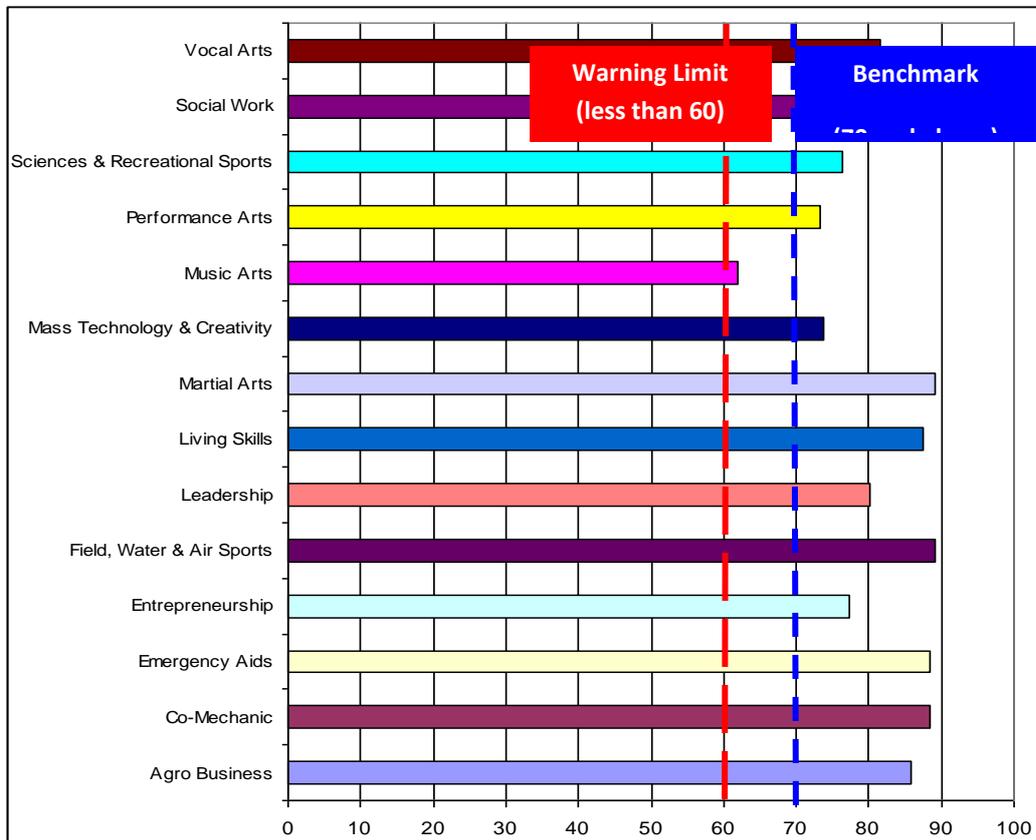

Figure 2 : Benchmark of Student's Satisfaction

This unit index score is between 60% and 70% which give a sign of MODERATE. None of the co-curricular units score LOW and EXCELLENT grade. Those trainer who score LOW grade should be reminded for correction and self-development purposes while for the other graded trainer should

be reminded to increase their grade score since none of them have score EXCELLENT grade

Conclusion

The result of this study shows that the relationship between the latent variables in theoretical measurement framework for students' satisfaction (SSCT model) is corresponds to the existing model (ACSI model) but perceived quality does not have direct or indirect effect with the other factors. As far as this study is concerned, the index score of SSCT model can be used as one of the tool to evaluate the trainer's performance because the SSCT model has specifically studied on the student's satisfaction towards their trainer.

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