AHP IN ASSESSING PERFORMANCE OF DIPLOMA INSTITUTES – A CASE STUDY

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ABSTRACT

Present paper shows application of Analytical Hierarchy Process (AHP) as potential tool in decision making in assessing performance of diploma institutes. AHP decompose the decision problem into a hierarchy of more easily comprehended sub-problems, each of which can be analyzed independently. The elements of the hierarchy can relate to any aspect of the decision problem. Assessment of diploma level institutes based on certain parameters is used as example where AHP application has been made. A hierarchical structure is framed for the parameters and the diploma institutes from where feedback received against the parameters for this study. By applying the AHP, the parameters are prioritized and a descending order list of diploma institutes is made in order to identify the best performing institutes. Step by step approach for applying AHP has been be used by using AHP Calculation Software. It is expected that this study will encourage the users in applying AHP in assessing institutional performance of similar institutions.

Keywords*: Analytical hierarchy process (AHP), Diploma institutes, Performance assessment, Decision making*

1 INTRODUCTION

The Analytical Hierarchy Process (AHP) is a decision-aiding method developed by Saaty It aims at quantifying relative priorities for a given set of alternatives on a ratio Scale, based on the judgment of the decision-maker, and stresses the importance of the intuitive Judgments of a decision-maker as well as the consistency of the comparison of alternatives in the decision-making process [Since a decision-maker bases judgments on knowledge and experience, then makes decisions accordingly, the AHP approach agrees well with the behaviour of a decision-maker. The strength of this approach is that it organizes tangible and intangible factors in a systematic way, and provides a structured yet relatively simple solution to the decision-making problems In addition, by breaking a problem down in a logical fashion from the large, descending in gradual steps, to the smaller and smaller, one is able to connect, through simple paired comparison judgments, the small to the large.

The objective of this paper is to introduce the application of the AHP in assessing institutional performance of some selected diploma level institutes in West Bengal (a state in the Eastern part of India). The paper will briefly review the concepts and applications of the multiple criteria decision analysis, the AHP's implementation steps, and demonstrate AHP application on the ranking some diploma level institutions with respect to some selected parameters. It is hoped that this will encourage its application in the similar cases.

2 MULTIPLE CRITERIA DECISION ANALYSIS (MCDA)

Administrators are faced with decision environments and problems in assessing organizational performance that are complex. The elements of the problems are numerous, and the interrelationships among the elements are extremely complicated. Relationships between elements of a problem may be highly nonlinear; changes in the elements may not be related by simple proportionality. Furthermore, human value and judgement systems are integral elements of similar problems Therefore, the ability to make sound decisions in finding and selecting criteria for assessing organizational performance is very important to the success of effort. In fact, it a skill that is certainly near the top of the list of decision making skills, and notices that few of us have had formal training in decision making.

Multiple criteria decision-making (MCDM) approaches are major parts of decision theory and analysis. They seek to take explicit account of more than one criterion in supporting the decision process. The aim of MCDM methods is to help decision-makers learn about the problems they face, to learn about their own and other parties' personal value systems, to learn about organizational values and objectives, and through exploring these in the context of the problem to guide them in identifying a preferred course of action . In other words, MCDA is useful in circumstances which necessitate the consideration of different courses of action, which can not be evaluated by the measurement of a simple, single dimension. Hwang and Yoon published a comprehensive survey of multiple attribute decision making methods and applications.

Two types of the problems that are common in the assessment of institutional performance that best fit MCDA models are evaluation problems and design problems. The

evaluation problem is concerned with the evaluation of, and possible choice between, discretely defined alternatives. The design problem is concerned with the identification of a preferred alternative from a potentially infinite set of alternatives implicitly defined by a set of constraints.

3 THE ANALYTICAL HIERARCHY PROCESS (AHP)

Belton compared AHP and a simple multi-attribute value (MAV), as two of the multiple criteria approaches. She noticed that both approaches have been widely used in practice which can be considered as a measure of success. She also commented that the greatest weakness of the MAV approach is its failure to incorporate systematic checks on the consistency of judgments. She noticed that for large evaluations, the number of judgments required by the AHP can be somewhat of a burden. A number of criticisms have been launched at AHP over the years. Watson and Freeling said that in order to elicit the weights of the criteria by means of a ratio scale, the method asks decision-makers meaningless questions, for example: `Which of these two criteria is more important for the goal? By how much?' Belton and Gear and Dyer pointed out that this method can suffer from rank reversal (an alternative chosen as the best over a set of X, is not chosen when some alternative, perhaps an unimportant one, is excluded from X). Belton and Gear and Dyer and Wendel attacked the AHP on the grounds that it lacks a firm theoretical basis. Harker and Vargas and Perez discussed these major criticisms and proved with a theoretical work and examples that they are not valid. They commented that the AHP is based upon a firm theoretical foundation and, as examples in the literature and the day-to-day operations of various governmental agencies, corporations and consulting firms illustrate, the AHP is a viable, usable decision-making tool. Saaty developed the following steps for applying the AHP:

