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A DECISION SUPPORT SYSTEM TO ASSIST THE GRADUATING SENIOR HIGH SCHOOL STUDENTS FOR COLLEGE AND DEGREE PROGRAM SELECTION USING VARIOUS MULTI-CRITERIA DECISION-MAKING APPROACH

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Market Research and Decision Analysis and Risk Management
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Introduction

- Education at a higher level is now viewed as necessary for a successful career. In 2018, City Mayors Annual Report about education in Cagayan de Oro City turned out that 87.63 percent is the completion rate. This is higher compared to 79.17 percent in the year 2012. Based on the given numbers, the completion rate in Cagayan de Oro City is increasing.

- College education can be a way to enhance opportunities for a good paying job in the future considering the global economy which is increasingly more competitive.

- Today, most colleges or universities are faced with challenge and stability during college in time with students' selection of program course. Mistakes may occur to students in choosing a college or a program course. Students flock to courses which seemingly interest them but tend to shift to other courses.

Introduction

The main objective of this study is to provide recommendations to the graduating Senior High School students in Cagayan de Oro City in selecting a Program Course and the Colleges/Universities suitable for them based on their preferences using Multi-Criteria Decision Making Methods.

Specifically, this study aims to:

- To determine the factors affecting the choice for the college/university selection;
- Formulate a Mathematical Model for college/university selection with the desired degree Program for graduating Senior High School students;
- Design and develop a decision support system for college/university selection with the desired degree Program for graduating Senior High School students.

Methodology

In order to achieve the objectives of this study, surveys and interviews were conducted among senior high school (SHS) and college students in various SHS, colleges and universities around Cagayan de Oro City, Philippines in order to determine the factors or criteria for college and degree program selection.

Top Five (5) criteria in college selection were considered namely:

1. Cost of Tuition & Other Fees
2. Availability of the Program
3. Quality/Reputation Ranking of the College
4. Location
5. Availability of Financial Aid

- Among the many Multi-criteria Decision Making methods, combined Analytical Hierarchy Process (AHP) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) was used in this research study.

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Methodology

Analytical Hierarchy Process (AHP)

The Analytical Hierarchy Process (AHP) is a multi-criteria decision-making method developed by Saaty.

The steps are as follows:

Step 1:

The establishment of pair-wise comparison matrix. Set up the pair-wise matrix of order $n\ x\ n$ consists of n elements in the rows and columns whose priorities are to be determined.

Step 2:

Perform pair-wise comparisons of all the elements Saaty's fundamental scale of absolute numbers (Tsinidou et al., 2010) to perform pair-wise comparison between the elements. Reciprocals of these values are used for the corresponding transposed judgements. For a matrix of order $"n",n(n-1)/2$ comparisons are required. When the pair-wise comparisons are completed, proceed to the next step to estimate the Eigen values of the matrix.

Methodology

Intensity of Importance	Definition	Explanation
1	Equal Importance	Two activities contribute equally to the objective
3	Weak Importance of one over another	Experience and judgement slightly favor one activity over another
5	Essential or strong importance	Experience and judgement strongly favor one activity over another
7	Demonstrated Importance	An activity is strongly favored and its dominance is demonstrated in practice
9	Absolute Importance	The evidence favoring one activity over another is the highest possible order of affirmation
2, 4, 6, 8	Intermediate values between the two adjacent judgements	When compromise is needed
Reciprocals of above nonzero	If activity has one of the above non zero numbers assigned to it when compared to activity j, then j has the reciprocal value when compared to i	

Methodology

Step 3:

The estimation of Eigen values of the matrix. After a matrix multiplication of pair-wise comparisons, an Eigenvector was obtained with its Eigen values. Averaging over normalized columns method proposed by Thomas Saaty is used to estimate the Eigen values.

Step 4: Checking the consistency of pair-wise judgements.

In order to verify the consistency of the pair-wise comparison matrix, Saaty proposed consistency index (CI) and consistency ratio (CR) defined as follows:

$$C.I = \frac{\lambda max - n}{(n - 1)}$$

$$C.R = \frac{C.I}{R.I}$$ the, C.R. should be < 0.10 to be acceptable

Where: λmax = maximum principal Eigen value of the comparison matrix.

n = number of elements (order of the pair-wise comparison matrix).

Methodology

Technique for Order Preference by Similarity to Ideal Solution (TOPSIS)

The Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), introduced by Hwang and Yoon in 1981, is a method of compensatory aggregation that compares a set of alternatives by identifying weights for each criterion, normalizing scores for each criterion and calculating geometric distance between each alternative and the ideal alternative, which is the best score in each criterion. Its process is as follows:

Step 1: Consider the decision matrix D, which consist of alternatives and criteria described by:

$$D = \begin{array}{c} \\ A_1 \\ \vdots \\ A_m \end{array} \begin{array}{c} \begin{array}{ccc} C_1 & \cdots & C_n \end{array} \\ \begin{bmatrix} x_{11} & \cdots & x_{1n} \\ \vdots & \ddots & \vdots \\ x_{1m} & \cdots & x_{mn} \end{bmatrix} \end{array}$$

where A_1, $A_2, \ldots, A_m$ are the viable alternatives, and C_1, $C_2, \ldots, C_n$ are the criteria. X_{ij} indicates the rating of the alternatives A_i according to criteria C_j.

Methodology

Step 2: Normalized the decision matrix *D* to obtain dimensionless matrix.

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}}$$

with $i = 1, \dots, m;\ j = 1, \dots, n.$ $R = [r_{ij}]_{mxn}$ is the normalized decision matrix. The decision matrix ***R*** represents the relative rating of the alternatives.

