

RANKING METHOD USING MULTIPLE WEIGHTED SCORE ANALYSIS

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ABSTRACT. *This study utilized a questionnaire produced by Noel-LevitzTM as an instrument to measure students' satisfaction in higher learning institutions. The main objectives of the study were to identify the most important factors on students' satisfaction towards the university and to obtain the rankings on these factors. The ranking illustrated an overall view of the university's performance based on the students' evaluation, which could be used as a guide to the university's management for improvement. The instrument was chosen because of its ability to measure the varieties on students' satisfaction based on their perception and expectation on these different factors. The respondents were selected at random from the first year students in the School of Forestry (SPTA) of Universiti Malaysia Sabah. There were 117 respondents constituting more than 60% of the registered first year students in SPTA. The Multiple Weighted Score Analysis was used indicating that out of the 11 factors of student's satisfaction, the important factors that give significant impact to the overall students' satisfaction were Campus Support Services, Campus Climate, Service Excellence and Registration Effectiveness.*

KEYWORDS. *Ranking, Student's Satisfaction, Multiple Weighted Score Analysis, Perception, Expectation.*

INTRODUCTION

Generally known that most of higher learning students have high expectation on the academic and service quality they received from their higher learning institution (Coaldrake, 2001). Higher learning institutions need an objective assessment, benchmarking and thorough planning by using the best measuring instrument and analysis method to assist on service quality improvement measures (Watson and Pitt, 1998).

To gain success in any field of businesses including non-profit one such as public education is the delivery of high service quality (Thompson, DeSouza, and Gale, 1985). So the focus of this study is, to identify whether we have delivered high service quality to our customers. In common practices, researchers always assessed students' satisfaction based on single-value measurements. From the instrument used in this study, that is a questionnaire produced by Noel-LevitzTM, the mean scores which is given by the overall scores divided by the number of items in the questionnaire. The problems with this method were that, the varieties of students' Satisfaction based on different educational

factors could not be identified and consequently there was no information on the students' Expectation based on different educational factors (Heck and Johnsrud, 2000).

MATERIALS AND METHODS

Respondents had been selected from the first year students of the School of Forestry using simple random sampling. They were given questionnaires designed for the Student Satisfaction Inventory™ which is distributed by USA Group Noel-Levitz™. The questionnaire consisted of 116 items that covered 83 educational attributes to assess the level of perceived Importance and Satisfaction. Basically, they were on the academic advising effectiveness, registration effectiveness, recruitment and financial aid effectiveness, instructional effectiveness, campus climate, campus life, campus support services, concern for the individual, campus safety and security, student centeredness and service excellence.

Table 1. Educational factors with the corresponding number of educational attributes.

Educational Factors	The Number of Educational Attributes
Academic Advising Effectiveness	5
Registration Effectiveness	17
Recruitment and Financial Aid Effectiveness	15
Instructional Effectiveness	7
Campus Climate	6
Campus Life	14
Campus Support Service	6
Concern for the Individual.	6
Campus Safety and Security.	5
Student Centeredness	8
Service Excellence	6

The Student Satisfaction Inventory™ had demonstrated high internal reliability and high convergent validity. The Cronbach's alpha was found to be a value of 0.97 for the set of Importance scores and 0.98 for the set of Satisfaction scores with $r = 0.71$ ($p < 0.00001$) (Elliot and Shin, 2003). The instrument also used Likert-type scale to obtain the scores for each educational attribute, specifically in measuring expectation and experience.

Table 2. Likert-type code scale on assessing the Importance and Satisfaction educational attributes.

Code	Importance	Satisfaction
1	Not Important At All	Not Satisfied At All
2	Not Very Important	Not Very Satisfied
3	Somewhat Not Very Important	Somewhat Not Very Satisfied
4	Neutral	Neutral
5	Somewhat Important	Somewhat Satisfied
6	Important	Satisfied
7	Very Important	Very Satisfied

Data Analysis

From the collected data, scores for all educational factors would be calculated using the equations (1) and (2). Equation (1) was used to obtain the total score of Importance for each educational factor-*i* while equation (2) was used to obtain the total score of Satisfaction for a given particular educational factor-*i*.

$$TI_i = \sum_{j=1}^{n_i} I_{ij} \quad (1)$$

$$TS_i = \sum_{j=1}^{n_i} S_{ij} \quad (2)$$

Where,
 TI_i = total score of perceived importance of educational factor *i*.
 TS_i = total score of satisfaction of educational factor *i*.
 I_{ij} = score of perceived importance of item *j* for educational factor *i*.
 S_{ij} = score of satisfaction for item -*j* for educational factor *i*.
 $i = 1, 2, \dots, m$
 m = number of educational factor
 $j = 1, 2, \dots, n_i$
 n_i = number of item of educational factor-*i*

