

CRITERIA FOR THE SELECTION OF STUDENTS' ACCOMMODATION MODEL IN NIGERIA TERTIARY INSTITUTIONS USING ANALYTIC HIERARCHY PROCESS

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ABSTRACT

The objective of this paper is to demonstrate the application of Analytic Hierarchy Process (AHP) in the selection of students' accommodations model. Against this backdrop, 8 experts in the field of students' accommodation were selected from four tertiary institutions in Bauchi state to provide experts' judgments on the best possible accommodation model from the four alternatives; on-campus in student's hostels, off-campus in a leased property, off-campus school managed or off-campus private. Four (4) criteria; academic proximity, students discipline, maintenance cost and students security were chosen. Pair wise comparison of the criteria was done against the main objective and alternatives were compared against the criteria and the weights generated favored academic proximity among the criteria and traditional on-campus accommodation model from among the competing alternatives. Although the technique may be applied in selection of any form of accommodation but the result may not be generalized due to limitation in geographical coverage and small population.

Keywords: Students accommodation, Analytic hierarchy process, multi-criteria decision analysis

INTRODUCTION

Although students accommodation is considered sine qua non in controlling students moral discipline and plays a vital role in increasing students academic performance, but it remain a challenging venture for institutions to manage. Like many other tertiary institutions in the world, tertiary institutions in Nigeria are facing problems in providing comfortable and affordable accommodation to their ever increasing students' population. In the recent years, tertiary institutions are facing real cuts in the level of public funding [2]. Thus, the level of discretionary funding that could be allocated to major infrastructure projects such as accommodation was reduced. In other hand, the demand for high quality education is fast growing in a crowded education market [2]. Nigeria has the biggest tertiary education system in Sub-Saharan Africa with 129 accredited universities, 78 Polytechnics and 63 Colleges of education[3]. More than 50% of the universities have over 20,000 students each. While the universities have continues to experience an average of 12% rise in student enrolments over the past decades, the surge in students has not been matched by a corresponding growth in student accommodation. Figures from the National Universities Commission (NUC) have shown that, the provision of student housing is less than 30% of demand [4]. The vast majority of students live in privately rented accommodation. While the Federal Tertiary Institutions have failed to keep pace with student housing needs, most of the state tertiary institutions have not even tried [5]. This may not be unconnected with the fact that, at the inception, state-established tertiary institutions have relegated the idea of student housing to

the background due to high maintenance cost. It may be assumed that, the state governments concerned with the enormous budget that would be required in the provision of student housing, could be better utilized in providing academic facilities [6]. However, this claim will be at the expense of both the students and government, because the overall objective of training students in both character and learning will be compromised.

Therefore, with the burgeoning student population, students' hostels problems have become glaring in almost all tertiary institutions in Nigeria [6]. Institutions are trying multiple alternatives to provide accommodation to their students. Conventionally, students' accommodation may be residential, non-residential and dual-residential [7]. However, presently, other alternative means adopted by some institutions is signing of leasing agreement with private developers. But, this strategy is not fully exploited by the respective proprietors of the institutions. Therefore most students are left to the mercy of private owners who charge and chase the students at will. Similarly, the private investors develop and manages students hostel in the institutions neighborhood. Although, this option relieves institution in management and maintenance cost, but, the students security and discipline are left to the mercy of the managers. Moreover, most developers charges the student exorbitantly high rent in a claim to cover up their investment. In the context of this paper, four (4) types of students' accommodation models were considered as practiced in many parts of the world. These include, Traditional on campus accommodation (TOC), Off-campus leased (OCL), On-campus school managed (OSM) and Off-campus private (OP). Table 1 shows the type of accommodations and their characteristics with respect to the institutions. Consequently, it has become pertinent to use a holistic approach in making decision for selection of a particular model of students' accommodation to suit the general objectives of education. Hence, criteria that may serve as a guide in the selection of affordable and comfortable students accommodation based on the current situations in Nigerian may include; academic proximity, students discipline, security and cost of the accommodation.

Table 1. Types of Accommodations and their characteristics

	<i>Academic Proximity</i>	<i>Students Discipline</i>	<i>Maintenance Cost</i>	<i>Security</i>
<i>Traditional On campus</i>	Student can easily reach academic facilities and services	Can be controlled by the school	High maintenance cost	Adequate security to the students is guaranteed
<i>Off-campus school managed</i>	Students may not be easily assessable to academic facilities and services	May be control by the school	Very high maintenance cost	Security to the students may be guaranteed
<i>Off campus leased</i>	Students may not be easily assessable to academic facilities and services	May be control by the school	Very low, maintenance cost	Security to the students may somehow be guaranteed
<i>Off-campus Private</i>	Students cannot be assessable to academic facilities and service	Cannot be control by the school	No maintenance cost	Student security cannot be guaranteed

Therefore, with multiple alternatives of students' accommodation models and multiple criteria guiding the selection, it has become pertinent to use multi criteria decision analysis in the selection process. On this not, this paper proposes the use of Analytic Hierarchy Process (AHP) as one of the multi – criteria decision making tools in the selection of an acceptable option from among the competing alternatives. Although there are many studies on students

accommodation but the writer cannot lay hand on any work on students' accommodation selection process[1, 8-10].