1. Define the problem and determine its goal.

2. Structure the hierarchy from the top (the objectives from a decision-maker's viewpoint) through the intermediate levels (criteria on which subsequent levels depend) to the lowest level which usually contains the list of alternatives.

3. Construct a set of pair-wise comparison matrices (size n x n) for each of the lower levels with one matrix for each element in the level immediately above by using the relative scale measurement shown in Table 1. The pair-wise comparisons are done in terms of which element dominates the other.

4. There are n (n -1) / judgments required to develop the set of matrices in step 3. Reciprocals are automatically assigned in each pair-wise comparison.

5. Hierarchical synthesis is now used to weight the eigenvectors by the weights of the criteria and the sum is taken over all weighted eigenvector entries corresponding to those in the next lower level of the hierarchy.

6. Having made all the pair-wise comparisons, the consistency is determined by using the eigenvalue, λ_{max}, to calculate the consistency index, CI as follows: CI= (λ_{max} – n)

/ (n-1), where n is the matrix size. Judgment consistency can be checked by taking the consistency ratio (CR) of CI with the appropriate value in Table 2. The CR is acceptable, if it does not exceed 0.10. If it is more, the judgment matrix is inconsistent. To obtain a consistent matrix, judgments should be reviewed and improved.

7. Steps 3-6 are performed for all levels in the hierarchy.

Table 1: Pair-Wise Comparison Scale for AHP Preferences

Numerical rating	Verbal judgments of preferences
9	Extremely preferred
8	Very strongly to extremely
7	Very strongly preferred
6	Strongly to very strongly
5	Strongly preferred
4	Moderately to strongly
3	Moderately preferred
2	Equally to moderately
1	Equally preferred

Table 2: Average Random Consistency (RI)

Size of matrix	1	2	3	4	5	6	7	8	9	10
Random Consistency	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49

Fortunately, there is no need to implement the steps manually. Professional commercial software is available on the market which simplifies the implementation of the AHP's steps and automates many of its computations (AHP Calculation Software by CGI - web-based free software or Expert Choice, developed by Expert Choice, Inc.).

3.1 Group decision making

The AHP allows group decision making, where group members can use their experience, values and knowledge to break down a problem into a hierarchy and solve it by the AHP steps. Brainstorming and sharing ideas and insights (inherent in the use of Expert Choice in a group setting) often leads to a more complete representation and understanding of the issues. The following suggestions and recommendations are suggested in the Expert Choice software manual.

1. Group decisions involving participants with common interests are typical of many organizational decisions. Even if we assume a group with common interests, individual group members will each have their own motivations and, hence, will be in conflict on certain issues. Nevertheless, since the group members are `supposed' to be striving for the same goal and have more in common than in conflict, it is usually best

to work as a group and attempt to achieve consensus. This mode maximizes communication as well as each group member's stake in the decision.

2. An interesting aspect of using Expert Choice is that it minimizes the difficult problem of ‘groupthink’ or dominance by a strong member of the group. This occurs because attention is focused on a specific aspect of the problem as judgments are being made, eliminating drift from topic to topic as so often happens in group discussions. As a result, a person who may be shy and hesitant to speak up when a group's discussion drifts from topic to topic will feel more comfortable in speaking up when the discussion is organized and attention turns to his area of expertise. Since Expert Choice reduces the influences of groupthink and dominance, other decision processes such as the well known Delphi technique may no longer be attractive. The Delphi technique was designed to alleviate groupthink and dominance problems. However, it also inhibits communication between members of the group. If desired, Expert Choice could be used within the Delphi context.