From the total score, the mean score for each educational factor was obtained. This was to eliminate the effect on the inequality of the number of items for all educational factors.

$$\overline{TI}_i = \frac{\sum_{j=1}^{n_i} I_{ij}}{n_i} \quad (3)$$

$$\overline{TS}_i = \frac{\sum_{j=1}^{n_i} S_{ij}}{n_i} \quad (4)$$

With \overline{TI}_i and \overline{TS}_i as the mean score of perceived importance and satisfaction for the i -th educational factor respectively, then the total score of mean could thus be calculated from equation (3) and (4).

$$T(\overline{TI}_i) = \sum_{i=1}^m \overline{TI}_i \quad (5)$$

$$T(\overline{TS}_i) = \sum_{i=1}^m \overline{TS}_i \quad (6)$$

If we denote WI_i and WS_i as the weight of perceived importance and satisfaction of i -th educational factor respectively then both weights could be determined by calculating the mean score for educational attribute i and then dividing it by the total mean score of all educational attributes. For all weight values, from both perceived Importance and Satisfaction scores, the educational attributes could be rated in descending order. The Weight mean could be used to indicate the ranking of Importance and Satisfaction for different categories of educational attributes.

$$WI_i = \frac{\overline{TI}_i}{T(\overline{TI}_i)} \quad (7)$$

$$WS_i = \frac{\overline{TS}_i}{T(\overline{TS}_i)} \quad (8)$$

All educational attributes within a particular category could be rated so as to determine which perceived attribute was of higher importance and satisfaction. The study also focused on the identification of the main sources of Importance and Satisfaction factors. Educational attributes or factors which obtained high expectation but low satisfaction scores would be identified so that they could be taken for quality improvement. The process of identification can be made by taking any central tendency measurements or quartiles depending on the weights distribution and the number of educational attributes that you wish to improve on.

RESULTS AND DISCUSSION

Respondents from the first year students of School of Forestry were selected using simple random sampling. With a population size of 163 students, the study had succeeded in collecting 117 respondents, constituting more than 60% of the first year population.

Table 3. Students distribution based on socio-demographic factors.

Demographic Factors	Frequency, f	Percentage, %
Gender		
Female	82	70.1

Male	34	29.1
Missing	1	0.9
Race		
Malay	49	41.9
Chinese	25	21.4
Indian	8	6.8
Sabahan/Sarawakian	35	29.9
College		
A/B	19	16.2
C/D	20	17.1
E	37	31.6
Others (Out campus)	41	35.0
Program		
HG19	35	29.9
HG20	37	31.6
HG23	25	21.4
HY11	20	17.1

Table 3 above presented the students' population distribution based on socio-demographic factors, namely gender, race, accommodation and programme registered. Most of the respondents were female, representing 82% of the sample size. The Malays constituted 49% while Sabahans and Sarawakians represented 35% of the sample size. Chinese and Indians constituted only 33% of the population. Many of the respondents lived in College E and "Others". "Others" referred to the other students' colleges which were located outside of the main campus. There were three of them, namely, Kurnia Perdana College, Indah Permai College and Kingfisher College.

Table 4. Students distribution based on socio-demographic factors of parents' income and parents' level of education.

Demographic Factors	Frequency, f	Percentage, %
Level of Education: Mother		
SRP	31	26.5
SPM/STPM	44	37.6
Degree and above	5	4.3
Others	37	31.6
Level of Education: Father		
SRP	28	23.9
SPM/STPM	43	36.7
Degree and above	14	14
Others	32	27.4
Level of Income		
Below 500	12	12.9
500 - <1500	41	37.9
1500-< 2500	38	32.8
2500 - < 3500	7	6.0
3500 - < 4500	7	6.0
≥ 4500	5	4.3

Using the data on the students' family background, this study found out that most of the respondents' parents had attained an average education. Around 30% of either parents had lower secondary certificates, 44% of their mothers had higher secondary certificates while 43% of their fathers were with SPM or STPM certificates. There was

only a small percentage of their parents who had a Degree or of higher academic qualifications. This comprised of 5% of their mothers and 14% of their fathers. One way ANOVA analysis showed that there was no significant difference of Importance and Satisfaction mean scores based on all categories of socio-demographic factors.

Table 5. SPSS Output of Normality Tests on Weight Values of Importance and Satisfaction for 11 Educational Factors. Tests of Normality

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Weight_Importance	.164	11	.200(*)	.935	11	.462
Weight_Satisfaction	.221	11	.140	.887	11	.127

* This is a lower bound of the true significance.

a Lilliefors Significance Correction

From the result of Shapiro-wilks normality tests, this study found that the weight distributions of Importance and Satisfaction of the educational factors are normal with significance values 0.462 and 0.127 respectively, which are greater than α value, 0.05. Following the normality results, the educational factors will be identified for quality improvement measures based on mean values. The mean values for the weight values of Importance and Satisfaction are the same which is 0.0909.

