© 2018 IJSRST | Volume 4 | Issue 9 | Print ISSN : 2395-6011 | Online ISSN : 2395-602X
Themed Section: Science and Technology

The Strategy for Choosing Campus Promotion Location Based on Decision Support System

Maringan Sianturi
Department of Computer Science, STMIK Budi Darma, North Sumatra, Indonesia

ABSTRACT

The selection of a campus promotion location is an activity that requires a large fee for a college. Site selection is based on criteria that influence the decision on the chosen location. Large costs but results that are not optimal will certainly have a negative impact on the management of universities in managing higher education. In order for the decision on the location of the campus promotion in accordance with the costs incurred and get great benefits, it must be used a decision support system based on the selection of the desired location. The application of the WASPAS method to a support-based system is very appropriate, because it can resolve conflicts of interest between each criterion, so that it will produce effective decisions. In this study the author uses the WASPAS method to select campus promotion.

Keywords : Marketing Strategy, Selection of Promotion Sites, DSS, WASPAS

I. INTRODUCTION

Promotion is a campus operational activity carried out at certain times. Usually, the promotion of a campus is carried out at the beginning of the year of the new academic year registration period from February to August. The academic year of a college will begin in September so that before entering the academic year, promotional activities are carried out. There are many types of promotions that can be done to attract new student candidates, can use Radio, Distribution of Brochures to Senior High Schools, create event activities in an area, give discounts for prospective students, open a promotional stand for a supermarket or a specific mall plaza and more.

The promotion that is carried out will certainly require a very large fee because it is related to the type of promotion carried out. In this article discusses the location selection strategy of campus promotions at a supermarket or mall plaza. The selection of supermarkets/malls/plaza that are used as promotional places still requires a fee. The amount of the cost depends on the location of the promotion with the city, the size of the stand area, the length of the promotion, the number of visitors to the mall and others. This is certainly a problem for college management in managing finances for this promotional event because it requires a large fee. But not many universities do promotional activities at the mall/supermarket/plaza which is the center of the crowd in an area. Of course, this activity will have a big impact on higher education, namely the number of applicants who apply to the college.

In order for the costs incurred in accordance with the desired results, of course, the college should not be wrong in determining the location of marketing. The choice of this location, of course, considers many criteria, and between each criterion has its own interests. To overcome differences in interests in each criterion, this problem can be solved by implementing a decision support system [1][2][3]. This system can assist management in producing effective decisions by applying multiple criteria-based methods in decision making[3][4].

In the application of decision support based systems using many criteria-based methods[5]. Many methods can be applied to this system, for example using the Technique For Others Reference method by Similarity to Ideal Solution (TOPSIS)[6][7], COmplex PRoportional ASSESSMENT (COPRAS) [8][9], Elimination Et Choix Tradusiant La Realite (ELECTRE) [4][10][11], Simple Additive Weighting [12], Weighted Product, Multi-Objective Optimization on the Base of Ratio Analysis Method (MOORA) [13][14][15], SMART [16], or based on Fuzzy [17][18][19].

In the previous research, the application of decision support systems in making decisions effective on the ranking of the best computer lecturers was carried out by Mesran (2017). The results of the study show that Electre helps the best computer lecturer decision by ranking the alternatives on each criterion[4]. Syafrida Hafni Sahir (2017) uses the Simple Additive Weighting method to provide salary incentives to employees of a company [12].

From some of the studies above it can be concluded that the application of a decision support system can have a major impact on decisions made by the leadership in this case management to get effective results. Based on this, the writer chose to apply the SAW method in this study to get a decision about the strategic location of campus promotion.

II. METHODS AND MATERIAL

2.1 Decision Support System

Decision support-based systems are information processing systems using computers to solve problems faced by management in producing a decision [1][4]. The application of a decision support system with the use of computers as a tool can make more effective the decisions produced by managers[3][6].

2.2 Weighted Aggregated Sum Product Assessment Method

The WASPAS method is a unique combination of the MCDM approach with a weighted sum model (WSM) and a weighted product model (WPM). Which method can be used to solve several problems such as decision making and others[20][21].

The procedure of Weighted Aggregated Sum Product Assessment (WASPAS) method [22][23][20] can be seen below:

Step 1: Create a Decision Matrix.

$$Xij = \begin{bmatrix} x_{11} & x_{12} & . & x_{1n} \\ x_{21} & x_{22} & . & x_{2n} \\ . & . & . & . \\ x_{m1} & x_{m2} & . & x_{mn} \end{bmatrix}$$

Step 2: Normalize the Decision Matrix

To normalize the decision matrix using equation 2.

For benetif criterion

$$R_{ij} = \frac{x_{ij}}{maxi_{xij}} \quad \text{...(1)}$$

For cost criterion

$$R_{ij} = \frac{x_{ij}}{mini_{xij}} \quad \text{...(2)}$$

Step 3: Calculate preference values (Qi) using the following formula:

$$Qi = 0{,}5 \sum_{j=1}^{n} R_{ij}Wj + 0{,}5 \prod_{j=1}^{n} (R_{ij})^{Wj} \quad \text{.........(3)}$$

In the WASPAS method, the best decision is the result of greater Qi.

