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PREFERABLE HIGHER EDUCATIONAL INSTITUTIONS BY MATRICULATION STUDENTS USING ANALYTICAL HIERARCHY PROCESS (AHP)

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Abstract

The students must be aware of their options for higher education study and comprehend their options for study pathways before they apply to a university. Choosing the right path is very important for students and it will be a difficult process if the students are unprepared. Poor preparation and knowledge about degree planning will lead to confusion among students due to the variety of higher-level institution options available to a student. This study will identify the factors that influence students' decisions to attend higher education institutions using the Analytical Hierarchy Process (AHP) and the preferred institutions that students in this cohort pick and examine the nature of the connection between the institutions that students prefer. The main sample for this study was drawn from Melaka's Matriculation College students over the age of 18. The data is gathered by analyzing the preferred university selection process and includes the identification of relevant criteria that are found necessary by students, such as college fees, friends and family influence, career path availability, course availability, the location of institutions, and scholarship coverage. The finding reveals that most students chose a public institution (IPTA) based on the availability of required courses and programs. This study is expected to be significant for professionals, higher education institution managements, and future researchers

Keywords: *AHP; Analytic Hierarchy Process; higher educational institution; criteria; Multicriteria Decision Making*

1. Introduction

Higher education leads to the award of a degree. It is also known as post-secondary education and it is an optional last stage of formal learning for any students who desire to continue their education after finishing for a certificate which is Sijil Matrikulasi KPM. The idea of attending a university to study is exciting to many students. They will experience a new environment, meet new people, and gain new knowledge. However, students must be aware of their options for higher education study and comprehend their options for study pathways before they apply to a university. Choosing the right path is very important for students, and it will be a difficult process if the students are unprepared. Matriculation program is a pre-university education that

typically lasts between two and four semesters and, upon successful completion, permits students to apply for degree programs at public universities (Abdussyukur et al., 2021). Some matriculation students lack a structured application to assist them in planning their degree based on certain factors. Hence poor preparation and knowledge about degree planning will lead to confusion among students due to the variety of higher-level institution options available to a student.

The Analytic Hierarchy Process (AHP) is a methodical approach for expressing any problem's elements hierarchically. In 1971, Thomas and Saaty (1990) created the AHP, as a method for methodical decision-making. It is a system of organizing decision-making mechanisms in a scenario influenced by several different independent actors (Kuzu, O. H., 2020). They provide a method for decision-making when there are limited choices, but each has a variety of attributes. It is also used in decision making situations where multiple factors must be considered simultaneously. Principle eigenvectors are used to create the ratio scale whereas principal eigenvectors are to create the consistency index (Lee, 2016). In this study will identify the factors that influence students' decisions to attend higher education institutions using the Analytical Hierarchy Process (AHP). It is also will determine the preferred institutions that students in this cohort pick and examine the nature of the connection between the institutions that students prefer; and the selection criteria that influence their decisions. This study deals with the application of the Analytical Hierarchy Process.

The objective of this study is to identify the factors of higher education institutes selection by matriculation students using Analytic Hierarchy Process (AHP) and to determine the preferable institutes of higher education chosen by matriculation students using Analytic Hierarchy Process (AHP)

2. Methodology

There are 5 steps in AHP approach which are identifying criteria and alternative, constructing a hierarchy framework analyzing data, collecting information by using questionnaires and calculating the weightage for criteria and alternative. The criteria that have been considered in this study are amount of college fees, friends and family influences, availability of career paths, availability of required courses or programs, location of institutions, and availability of scholarship coverages. Meanwhile 4 institutions: Public Institution (IPTA), Private Institution (IPTS), Polytechnic Premiere (Poly) and Institution of Teacher Education (IPG) have been selected as alternatives for this study.

Step I : Construct the pairwise comparison matrix

Each criterion is compared with every other criterion using the fundamental scale that gives the relative importance value shown in Table 1. Saaty, T .L (1977)

Table 1: The Fundamental Scale

Importance Scale	Definition of Importance Scale
1	Extremely importance
3	Very importance
5	Strong importance
7	Moderate importance
9	Equal importance
2, 4, 6, 8	Intermediate value

A pairwise comparison matrix is constructed in the form:

$$C = \begin{bmatrix} C_{11} & C_{12} & C_{13} & C_{14} \dots & C_{1n} \\ C_{21} & C_{22} & C_{23} & C_{24} \dots & C_{2n} \\ C_{31} & C_{32} & C_{33} & C_{34} \dots & C_{3n} \\ \dots & & & & \\ C_{n1} & C_{n2} & C_{n3} & C_{n4} \dots & C_{nn} \end{bmatrix} \quad (1)$$

where C_{ij} represents the relative importance of criterion i over criterion j and n is the number of criteria.