3. When Expert Choice is used in a group session, the group can be shown a hierarchy that has been prepared in advance. They can modify it to suit their understanding of the problem. The group defines the issues to be examined and alters the prepared hierarchy or constructs a new hierarchy to cover all the important issues. A group with widely varying perspectives can feel comfortable with a complex issue, when the issue is broken down into different levels. Each member can present his own concerns and definitions. Then, the group can cooperate in identifying the overall structure of the issue. In this way, agreement can be reached on the higher-order and lower-order objectives of the problem by including all the concerns that members have expressed. The group would then provide the judgments. If the group has achieved consensus on some judgment, input only that judgment. If during the process it is impossible to arrive at a consensus on a judgment, the group may use some voting technique, or may choose to take the `average' of the judgments. The group may decide to give all group members equal weight, or the group members could give them different weights that reflect their position in the hierarchy. All calculations are done automatically on the computer screen.

4. The Group Meeting: While Expert Choice is an ideal tool for generating group decisions through a cohesive, rigorous process; the software does not replace the components necessary for good group facilitation. There are a number of different approaches to group decision-making, some better than others. Above all, it is important to have a meeting in which everyone is engaged, and there is buy-in and consensus with the result.

4 APPLICATION OF THE AHP IN ASSESSING INSTITUTIONAL PERFORMANCE

In this paper, contributing parameters (an evaluation problem) will be used as an example of the possibility of using AHP in assessing institutional performance. Performance of any institutes is normally done by considering some contributing parameters (criterion), not by a

single parameter. AHP is a suitable technique deals with multiple decision parameters to arrive at the best alternative where all the alternatives are judged on the basis of all the decision parameters. Assessment of diploma level institutions is viewed as a multi-criteria decision making problem where AHP technique can suitably be applied. Here important aspect is to find out the contributing parameters and putting subjective weightage to them accordingly details approach for doing so are described in the subsequent sections of this paper.

4.1 Selection of contributing parameters in assessing institutional performance

Parameters which reflect the institutional level performance are likely to differ depending on whose view points are taken. Different stake holders have different viewpoints regarding parameters selection for assessing the institutional level performance. However, Georgopoloares and Tannenbaun (1957), Caplow (1964), Friendander and Pickle (1968), Mott (1972), and Duncan (1973) are those who suggest that institutional performance and effectiveness are generally to be assessed by some common criteria irrespective of the types of organizations. Other researchers opined that, the organizations have different characteristics, goals, and constituencies and as a result each type of organization requires a unique set of criteria to judge the organizational performance and effectiveness (Rice, 1961; Hall, 1972; Scott, 1977).

To arrive at the parameters for assessing the institutional level performance of the diploma level institutions a few senior administrators and faculty members of the system were interviewed based on structured questionnaire for suggesting some common factors which reflects the institutional performance. While interviewing special emphasis was given on criteria relating to the organizational level analysis. Certain cluster of items became predominant as the criteria emerged from the interviews and on the basis of that seven separate groupings of criteria were framed. “Criterion combination is based on value judgements, without any algorithm or higher order truth to which we can appeal (Campbell, 1977)”. Several alternative groupings were tried but the grouping in the present case represents the most suitable one which reflects all possible criteria of institutional performance list of such criteria is as follows:

Academic Environment and Freedom- AFE
Affiliation and Belongingness- A&B
Strategic- Str.
Student Guidance and Counselling- SGC
System Openness and Stake holders Interactions- SOSI
Support and Structure- SS

4.2 Rating of decision alternatives

Rating of diploma institutes (alternatives) as satisfied each parameter is done by administering an instrument to a sample group of people of different levels associated in diploma education system of West Bengal. All items used in the instrument are directly

related to the assessment criteria as selected before hand and are assigned five point scale where 5 denotes strongly agree and 1 represents strongly disagree.
By using Weighted Average Method (WAG) - a simple statistical calculation, institute wise average score were calculated (Table 3). Average score for respective institutes were used for rating the diploma institutes as mentioned above. For example in case of Polytechnic 1 (P1) average scores are 1.72, 2.31, 4.34, 4.55, 3.98, and 2.92 for criteria- Academic Environment and Freedom, Affiliation and Belongingness, Strategic ,Student Guidance and Counselling, System Openness and Stake holders Interactions, Support and Structure respectively. Instead of putting subjective weight-age to all the contributing parameters based on the individuals experience the average scores could be used while putting the same (subjective weight-age) for applying AHP in the subsequent sections.