Step 3: Calculate the weighted normalized matrix $P = [p_{ij}]_{mxn}$ with $i = 1, \dots, m;\ j = 1, \dots, n$ by multiplying the normalized decision matrix by its associated weights.

$$p_{ij} = w_j r_{ij}\ with\ i = 1, \dots, m;\ j = 1, \dots, n.$$

Methodology

Step 4: Identifying the positive ideal solutions and negative ideal solutions.

$$A^+ = (p_1^+ p_2^+, \dots, p_m^+) \; where \; p_j^+ = (max_i \, p_{ij}, j \in J_1, min_i p_{ij}, j \in J_2)$$

$$A^- = (p_1^- p_2^-, \dots, p_m^-) \; where \; p_j^- = (max_i \, p_{ij}, j \in J_1, min_i p_{ij}, j \in J_2)$$

Where $J_1 \; and \; J_2$ represent benefit and cost criteria respectively.

Step 5: Calculate the separation measures from the positive ideal solutions and negative ideal solutions.

$$d_i^+ = \sqrt{\sum_{j=1}^{n} (p_j^+ - p_{ij})^2} \quad with \; i = 1, \dots, m$$

$$d_i^- = \sqrt{\sum_{j=1}^{n} (p_j^- - p_{ij})^2} \quad with \; i = 1, \dots, m.$$

Methodology

Step 6: Calculate the relative closeness coefficient for each alternative with respect to positive ideal solution.

$$C_i = \frac{d_i^-}{d_i^+ + d_i^-}$$

Step 7: Rank the alternatives according to the relative closeness coefficients. The best alternatives are those that have higher value C_i and therefore should be chosen.

Salient Results

- In this study, a Microsoft Excel – based system was developed in order to automate the process of calculation of decision matrices. The Microsoft Excel has a programming aspect, allowing the user to employ numerical methods. Also, it has interactive features allowing user interfaces that can completely hide the spreadsheet used as data calculators from the user, making it look like ***application*** that asks the user questions and provides answers.
- Through Microsoft Excel, questions for pairwise-comparison of college/university preference were integrated in the system so that once the graduating senior high school student answers, corresponding ratios will be generated automatically. The said ratios will be the elements or the entries of the matrices of the different Mathematical models. The concepts and methodologies of each MCDM were also integrated in the system by applying advanced Excel formulas and functions.
- The spreadsheet for the data calculation were all hidden so as to make it look like a decision support application. Once all the conditions set by the system to the user were met, an automated ideal college/university with the desired degree program recommendation will then be presented by the system based from the calculated data.

Salient Results

Figure 1. Decision Support System landing page

In this section, the details of the user (demographics) will be asked. The user will have to simply "toggle" to select an answer. **[a]**

In this section, pairwise comparisons are made. The user must carefully evaluate his answer in order to be consistent. It is very important to be coherent in pairwise comparison because the system can detect inconsistencies. The answers per question will be transformed into ratios which will be the entries in the decision matrix. **[b]**

The user must carefully evaluate each question in order to be consistent. The answer per question will be transformed into ratios which will be the entries in the decision matrices. A graph will be presented in this portion once the data is complete. **[c]**