Step II: determine the normalized matrix.

$$C_N = \begin{bmatrix} V_{11} & V_{12} & V_{13} & V_{14} \dots & V_{1n} \\ V_{21} & V_{22} & V_{23} & V_{24} \dots & V_{2n} \\ V_{31} & V_{32} & V_{33} & V_{34} \dots & V_{3n} \\ \dots & & & & \\ V_{n1} & V_{n2} & V_{n3} & V_{n4} \dots & V_{nn} \end{bmatrix} \quad (2)$$

V_{ij} is element of normalized matrix

Where

$$V_{ij} = \frac{C_{ij}}{C_j}$$

Step III: calculation of weightage

$$W_i = \frac{1}{n} \sum_1^n V_{ij} \quad (3)$$

Where W_i = the weightage of criteria i

n is a number of criteria.

Hence, the weightage of criteria can be represented as follows:

$$W_c = [W_1 \quad W_2 \quad W_3 \quad \dots \quad W_n] \tag{4}$$

The results of this section can be concluded that the most important criterion is the criteria with the highest weightage.

Step IV: Checking of consistency matrix

The comparison matrix is consistence if and only if

$$CW^T = nW^T$$

However, if the equation is not satisfied, indicating inconsistency, the next step is calculating the consistency index (CI) and consistency ratio (CR). The comparison matrix is considered consistent if the CR is less than 0.1. The formula for calculating CI and CR is:

Firstly, find the maximum eigenvalue (λ_{max}):

$$\lambda_{max} = \frac{1}{n} \sum_1^n \frac{C_i W_i^T}{W_i^T} \tag{5}$$

where, C_i represents the pairwise comparison of criterion i , W_i^T is the weightage of criterion i in transpose and n is the total number of criteria.

Next, find the consistency index (CI) and consistency ratio (CR):

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

$$CR = \frac{CI}{RI}$$

where λ_{max} represents the maximum eigenvalue of the matrix, n is the total number of criteria, and RI is the random index obtained from Table 2.

Table 2: Value of Random Index (RI)

n	1	2	3	4	5	6	7	8	9	10
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

Step V: Calculate the weightage of alternative

The weight of each alternative for each criterion is calculated using the same method as in *Step I* until *Step IV*. The weightage of each alternative is multiplied by the weightage of the corresponding criteria, and the results are summed to obtain the overall weightage of each alternative. The calculation of alternative weighting (W_A) is as below:

$$= [A1 \quad A2 \quad \dots \quad A][A] \tag{6}$$

3. Result and Discussion

Based on the research findings, the preferences of UiTM students for higher educational selection were determined.

Table 3: Final ranking for each criterion

C_n	Criterion	Weightage	Ranking
C_1	Amount of College Fees	0.18037	4
C_2	Friends and Family Influences	0.08183	6
C_3	Availability of Career Paths	0.20942	2
C_4	Availability of Required Courses or Programs	0.21421	1
C_5	Location of Institutions	0.13001	5
C_6	Availability of Scholarship Coverages	0.18416	3

Based on Table 3, the most important factor for matriculation students to select the higher educational is availability of required course or program. Followed by availability of career paths, availability of scholarship coverage and fees. Location and influence from family and friends are the least important for them to select the higher educational institutions.

Table 4: Final ranking for each alternative

A_n	Alternative	Weightage	Ranking
A_1	Public Institution (IPTA),	0.3928	1
A_2	Private Institution (IPTS)	0.2372	2
A_3	Polytechnic Premiere (Poly)	0.1666	4
A_4	Institution of Teacher Education (IPG)	0.2032	3

Meanwhile, in terms of preferred higher educational institution, IPTA was the top choice among students with 0.3928, followed by IPTS, 0.2372 and IPG, 0.2032. Polytechnic Premier is not the most preferable higher educational institution among matriculation students with the weightage 0.1666.

4. Conclusion

The present study used the AHP method as a tool for evaluating the significance of the criteria that students prefer when choosing a higher education institution. The questionnaire based on AHP methodology was made. The criteria that were listed in the questionnaire are, amount of college fees, friends and family influences, availability of career paths, availability of required courses or programs, location of institutes, and availability of scholarship coverages. While the higher education institutions that were listed in the questionnaire are, Public Institution (IPTA), Private Institutions (IPTS), Institute of Teacher Education (IPG), and Polytechnic (Poly).

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