Table 6. List of Educational Factors with corresponding Importance's weight value.

	Total Mean	Weight (WI _i)	Ranking
Academic Advising Effectiveness	659.20	0.0935	1
Service Excellence	647.00	0.0918	2
Campus Support Service	646.00	0.0916	3
Registration Effectiveness	645.50	0.0916	4
Instructional Effectiveness	645.43	0.0916	5
Campus Climate	643.02	0.0912	6
Student Centeredness	639.83	0.0908	7
Concern For Individual	635.33	0.0901	8
Recruitment and Financial Aid	633.00	0.0898	9
Campus Life	627.62	0.0890	10
Security and Safety Campus	627.60	0.0890	11
	7049.53	1.0000	

Table 6 above showed the weight values of all educational factors that had been sorted out in descending order. The highest weight indicated the most important factor in assessing the importance of the educational factors perceived by the respondents. The mean value of the Importance's weight was 0.0909 and this was used as the mid point to identify the most important factors which were needed to be emphasized in order to improve satisfaction level towards the university.

By referring to the Likert-type scale used in the instrument, the higher the score would signify the more important the educational factor was. Therefore, only educational factors with weight values above or equal to 0.0909 would be chosen and would be regarded as the most important factor to be emphasized. Those educational factors were Academic Advising Effectiveness, Service Excellence, Campus Support Service, Registration Effectiveness, Instructional Effectiveness and Campus Climate.

Table 7. List of Educational Factors with corresponding Satisfaction's weight values.

	Total Mean	Weight (WS _i)	Ranking
Campus Security and Safety	457.80	0.0855	1
Campus Support Service	480.71	0.0897	2
Service Excellence	483.00	0.0902	3
Recruitment and Financial Aid	485.17	0.0906	4
Campus Climate	485.41	0.0906	5
Registration Effectiveness	486.33	0.0908	6
Concern For Individual	488.67	0.0912	7
Student Centeredness	488.67	0.0912	8
Campus Life	490.34	0.0915	9
Instructional Effectiveness	500.29	0.0934	10
Academic Advising Effectiveness	510.40	0.0953	11
	5356.79	1.0000	

From Table 7, the Satisfaction's weight values had been sorted out in the ascending order. By referring to the Likert-type scale, the lowest scores would indicate also the most unsatisfied educational factors perceived by the respondents. The lowest weight's value would indicate the most critical educational factor which really needed improvement actions from the university's management. From the results, the poorest educational factors were Campus Security and Safety, Campus Support Service, Service Excellence, Recruitment Financial Aid, Campus Climate and Registration Effectiveness.

Four of the listed six factors were considered as the most important factors on assessing students' satisfaction. There were Campus Support Services, Campus Climate, Service Excellence and Registration Effectiveness. These four educational factors have been identified based on cross comparison between the six listed educational factors in Table 6 and 7 which have been highlighted. The other two factors in Table 6, Academic Advising Effectiveness and Instructional Effectiveness have not been considered important because both factors received considerable Satisfaction's weight from the respondents. Same reason goes to the other two educational factors in Table 7, Campus Security and Safety and Recruitment and Financial Aid are not considered as important in assessing students' satisfaction because these factors are not listed in the top six of the most important factors even though both factors received poor satisfaction level from the respondents. Generally this study concluded that, the higher weight value of Importance but lower weight value in Satisfaction indicated the critical educational factors which really needed quality improvement.

REFERENCES

- Coaldrake, P. 2001. *Responding to Changing Student Expectations*. *Journal of the Program on Institutional Management in Higher Education* **13** (2): 75-90.
- Elliot, K. & Shin, D. 1999. *Assessing Student Satisfaction: An Approach to Help in the Development of Marketing Strategy for a University*. Minnesota State University, Mankota.
<http://www.sbaer.uca.edu/research/1999/mma/99mma045.html>
- Heck, R.H & Johnsrud, L.K. 2000. *Administrative Effectiveness in Higher Education: Improving Assessment Procedures*. *Research in Higher Education* **41**(6): 663-85.
- Thompson, Philip, Glenn DeSouza, & Bradley T. Gale 1985. *The Strategic Management of Service Quality*, Cambridge, MA: The Strategic Planning Institute, PIMSLETTER No. 33.
- Watson, R.T. & Pitt, L.F. 1998. *Measuring Information System Service Quality: Lessons From Two Longitudinal Studies*. *MIS Quarterly* **22**(1): 35-44