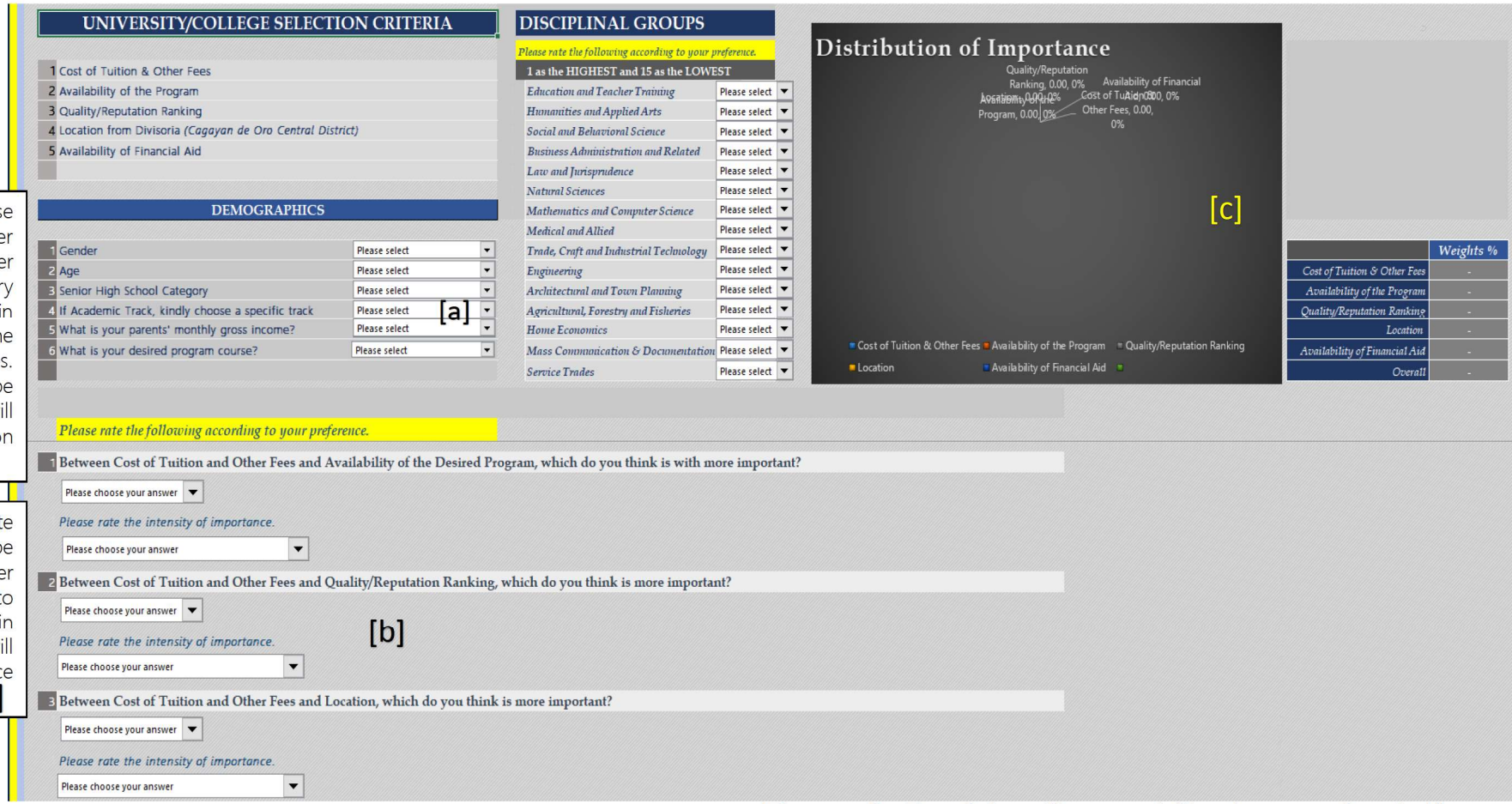


Figure 2. Decision Support System main platform

This section will be generated once the user was able to consistently evaluated the pairwise comparisons.

The recommendations will appear in this page.

COLLEGE/UNIVERSITY & PROGRAM DETAILS								
Rank	College Type	College/University	Program	Discipline	Address	College/University Ranking in the Philippines	Total Assessment	Location (meters) from Divisoria
1	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-
32	-	-	-	-	-	-	-	-
33	-	-	-	-	-	-	-	-
34	-	-	-	-	-	-	-	-
35	-	-	-	-	-	-	-	-
36	-	-	-	-	-	-	-	-
37	-	-	-	-	-	-	-	-
38	-	-	-	-	-	-	-	-
39	-	-	-	-	-	-	-	-
40	-	-	-	-	-	-	-	-
41	-	-	-	-	-	-	-	-

Figure 3. DSS Results page

This is a sample of a DSS user currently inputting the details requested by the DSS application.