Table 3: Institute Wise Average Scoring of Six Dimensions

Diploma Institutes	Dimensions					
	A	B	C	D	E	F
P1: Polytechnic 1	1.72	2.31	4.34	4.55	3.98	2.29
P2: Polytechnic 2	1.99	3.05	1.78	2.96	4.07	3.30
P3: Polytechnic 3	3.97	4.36	2.92	2.58	1.23	2.23
P4: Polytechnic 4	4.79	4.07	4.46	2.031	3.13	4.39
P5: Polytechnic 5	2.9	1.01	1.20	1.39	2.43	1.19

5 EXAMPLE

A simplified problem assessing institutional performance as example will be demonstrated here for illustration purposes. To simplify calculations, the factors that will be used in this case and selected as contributing parameters are:

Academic Environment and Freedom- AFE
Affiliation and Belongingness- A&B
Strategic- Str.
Student Guidance and Counselling- SGC
System Openness and Stake holders Interactions- SOSI
Support and Structure- SS

Other criteria can be added if necessary, together with a suggestion that a computer be used to simplify calculations.

Table 4 represents an example of assessment of institutional performance for which alternatives (polytechnics) are considered. Table 4 is developed based on the data available and presented in table 1 (Pair-wise comparison scale for AHP preferences) above. In this case, an argument could be presented that polytechnic 5 is not meeting the minimum criteria. Descriptions presented in Table 4 under ` polytechnic 5 ', such as `very bad support structure', `student guidance & counselling' and ' affiliation & belongingness', qualifies it for immediate elimination from the list by the alternatives. Nevertheless, it is the choice of the decision-maker to eliminate polytechnic 5 immediately since it does not qualify the minimum criteria. Polytechnic 5 could be left on the list (the choice in this paper for demonstration

purposes) so that he appears at the end of the list of `best polytechnics in descending order', as will be shown at the end of the example. The matter is safeguarded by checking the consistency of the pair-wise comparison which is a part of the AHP procedure.

By following the AHP procedure described in the Section 5, the hierarchy of the problem can be developed as shown in Fig. 1. For step 3, the decision-makers have to indicate preferences or priority for each decision alternative in terms of how it contributes to each criterion as shown in Table 5.

Table 4: Pair Wise Comparison of Alternatives (Polytechnics) - An Example

	Polytechnic 1	**Polytechnic 2**	**Polytechnic 3**	**Polytechnic 4**	**Polytechnic 5**
Academic Environment and Freedom	very poor	poor	good	very good	average
Affiliation and Belongingness	bad	average	very good	good	very bad
Strategic	Very good	low	average	good	very low
Student Guidance and Counselling	Very good	average	good	bad	very bad
System Openness and Stake holders Interactions	strong	very strong	very low	average	low
Support and Structure	bad	average	good	very good	very bad