III. RESULTS AND DISCUSSION

Determining a strategic location for the distribution of college brochures, of course, must be analyzed in advance of the location of the location of choice. Higher education leaders will take several choices in locations that are considered strategic. Once in the location list, the criteria used as a reference must also be determined. The number of criteria used, this will result in a more effective decision so that the higher education leaders will be confident in the decisions obtained. Using the WASPAS method, it becomes the right solution for capital owners/businesses in getting support for the decisions that will be made. WASPAS is a simple method with a few easy steps but takes into account the criteria for profit and loss.

The following table is a list of criteria (table 1) and alternatives (table 2) that are needed in the decision processing using the WASPAS method.

TABLE I
List of Criteria

Criteria	Weighted	Type	Description
Area(C_1)	15%	Benefit	Extensive location
Total population (C_2)	20%	Benefit	Number of residents around the plaza (Thousand)
Distance (C_3)	35%	Cost	Distance from campus (Km)
Price (C_4)	20%	Cost	Rental price
Number of campuses (C_5)	10%	Cost	Number of campuses around the Plaza

TABLE II
List of Alternative

Alternative	Location
A_1	Suzuya Tj. Morawa
A_2	Suzuya Lubuk Pakam
A_3	Medan Plaza
A_4	Suzuya Katamso
A_5	Irian Supermarket

In table 3, the rating data matches between criteria and alternatives.

TABLE III
Match Rating

Alternative	C_1	C_2	C_3	C_4	C_5
A_1	9 m^2	10	13 km	3,5 jt	3
A_2	6 m^2	15	17 km	3,5 jt	3
A_3	6 m^2	9	7 km	7,5 jt	7
A_4	8 m^2	10	3 km	2,5 jt	5
A_5	9 m^2	10	5 km	3,5 jt	3

From the data in table 4, taken as a decision matrix like the following table.

TABLE IV
Alternative Match Rating and Criteria

Alternative	C_1	C_2	C_3	C_4	C_5
A_1	9	10	13	3,5	3
A_2	6	15	17	3,5	3
A_3	6	9	7	7,5	7
A_4	8	10	3	2,5	5
A_5	9	10	5	3,5	3

The first step is, making a decision matrix.

$$X_{ij} = \begin{bmatrix} 9 & 10 & 13 & 3,5 & 3 \\ 6 & 15 & 17 & 3,5 & 3 \\ 6 & 9 & 7 & 7,5 & 7 \\ 8 & 10 & 3 & 2,5 & 5 \\ 9 & 10 & 5 & 3,5 & 3 \end{bmatrix}$$

Max X_{ij} [9 15 17 7,5 7]

Min X_{ij} [6 9 3 2,5 3]

The second step is normalizing the decision matrix using equation 1.

Calculate C_1

R_{11} = 9/9 = 1,0000

R_{21} = 6/9 = 0,6667

R_{31} = 6/9 = 0,6667

R_{41} = 8/9 = 0,8889

R_{51} = 9/9 = 1,0000

Calculate C_2

R_{12} = 10/15 = 1,0000

R_{22} = 15/15 = 0,6667

R_{32} = 9/15 = 0,6667

R_{42} = 10/15 = 0,8889

R_{52} = 10/15 = 1,0000

For C_3-C_5 criteria use equation 2, so that the Rij matrix is obtained, as below:

$$\begin{vmatrix} 1,0000 & 0,6667 & 1,3077 & 2,1429 & 2,3333 \\ 0,6667 & 1,0000 & 1,0000 & 2,1429 & 2,3333 \\ 0,6667 & 0,6000 & 2,4286 & 1,0000 & 1,0000 \\ 0,8889 & 0,6667 & 5,6667 & 3,0000 & 1,4000 \\ 1,0000 & 0,6667 & 3,4000 & 2,1429 & 2,3333 \end{vmatrix}$$

W = [0.15 ; 0.2 ; 0.35 ; 0.2 ; 0.1]

The last step calculates Preference (Qi) using equation 3:

$$Q_1 = \left(0.5 \sum (1,0000 \times 0,15) + (0,6667 \times 0,02) + (1,3077 \times 0,35) + (2,1429 \times 0,2) + (2,3333 \times 0.1)\right) + (0.5 \prod (1,0000)^{0,15} \times (0,6667)^{0,2} \times (1,3077)^{0.35} \times (2.1429)^{0,2} \times (2,3333)^{0.1}$$

= 1,343

$$Q_2 = \left(0.5 \sum (0,6667 \times 0,15) + (1,0000 \times 0,02) + (1,0000 \times 0,35) + (2,1429 \times 0,2) + (2,3333 \times 0.1)\right) + (0.5 \prod (0,6667)^{0,15} \times (1,0000)^{0,2} \times (1,0000)^{0.35} \times (2.1429)^{0,2} \times (2,3333)^{0.1}$$

= 1,252

$$Q_3 = \left(0.5 \sum (0,6667 \times 0,15) + (0,6000 \times 0,02) + (2,4286 \times 0,35) + (1,0000 \times 0,2) + (1,0000 \times 0.1)\right) + (0.5 \prod (0,6667)^{0,15} \times (0,6000)^{0,2} \times (2,4286)^{0.35} \times (1,0000)^{0,2} \times (1,0000)^{0.1}$$