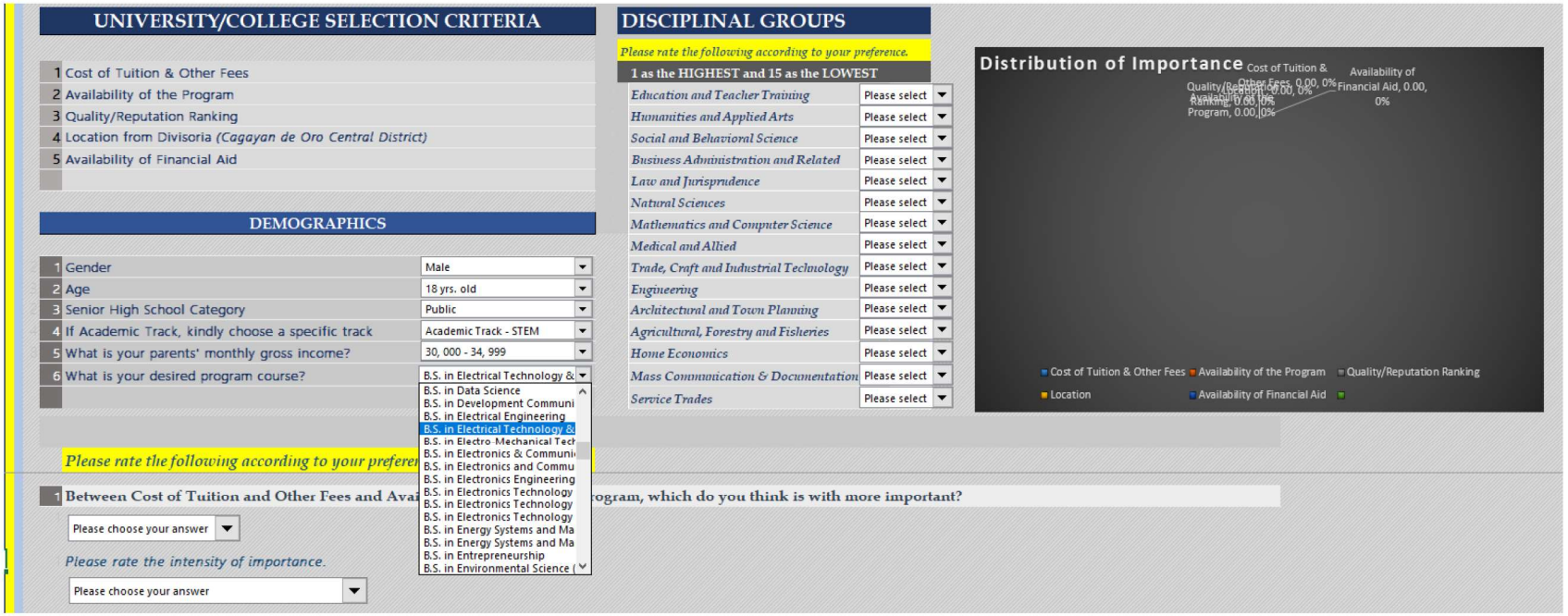


Figure 4. A sample DSS being completed by the user

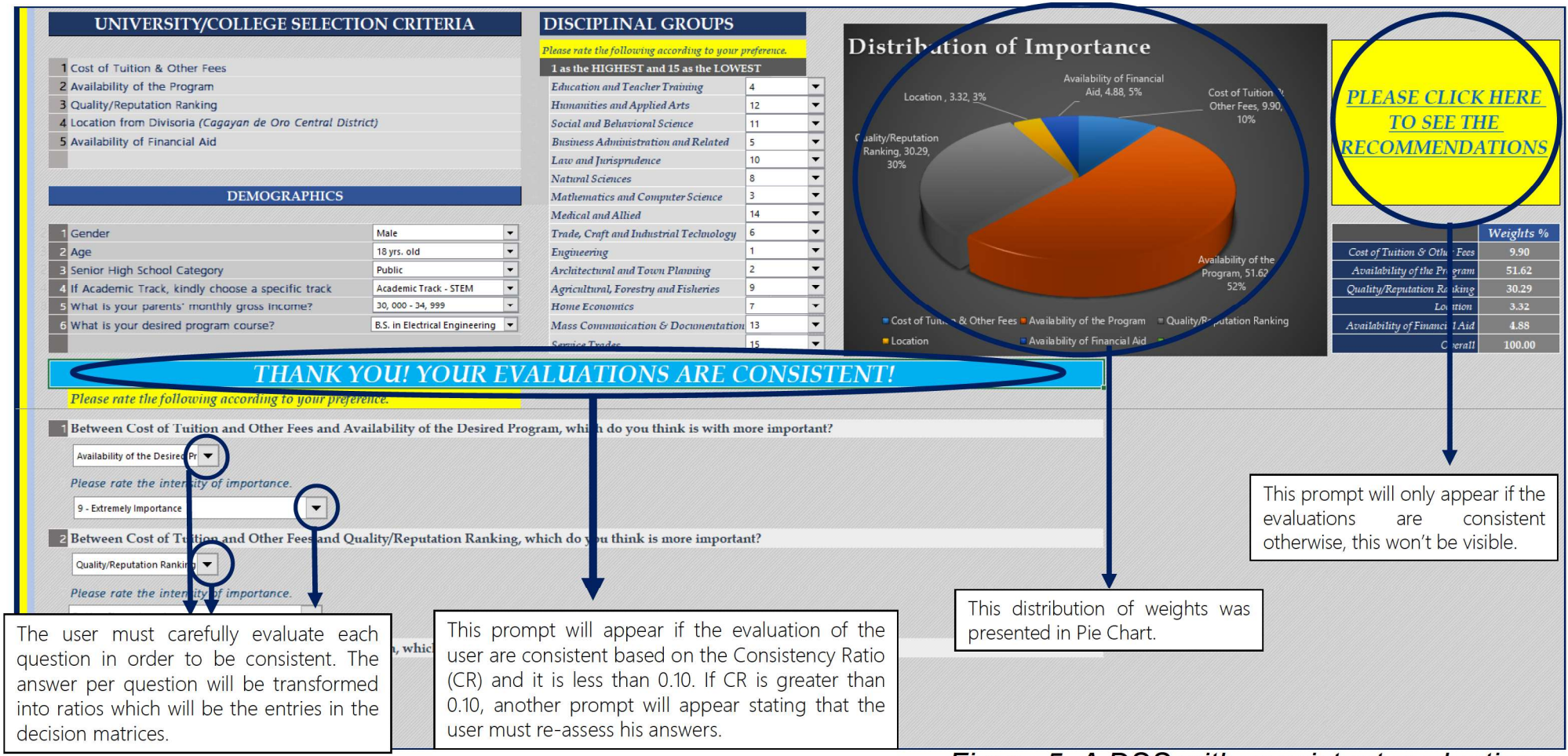
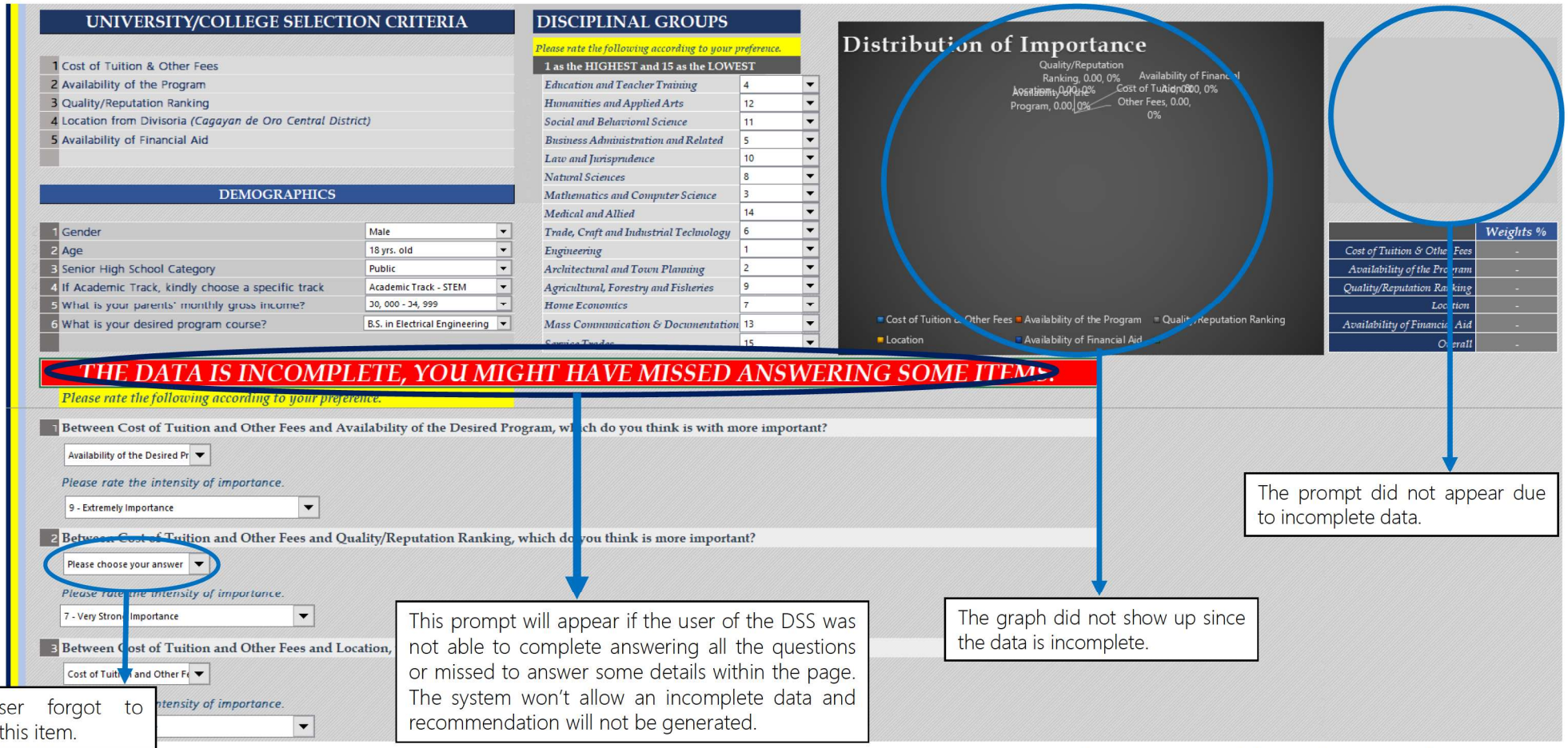


Figure 5. A DSS with consistent evaluations



The user forgot to answer this item.