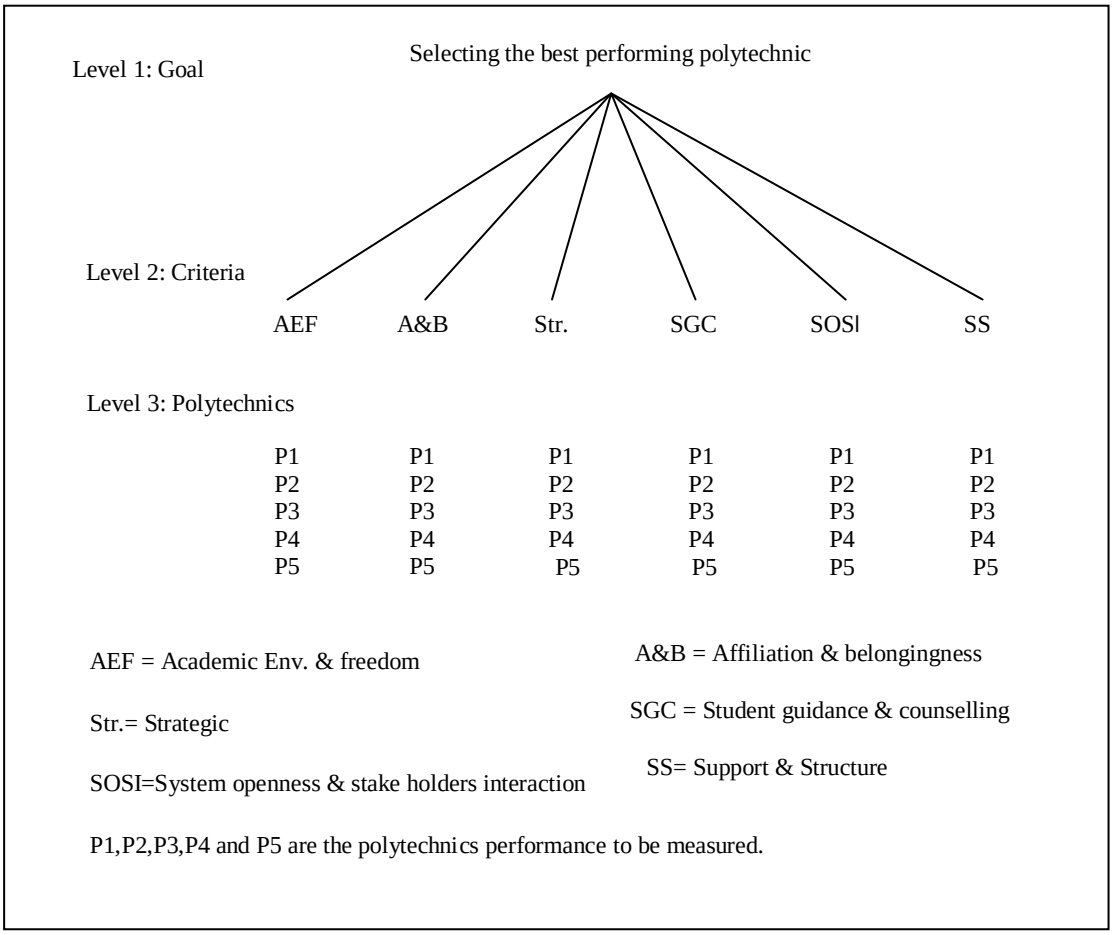

Figure: 1 Hierarchy of the Problem (Example)

Then, the following can be done manually or automatically by the AHP software:

1. Synthesizing the pair-wise comparison matrix (example: Table 6);
2. Calculating the priority vector for a criterion such as experience (example: Table 6);
3. Calculating the consistency ratio;
4. Calculating λ_{max};
5. Calculating the consistency index, CI;
6. Selecting appropriate value of the random consistency ratio from Table 2; and
7. Checking the consistency of the pair-wise comparison matrix to check whether the decision-maker's comparisons were consistent or not.

Table 5: Pair-Wise Comparison Matrix for Academic Environment & Freedom- AEF

AEF	P1	P2	P3	P4	P5
P1	1	1/3	1/2	1/6	2
P2	3	1	2	1/2	4
P3	2	1/2	1	1/3	3
P4	6	2	3	1	7
P5	1/2	1/4	1/3	1/7	1

The calculations for these items will be explained next for illustration purposes. Synthesizing the pair-wise comparison matrix is performed by dividing each element of the matrix by its column total. For example, the value 0.08 in Table 6 is obtained by dividing 1 (from Table 5) by 12.5, the sum of the column items in Table 5 (1 + 3 + 2 + 6 +1/2).

The priority vector in Table 6 can be obtained by finding the row averages. For example, the priority of polytechnic P1 (alternative 1) with respect to the criterion Academic Environment and Freedom in Table 6 is calculated by dividing the sum of the rows (0.08 + 0.082 + 0.073 + 0.078 + 0.118) by the number of contractors (columns), i.e., 5, in order to obtain the value 0.086. The priority vector for experience, indicated in Table 6, is given below.

$$\begin{bmatrix} 0.086 \\ 0.249 \\ 0.152 \\ 0.457 \\ 0.055 \end{bmatrix} \quad (1)$$

Now, estimating the consistency ratio is as follows:

Table 6: Synthesized Matrix for Academic Environment & Freedom

AEF	P1	P2	P3	P4	P5	Priority vector
P1	0.08	0.082	0.073	0.078	0.118	0.086
P2	0.24	0.245	0.293	0.233	0.235	0.249
P3	0.16	0.122	0.146	0.155	0.176	0.152
P4	0.48	0.489	0.439	0.466	0.412	0.457
P5	0.04	0.061	0.049	0.066	0.059	0.055
					$\Sigma = 0.999$	

$\lambda_{max.}$ 5:037, CI . 0:00925, RI . 1:12, CR . 0:0082 < 0:1 OK.