THE CONCEPT OF ANALYTIC HIERARCHY PROCESS

The analytic hierarchy process, popularly known as AHP is a multi-criteria decision making tool [11]. It is a mathematically simple tool that can be described more effectively by using matrix in the linear algebra. This technique is capable of handling a large number of decision factors and provides a systematic procedure of ranking many decision variables. There are many multi criteria decision making techniques such as multi-attribute value theory (MAVT), multi attribute utility theory (MADT), multi group hierarchical discrimination (MHDIS) neural network (NN), fuzzy set theory (FS), however the study of Yu & Shing, (2013) has indicated that, there is not much difference between MADT and Analytic Hierarchy Process (AHP). Similarly Tang, *et al.* (2004) confirmed the straight forwardness of AHP. Meanwhile Márquez, (2007) affirmed that, AHP allows the decision makers to model a problem in a hierarchical structure showing the relationship of the goal, objectives (criteria), and alternatives based on general principle of Analytic Hierarchy Process is shown in Figure 1.

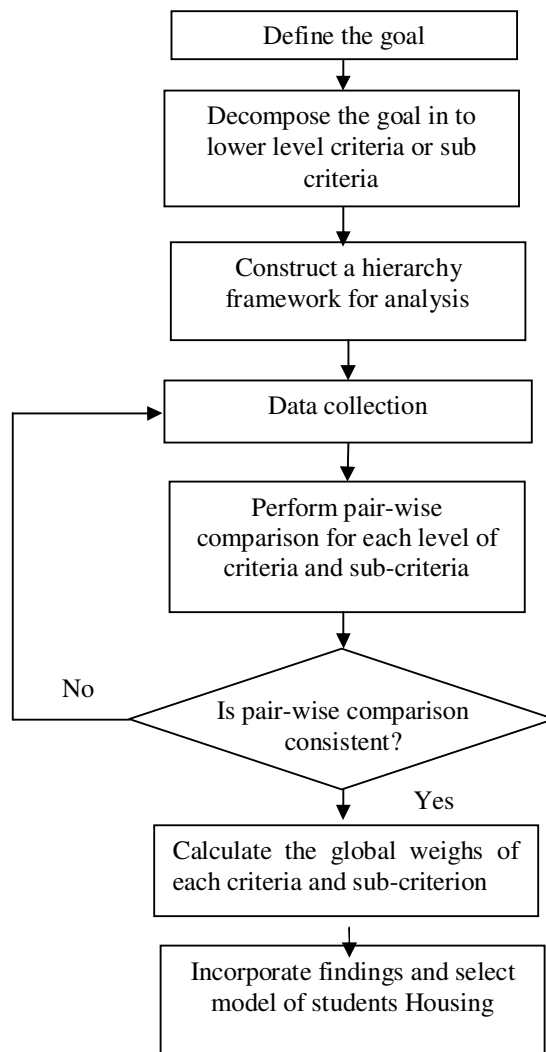


Figure 1. Flow diagram involving steps to conduct the AHP study [15]

Table 2. Pair wise comparisons ratio scale of 1 to 9 [16]

<i>Intensity of relative Importance</i>	<i>Definition</i>	<i>Explanation</i>
1	Equal Importance	Two alternatives contribute equally to the objectives
3	Moderate importance of one over another	Experience and judgment slightly favoured one alternative over another
5	Essential or strong importance	Experience and judgment strongly favoured one alternative over another
7	Demonstrated importance	An alternative is strongly favoured and its dominance is demonstrated in practice
9	Extreme Importance	The evidence favouring one alternative over another is of the highest possible order of affirmation
2, 4, 6, 8	Intermediate values between the two adjacent judgments	When compromised is needed.

Analytic Hierarchy Process in the Selection of Students’ Accommodation

The principles of Analytic Hierarchy Process (AHP) demands that, decision objectives must be hierarchically structured as shown on figure 2. The upper level of the hierarchy is representing the overall goal which is the selection of students’ accommodation model, while the middle level represents the four (4) criteria for selection of the students’ accommodation; academic proximity (AP), students discipline (SD), maintenance cost (MC) and Security (SS) as proposed in this study. Finally the lowest level represents the four (4) alternatives of students’ accommodation, these are traditional on-campus (TOC), off-campus leased (OCL), off-campus school managed (OSM) and off-Campus private (OCP). Two respondents from each of four tertiary institutions located in Bauchi state were selected to make the judgment. The Eight (8) selected respondents were considered experts in the field of students’ accommodation due to their long term experience working under students’ affairs departments of their respective institutions. The respondent made a pair wise judgment based on 9 points AHP ratio scale as described in table 1