This prompt will appear if the user of the DSS was not able to complete answering all the questions or missed to answer some details within the page. The system won't allow an incomplete data and recommendation will not be generated.

The graph did not show up since the data is incomplete.

The prompt did not appear due to incomplete data.

Figure 6. A DSS with an incomplete data

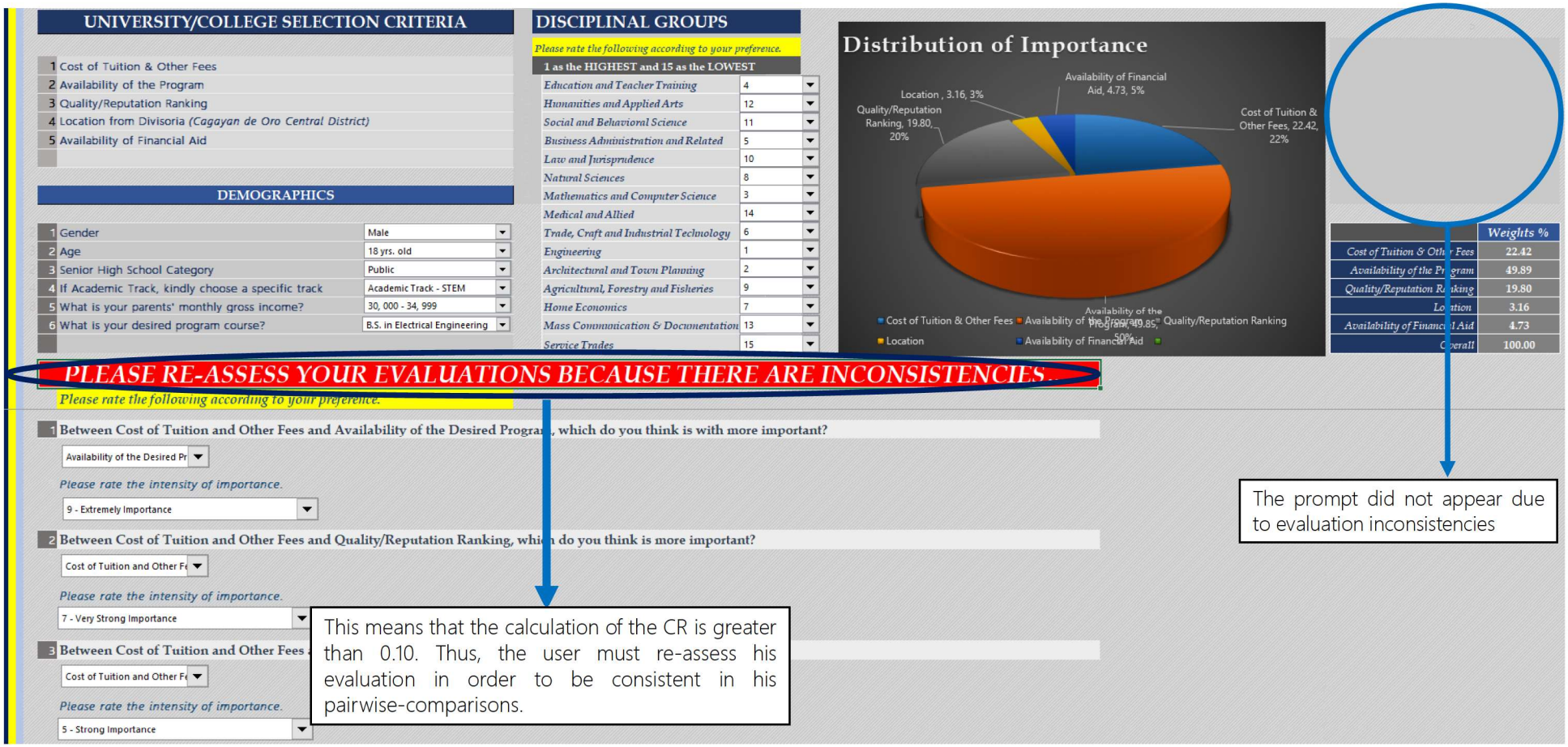
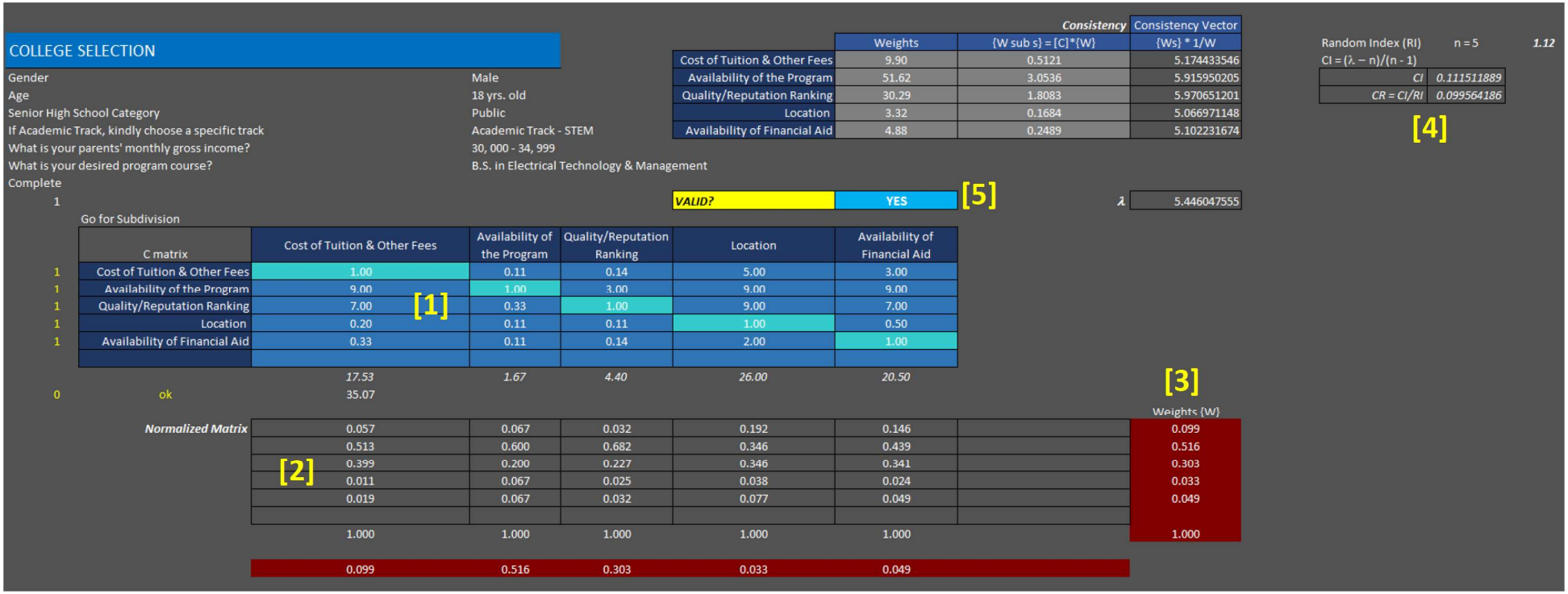