$$0.086\begin{bmatrix} 1 \\ 3 \\ 2 \\ 6 \\ 1/2 \end{bmatrix} + 0.249\begin{bmatrix} 1/3 \\ 1 \\ 1/2 \\ 2 \\ 1/4 \end{bmatrix} + 0.152\begin{bmatrix} 1/2 \\ 2 \\ 1 \\ 3 \\ 1/3 \end{bmatrix} + 0.457\begin{bmatrix} 1/6 \\ 1/2 \\ 1/3 \\ 1 \\ 1/7 \end{bmatrix} + 0.055\begin{bmatrix} 2 \\ 4 \\ 3 \\ 7 \\ 1 \end{bmatrix} = \underset{(weighted\ Sum\ Matrix)}{\begin{bmatrix} 0.431 \\ 1.259 \\ 0.766 \\ 2.312 \\ 0.276 \end{bmatrix}} \quad (2)$$

Dividing all the elements of the weighted sum matrices by their respective priority vector element, we obtain:

$$\frac{0.431}{0.086} = 5.012\ , \qquad \frac{1.259}{0.249} = 5.056,\ \frac{0.766}{0.152} = 5.039, \frac{2.312}{0.457} = 5.059,$$
$$\frac{0.276}{0.055} = 5.018 \quad (3)$$

We then compute the average of these values to obtain $\lambda_{max.}$

$$\lambda_{max} = \frac{5.012 + 5.056 + 5.039 + 5.059 + 5.018}{5} = 5.037 \quad (4)$$

Now, we find the consistency Index, CI as follows:

$$CI = \frac{\lambda_{max} - n}{n-1} = \frac{5.037 - 5}{5-1} = 0.00925 \quad (5)$$

Selecting appropriate value of random consistency ratio, RI, for a matrix size of five using Table 2, we find RI = 1.12. We then calculate the consistency ratio, CR, as follows:

$$CR = CI/RI = 0.00925/1.12 = 0.0082 \quad (6)$$

Table 7: Pair-Wise Comparison Matrix for Affiliation & Belongingness- A&B

A&B	P1	P2	P3	P4	P5	Priority vector
P1	1	6	3	2	7	0.425
P2	1/6	1	1/4	1/2	3	0.088
P3	1/3	4	1	1/3	5	0.178
P4	1/2	2	3	1	7	0.268
P5	1/7	1/3	1/5	1/7	1	0.039
						Σ = 0.998

$\lambda_{max.}$ =5.32, CI =0.08, RI =1.12, CR=0.071< 0:1 OK.

Table 8:Pair-Wise Comparison Matrix for Strategic- STR.

Str.	P1	P2	P3	P4	P5	Priority vector
P1	1	7	1/3	2	8	0.269
P2	1/7	1	1/5	1/4	4	0.074
P3	3	5	1	4	9	0.461
P4	1/2	4	1/4	1	6	0.163
P5	1/8	1/4	1/9	1/6	1	0.031
						Σ = 0.998

$\lambda_{max.}$ =5.38, CI =0.095, RI =1.12, CR=0.085< 0:1 OK.

As the value of CR is less than 0.1, the judgments are acceptable. Similarly, the pair-wise comparison matrices and priority vectors for the remaining criteria can be found as shown in Tables 7-11, respectively.

In addition to the pair-wise comparison for the decision alternatives, we also use the same pair-wise comparison procedure to set priorities for all six criteria in terms of importance of each in contributing to the overall goal. Table 12 shows the pair-wise comparison matrix and priority vector for the six criteria.

Now, the software can do the rest automatically, or we manually combine the criterion priorities and the priorities of each decision alternative relative to each criterion in order to develop an overall priority ranking of the decision alternative which is termed as the priority matrix (Table 13). The calculations for finding the overall priority of contractors are given below for illustration purposes:

Overall priority of alternative 1 (polytechnic- P1)

$$=0.372(0.086) + 0.293(0.425) +0.156(0.269) +0.053(0.151) +0.039(0.084) +0.087(0.144) = 0.222 \quad (7)$$

Table 9: Pair-Wise Comparison Matrix for Student Guidance & Counselling- SGC

SGC	P1	P2	P3	P4	P5	Priority vector
P1	1	1/2	1/4	2	5	0.151
P2	2	1	1/3	5	7	0.273
P3	4	3	1	4	6	0.449
P4	1/2	1/5	1/4	1	2	0.081
P5	1/5	1/7	1/6	1/2	1	0.045
						$\Sigma = 0.999$

$\lambda_{max.}$ =5.24, CI =0.059, RI =1.12, CR=0.053< 0:1 OK.