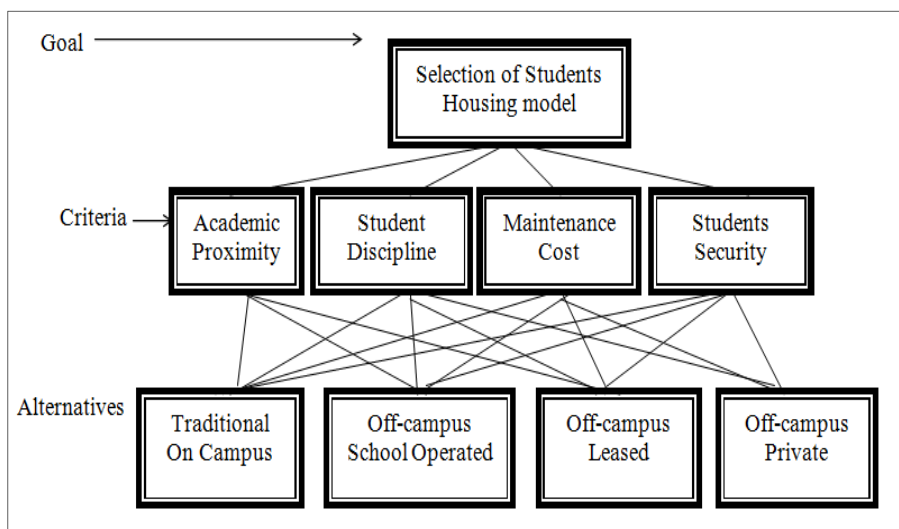


Figure 2. AHP Model for the selection of Students Housing

Pair wise comparison begins with comparing the relative importance of two selected items. In table 2 the judgments are decided based on the decision makers experience and knowledge. The four criteria where compared against the general goal.

Table 2. Pair wise comparison of criteria with respect to overall goal

	<i>AP</i>	<i>SD</i>	<i>MC</i>	<i>SS</i>
Academic Proximity (AP)	1.00	2.12	1.54	2.63
Students Discipline (SD)	0.33	1.00	2.61	3.11
Maintenance Cost (MC)	0.39	0.30	1.00	1.85
Students Security (SS)	0.38	0.32	0.35	1.00
SUM	2.10	3.74	5.50	8.59

After comparing the criteria, the next step is to calculate the vectors of priority; the average of normalized columns using (ANC) Method as shown in table 3. In this method the element of each column is divided by the sum of the column and then adds the element to each resulting row and divides the sum by the number of element in the row (*n*). According to [16] mathematically the vector of priorities can be calculated as;

$$\lambda_{max} = \sum_{j=1}^n \frac{AW}{nW} (i = 1, 2, \dots, n) \dots\dots \text{Equation 1}$$

Table 3. Synthesized matrix for the criteria

	<i>AP</i>	<i>SD</i>	<i>MC</i>	<i>SS</i>	<i>Weight</i>
AP	0.48	0.57	0.28	0.31	0.41
SD	0.16	0.27	0.47	0.36	0.32
MC	0.19	0.08	0.18	0.22	0.17
SS	0.18	0.09	0.06	0.12	0.11
	1.00	1.00	1.00	1.00	1.00

The Consistency Analysis

Since the comparison is carried out through personal or subjective judgments, some degree of inconsistency might be eminent. To ensure the consistency of the judgment, consistency analysis is required. The consistency indexed is derived from random index of analytic hierarchy process in Table 4 and the total sum from the synthesized matrix minus the number of criteria. Thus;

Table 4. Random Index of Analytic Hierarchy Process [16]

n	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
RI	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

Consistency Index (CI)			
CI =	$\frac{\lambda - n}{n - 1}$	=	0.03
Step V : Consistency Ratio (CR)			
CR =	$\frac{0.03}{0.90}$	=	0.03

As the value of CR < 0.1, the judgment matrix is therefore consistent

FINDING AND DISCUSSION

Based on finding in this study, traditional on campus accommodation model may be preferred by the decision makers and is therefore considered the most favorite model to all the participating institutions in this study. This may not be unconnected with the enormous advantage accorded to the model as outlined by [10] which includes;

1. Helping students attain to intellectual competence, forming personal character and aiding in forming patterns of behavior.
2. Instilling common passions and attractive academic outcomes amongst students.
3. Offering cohesiveness, security, accountable citizenship, participation, intellectual stimulation, communal structure and motivation.
4. Creating institutional loyalty and eventual alumni support
5. Enhancing knowledge diversification to different discipline other than student's own specialization and general awareness through contact with different roommates.
6. Facilitating solidarity and unity among student population. It is considered as common factor that attracts and unites students' involved in different fields of studies, apart from social activities such as cultural activities and sports.

CONCLUSION

The Analytic Hierarchy Process is used in identifying best criteria in the selection of students' accommodation from among other alternatives. Academic proximity considered the most important criteria in choosing student accommodation as found by this study. The outcome of this study may possibly open a new area of academic discuss that may require a holistic approach. The finding may not be unconnected with small number of respondents that have participated in the study. Therefore, there is need for extending the study to cover a wider geographical area with a corresponding larger population of respondents.

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