Figure 7. A DSS with inconsistent evaluations



COLLEGE SELECTION

Gender	Male
Age	18 yrs. old
Senior High School Category	Public
If Academic Track, kindly choose a specific track	Academic Track - STEM
What is your parents' monthly gross income?	30, 000 - 34, 999
What is your desired program course?	B.S. in Electrical Technology & Management
Complete	
1	

Go for Subdivision

	C matrix	Cost of Tuition & Other Fees	Availability of the Program	Quality/Reputation Ranking	Location	Availability of Financial Aid
1	Cost of Tuition & Other Fees	1.00	0.11	0.14	5.00	3.00
1	Availability of the Program	9.00	1.00	3.00	9.00	9.00
1	Quality/Reputation Ranking	7.00	0.33	1.00	9.00	7.00
1	Location	0.20	0.11	0.11	1.00	0.50
1	Availability of Financial Aid	0.33	0.11	0.14	2.00	1.00
		17.53	*1.67*	*4.40*	*26.00*	*20.50*
0	ok	35.07				

[1]

[2]

	Cost of Tuition & Other Fees	Availability of the Program	Quality/Reputation Ranking	Location	Availability of Financial Aid		Weights {W}
Normalized Matrix	0.057	0.067	0.032	0.192	0.146		0.099
	0.513	0.600	0.682	0.346	0.439		0.516
	0.399	0.200	0.227	0.346	0.341		0.303
	0.011	0.067	0.025	0.038	0.024		0.033
	0.019	0.067	0.032	0.077	0.049		0.049
	1.000	1.000	1.000	1.000	1.000		1.000
	0.099	0.516	0.303	0.033	0.049		

[3]

	Weights	{W sub s} = [C]*{W}	Consistency Vector {Ws} * 1/W
Cost of Tuition & Other Fees	9.90	0.5121	5.174433546
Availability of the Program	51.62	3.0536	5.915950205
Quality/Reputation Ranking	30.29	1.8083	5.970651201
Location	3.32	0.1684	5.066971148
Availability of Financial Aid	4.88	0.2489	5.102231674

Consistency

VALID? **YES** [5]

λ 5.446047555

Random Index (RI) n = 5 *1.12*

CI = (λ − n)/(n - 1)

CI	*0.111511889*
CR = CI/RI	*0.099564186*

[4]

[1] The answers presented by the user in Figure 5 were converted into ratios in a 5x5 matrix [C].

[2] This is the normalized matrix using the methods of AHP.

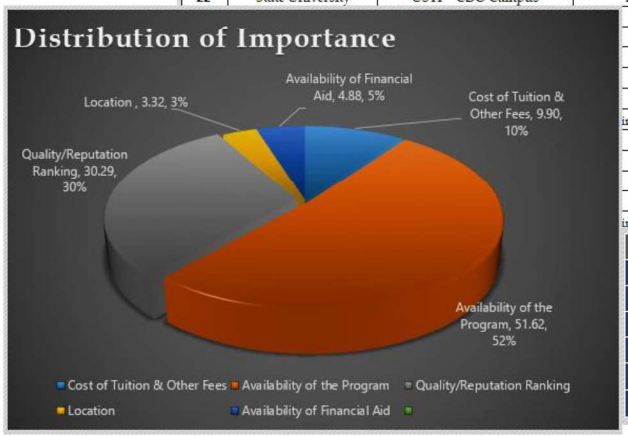
[3] The generated weighted matrix. This will serve as the data in the pie chart in Figure 5.

[4] Consistency Ratio is calculated and the result is 0.0996 which is less than 0.10.

[5] Validity Test. Since the value of CR is less than 0.10 then the evaluation is consistent.