Overall priority of alternative 2 (polytechnic P2)

$$=3.372(0.249) +0.293(0.088) +0.156(0.074) +0.053(0.273) +0.039(0.264) +0.087(0.537) =0.201 \quad (8)$$

Table 10: Pair-Wise Comparison Matrix for System Openness and Stakeholders' Opinions- SOSI

SOSI	P1	P2	P3	P4	P5	Priority vector
P1	1	1/6	1/8	2	3	0.084
P2	6	1	1/4	5	7	0.264
P3	8	4	1	9	9	0.556
P4	1/2	1/5	1/9	1	2	0.057
P5	1/3	1/7	1/9	1/2	1	0.038
						$\Sigma = 0.999$

$\lambda_{max.}$ =5.28, CI =0.071, RI =1.12, CR=0.063< 0:1 OK.

Table 11: Pair-Wise Comparison Matrix for Support & Structure- SS

SS	P1	P2	P3	P4	p5	Priority vector
P1	1	1/5	1/3	3	3	0.144
P2	5	1	5	6	6	0.537
P3	3	1/5	1	2	2	0.173
P4	1/3	1/6	1/2	1	2	0.084
P5	1/3	1/6	1/2	1/2	1	0.062

$\Sigma = 0.999$

$\lambda_{max.}$ =5.40, CI =0.10, RI =1.12, CR=0.089< 0:1 OK.

Table 12: Pair-Wise Comparison Matrix for Six Criteria

	AEF	A&B	Str.	SGC	SOSI	SS	Priority vector
AEF	1	2	3	6	6	5	0.372
AXB	1/2	1	3	6	6	5	0.293
Str.	1/3	1/3	1	4	4	3	0.156
SGC	1/6	1/6	¼	1	2	1/2	0.053
SOSI	1/6	1/6	¼	½	1	¼	0.039
SS	1/5	1/5	1/3	2	4	1	0.087

$\Sigma = 1.00$

$\lambda_{max.}$ =6.31, CI =0.062, RI =1.24, CR=0.05< 0:1 OK.

Overall priority of alternative 3 (polytechnic P3)

=0.372(0.152) +0.293(0.178) +0.156(0.461) +0.053(0.449)
+0.039(0.556) +0.087(0.173) = 0.241 (9)

Overall priority of alternative 4 (polytechnic P4)

=0.372(0.457) +0.293(0.268) +0.256(0.163) +0.053(0.081)
+0.039(0.057) +0.087(0.084) =0.288 (10)

Overall priority of alternative 5 (polytechnic P5)

=0.372(0.055) +0.293(0.039) +0.156(0.031) +0.053(0.045)
+0.039(0.038) +0.087(0.062) =0.046 11)

Table 13: Priority matrix for Assessment of Performance

AEF	AEF	A&B	Str.	SGC	SOSI	SS	Overall Priority vector
P1	0.086	0.425	0.269	0.151	0.084	0.144	0.222
P2	0.249	0.088	0.074	0.273	0.264	0.537	0.201
P3	0.152	0.178	0.461	0.449	0.556	0.173	0.241
P4	0.457	0.268	0.163	0.081	0.057	0.084	0.288
p5	0.055	0.039	0.031	0.045	0.038	0.062	0.046

For taking decisions, the polytechnic institutes under considerations are now ranked according to their overall priorities, as follows: P4, P3, P1, P2, and P5, indicate that P4 is the best in terms of performance.

6 CONCLUSION

Assessment of performance and making rank of institutes is a complex decision making process that requires discerning abilities and methods to make sound decisions. The paper has presented the Analytical Hierarchy Process (AHP) as a decision-making method that allows the consideration of multiple criteria. An example of diploma institutes and their performance was created to demonstrate AHP application in assessing institutional performance of diploma institutes.

Assessing performance involves criteria and priorities that are determined by user requirements and preferences as well as the characteristics of the individual institutes. AHP allows group decision-making. The AHP is now used as common tool in multi-criteria decision making process as a part of operation research and management science because of it's both technically validity and practical usefulness.

Some formidable problems stand as obstacles to the selection of common criteria to assess the institutional performance, because it is very difficult to specify appropriate, measurable parameters which reflect the institutional performance. Findings in the study are preliminary and exploratory, but they do suggest some directions for similar study that may both enhance understanding of institutional level environment and help to improve the performance. Results shown are not the true reflections of diploma education systems, indicative only. No general conclusion can be made out of these findings to the diploma education system of the state as mentioned.

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