COLLEGE / UNIVERSITY & PROGRAM DETAILS

Rank	College Type	College/University Name	Program	Discipline	Address	College/University Ranking in the Philippines	Total Assessment	Location (meters) from Divisoria
1	State University	USTP - CDO Campus	B.S. in Electrical Engineering	Engineering	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
2	Private University	Xavier University	B.S. in Electrical Engineering	Engineering	Corrales Avenue, Cagayan de Oro City	17th	₱38,530.00	400
3	Private University	Liceo de Cagayan	B.S. in Electrical Engineering	Engineering	Rodolfo N. Pelaez Blvd, Cagayan de Oro City	128th	₱27,959.60	1,300
4	Private College	Cagayan de Oro College	B.S. in Electrical Engineering	Engineering	Max Y. Suniel St, Cagayan de Oro	Unranked	₱24,793.50	1,000
5	Private University	Xavier University	B.S. in Civil Engineering	Engineering	Corrales Avenue, Cagayan de Oro City	17th	₱35,380.00	400
6	Private University	Xavier University	B.S. in Industrial Engineering	Engineering	Corrales Avenue, Cagayan de Oro City	17th	₱35,380.00	400
7	State University	USTP - CDO Campus	B.S. in Electro-Mechanical Technology	Trade, Craft and Industrial Technology	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
8	State University	USTP - CDO Campus	B.S. in Electronics & Communications Technology	Trade, Craft and Industrial Technology	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
9	State University	USTP - CDO Campus	B.S. in Electronics Technology (ES)	Trade, Craft and Industrial Technology	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
10	State University	USTP - CDO Campus	B.S. in Electronics Technology (MST)	Trade, Craft and Industrial Technology	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
11	State University	USTP - CDO Campus	B.S. in Electronics Technology (TN)	Trade, Craft and Industrial Technology	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
12	State University	USTP - CDO Campus	B.S. in Energy Systems and Management (EMCM)	Trade, Craft and Industrial Technology	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
13	State University	USTP - CDO Campus	B.S. in Energy Systems and Management (PSDE)	Trade, Craft and Industrial Technology	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
14	State University	USTP - CDO Campus	B.S. in Electrical Technology & Management	Trade, Craft and Industrial Technology	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
15	State University	USTP - CDO Campus	B.S. in Manufactoring Engineering Technology	Trade, Craft and Industrial Technology	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
16	State University	USTP - CDO Campus	B.S. in Civil Engineering	Engineering	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
17	State University	USTP - CDO Campus	B.S. in Electronics Engineering	Engineering	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
18	State University	USTP - CDO Campus	B.S. in Mechanical Engineering	Engineering	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
19	State University	USTP - CDO Campus	B.S. in Geodetic Engineering	Engineering	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
20	State University	USTP - CDO Campus	B.S. in Computer engineering	Engineering	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
21	Private University	Xavier University	B.S. in Electronics Engineering	Engineering	Corrales Avenue, Cagayan de Oro City	17th	₱38,530.00	400
22	State University	USTP - CDO Campus	B.S. in Automotive Mechanical Technology	Trade, Craft and Industrial Technology	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
			B.S. in Autotronics	Trade, Craft and Industrial Technology	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
			B.S. in Chemical Engineering	Engineering	Corrales Avenue, Cagayan de Oro City	17th	₱42,205.00	400
			B.S. in Mechanical Engineering	Engineering	Corrales Avenue, Cagayan de Oro City	17th	₱42,810.00	400
			B.S. in Civil Engineering	Engineering	Corrales Ext, Barangay 23, Cagayan de Oro City	139th	₱21,751.28	1,700
			B.S. in Mechanical Engineering	Engineering	Corrales Ext, Barangay 23, Cagayan de Oro City	139th	₱21,751.28	1,700
			in Electronics and Communications Engineering	Engineering	Corrales Ext, Barangay 23, Cagayan de Oro City	139th	₱21,751.28	1,700
			B.S. in Marine Engineering	Engineering	Corrales Ext, Barangay 23, Cagayan de Oro City	139th	₱21,751.28	1,700
			B.S. in Mathematics	Mathematics and Computer Science	Corrales Avenue, Cagayan de Oro City	17th	₱30,520.00	400
			B.S. in Civil Engineering	Engineering	Rodolfo N. Pelaez Blvd, Cagayan de Oro City	128th	₱27,959.60	1,300
			B.S. in Computer Engineering	Engineering	Rodolfo N. Pelaez Blvd, Cagayan de Oro City	128th	₱27,959.60	1,300
			in Electronics and Communications Engineering	Engineering	Rodolfo N. Pelaez Blvd, Cagayan de Oro City	128th	₱27,959.60	1,300
				Engineering	Rodolfo N. Pelaez Blvd, Cagayan de Oro City	128th	₱27,959.60	1,300
				Architectural and Town Planning	C.M. Recto Ave., Lapasan, Cagayan de Oro City	81st	*free tuition c/o CHED UniFAST	2,800
				Mathematics and Computer Science	Corrales Avenue, Cagayan de Oro City	17th	₱31,390.00	400



	Weights %
Cost of Tuition & Other Fees	9.90
Availability of the Program	51.62
Quality/Reputation Ranking	30.29
Location	3.32
Availability of Financial Aid	4.88
Overall	100.00

[1]

The recommendation of the system was based on the given weights [1] of the main criteria.

CONSOLIDATED DATA

ACADEMIC TRACK - STEM	
Senior High School Category	All

Count of Program	Course Discipline									
Rank	Agricultural, Forestry and Fisheries	Architectural and Town Planning	Education and Teacher Training	Engineering	Mathematics and Computer Science	Medical and Allied	Natural Sciences	Social and Behavioral Science	Trade, Craft and Industrial Technology	Grand Total
1	1	1		10		3	3	1	1	20
2		1		11		2	4	1	1	20
3				11		2	5	1	1	20
4				12		2	4	1	1	20
5			1	13		1	4		1	20
6			1	10		2	5		2	20
7			1	11	1	2	3		2	20
8			1	10	1	2	4		2	20
9			1	7	3		6		3	20
10			1	8	2	1	4		4	20
Grand Total	**1**	**2**	**6**	**103**	**7**	**17**	**42**	**4**	**18**	**200**

Based from RANK 1:

Ten out of twenty senior high school students from the STEM strand tends to be inclined into Engineering courses.

Three out of twenty are inclined into Natural Sciences.

Three out of twenty are inclined into Medical and Allied Sciences.

**Overall, the SHS students are inclined into Engineering and Natural Sciences.*

CONSOLIDATED DATA

ACADEMIC TRACK - ABM	
Senior High School Category	All

Count of Program	Course Discipline								
Rank	Business Administration and Related	Education and Teacher Training	Engineering	Mathematics and Computer Science	Natural Sciences	Service Trades	Social and Behavioral Science	Trade, Craft and Industrial Technology	Grand Total
1	13				2	5			20
2	12				4	4			20
3	13				4	3			20
4	10	1		1	4	3		1	20
5	9	1		1	6	2		1	20
6	6	3		1	7	2		1	20
7	6	2		2	8	1		1	20
8	7	2	1		7	2		1	20
9	6	3		1	5	3	1	1	20
10	4	2	1	2	6	3	1	1	20
Grand Total	**86**	**14**	**2**	**8**	**53**	**28**	**2**	**7**	**200**

Based from RANK 1:

Thirteen out of twenty senior high school students from the ABM strand tends to be inclined into Business Administration and related courses.

Five out of twenty are inclined into Service Trades.

Two out of twenty are inclined into Natural Sciences.

**Overall, the SHS students are inclined into Business Administration and related courses.*

CONSOLIDATED DATA

ACADEMIC TRACK - HUMSS	
Senior High School Category	All

Count of Program	Course Discipline										
Rank	Architectural and Town Planning	Education and Teacher Training	Home Economics	Humanities and Applied Arts	Law and Jurisprudence	Mass Communication & Documentation	Mathematics and Computer	Service Trades	Social and Behavioral	Trade, Craft and Industrial	Grand Total
1		8		1	7	2			2		20
2		9		1	5	2	1		2		20
3		8	1	1	4	2	1	1	2		20
4	1	8		2	4	1	1		2	1	20
5		9		3	1	1		2	1	3	20
6		9	2	2	1	1		1	1	3	20
7		10		2		1		2	2	3	20
8	1	10		2		1		2	1	3	20
9		11	1	2				1	2	3	20
10	1	11		1				3	1	3	20
Grand Total	**3**	**93**	**4**	**17**	**22**	**11**	**3**	**12**	**16**	**19**	**200**

Based from RANK 1:

Eight out of twenty senior high school students from the HUMSS strand tends to be inclined into Education and Teacher Training

Seven out of twenty are inclined into Service Law and Jurisprudence.

Two out of twenty are inclined into Mass Communication and Documentation.

**Overall, the SHS students are inclined into Trade, Education and Teacher Training.*

CONSOLIDATED DATA

ACADEMIC TRACK - TECHVOC	
Senior High School Category	All

Count of Program	Course Discipline										
Rank	Agricultural, Forestry and Fisheries	Architectural and Town Planning	Education and Teacher Training	Home Economics	Law and Jurisprudence	Mass Communication & Documentation	Mathematics and Computer Science	Service Trades	Social and Behavioral	Trade, Craft and Industrial	Grand Total
1	1	1		5		2	11				20
2			1	2	1		7		1	8	20
3			2				5			13	20
4		1	2				6			11	20
5			2	1			4			13	20
6			3				4			13	20
7			4				3			13	20
8			3				2			15	20
9			3	1			1			15	20
10			4				1	1		14	20
Grand Total	**1**	**2**	**24**	**9**	**1**	**2**	**44**	**1**	**1**	**115**	**200**

Based from RANK 1:

Eleven out of twenty senior high school students from the TECHVOC strand tends to be inclined into Mathematics and Computer Science.

Five out of twenty are inclined into Home Economics.

Two out of twenty are inclined into Mass Communication and Documentation.

**Overall, the SHS students are inclined into Trade, Craft and Industrial.*

Conclusions

The decision support system (DSS) developed in this study provides the graduating Senior High School students in Cagayan de Oro City of recommendations on college / university selection including the suitable curricular program based from the factors considered.

Moreover, students are given better perspective on college selection by providing them all the available alternatives in college and program selection. Most of the details of the college and curricular programs are already provided. The results of the study further show that recommendations vary depending on the weights of the factors.

The combined Analytical Hierarchy Process (AHP) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) is great blend of Multi-criteria decision making methods as the AHP uses pairwise comparison and minimizes inconsistent evaluations and TOPSIS conveniently ranks the alternatives based on relative closeness to the ideal positive solution and its distance from the negative ideal solution.

Recommendations

The currently developed decision support system for college/university selection using the AHP-TOPSIS cannot identify which data is unfilled and can hardly specify the part wherein the decision maker made an inconsistency. It is highly recommended to incorporate additional prompts to specify the empty data fields and to give automated suggestions as to which part of the pairwise comparisons had inconsistencies. Furthermore, before making a decision, up-to-date information should be obtained and consulted from the different colleges and universities. A collaboration with all colleges and universities would be ideal.

Lastly, there are MCDMs that use complex processes and iterations like the Multi-Attribute Utility Theory (MAUT), Fuzzy Set Theory, Elimination and Choice Translating Reality (ELECTRE) and PROMETHEE. MAUT is data intensive. It requires incredible amount of input at every step of the procedure in order to accurately record the decision maker's preferences. Fuzzy Set Theory developed by Zadeh in 1965 necessitates numerous simulations before being able to be used in the real world. ELECTRE and PROMETHEE are similar in nature. They are outranking methods that use several iterations. It is recommended to integrate these other techniques in college/university selection support system and compare the results for future researches.

Thank you!

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