= 1,265

$$Q_4 = \left(0.5 \sum (0,8889 \times 0,15) + (0,6667 \times 0,02) + (5,6667 \times 0,35) + (3,0000 \times 0,2) + (1,4000 \times 0.1)\right) + (0.5 \prod (0,8889)^{0,15} \times (0,6667)^{0,2} \times (5,6667)^{0.35} \times (3,0000)^{0,2} \times (1,4000)^{0.1}$$

= 2,566

$$Q_5 = \left(0.5 \sum (1{,}0000 \times 0{,}15) + (0{,}6667 \times 0{,}02) + (3{,}4000 \times 0{,}35) + (2{,}1429 \times 0{,}2) + (2{,}3333 \times 0.1)\right) + (0.5 \prod (1{,}0000)^{0{,}15} \times (0{,}6667)^{0{,}2} \times (3{,}4000)^{0.35} \times (2.1429)^{0{,}2} \times (2{,}3333)^{0.1}$$

$= 1{,}965$

From the calculation of preferences, the following results are obtained:

TABLE V
Results Rank

Alternative	Results	Rank
A_1	1,343	3
A_2	1,252	5
A_3	1,265	4
A_4	2,566	1
A_5	1,965	2

From the results above, it can be seen that A4 (Suzuya Katamso) is a good location for a strategic campus promotion from several other locations.

IV. CONCLUSION

The results of the study resulted that the application of the WASPAS method was successful in determining the location of the strategic promotion with the highest value. The WASPAS method is a fairly simple method of streamlining the results of decisions by considering several alternatives based on certain criteria.

V. REFERENCES

[1] S. Kusumadewi, S. Hartati, A. Harjoko, and R. Wardoyo, *Fuzzy Multi-Attribute Decision Making (Fuzzy MADM)*. Yogyakarta: Graha Ilmu, 2006.

[2] Kusrini, *Sistem Pendukung Keputusan dan Aplikasinya*. Yogyakarta: Andi, 2007.

[3] G.-H. Tzeng and J.-J. Huang, *Multiple Attribute Decision Making Method And Applications*. CRC Press, 2011.

[4] Mesran, G. Ginting, Suginam, and R. Rahim, “Implementation of Elimination and Choice Expressing Reality (ELECTRE) Method in Selecting the Best Lecturer (Case Study STMIK BUDI DARMA),” *Int. J. Eng. Res. Technol. (IJERT*, vol. 6, no. 2, pp. 141–144, 2017.

[5] M. Mesran, S. D. Nasution, S. Syahputra, A. Karim, and E. Purba, “Implementation of the Extended Promethee II in Upgrade Level of Mechanic,” *Int. J. Sci. Res. Sci. Technol.*, vol. 4, no. 2, pp. 125–130, 2018.

[6] G. Ginting, Fadlina, Mesran, A. P. U. Siahaan, and R. Rahim, “Technical Approach of TOPSIS in Decision Making,” *Int. J. Recent Trends Eng. Res.*, vol. 3, no. 8, pp. 58–64, 2017.

[7] M. Ashrafzadeh, F. M. Rafiei, N. M. Isfahani, and Z. Zare, “Application of fuzzy TOPSIS method for the selection of Warehouse Location : A Case Study,” *Interdiscip. J. Contemp. Res. Bus.*, vol. 3, no. 9, pp. 655–671, 2012.

[8] Mesran, P. Ramadhani, A. Nasution, D. Siregar, Fadlina, and A. P. U. Siahaan, “Implementation of Complex Proportional Assessment Method in the Selection of Mango Seeds,” *Int. J. Sci. Res. Sci. Technol.*, vol. 3, no. 7, pp. 397–402, 2017.

[9] Esra; and AyÇegül, “AIR CONDITIONER SELECTION PROBLEM WITH COPRAS AND ARAS METHODS,” *Manas J. Soc. Stud.*, vol. 5, no. 2, 2016.

[10] I. Saputra, S. I. Sari, and Mesran, “PENERAPAN ELIMINATION AND CHOICE TRANSLATION REALITY (ELECTRE) DALAM PENENTUAN KULKAS TERBAIK,” *KOMIK (Konferensi Nas. Teknol. Inf. dan Komputer)*, vol. I, pp. 295–305, 2017.

[11] S. R. Ningsih, I. S. Damanik, I. Gunawan, and W. Saputra, “SISTEM PENDUKUNG

KEPUTUSAN DENGAN MENGGUNAKAN METODE ELECTRE DALAM MENENTUKAN PENERIMA PROGRAM INDONESIA PINTAR (PIP) MELALUI KARTU INDONESIA PINTAR (KIP) (STUDI KASUS: SD SWASTA AL – WASHLIYAH MOHO KABUPATEN SIMALUNGUN)," *KOMIK (Konferensi Nas. Teknol. Inf. dan Komputer)*, vol. 1, no. 1, Nov. 2017.

[12] S. H. Sahir, R. Rosmawati, and K. Minan, "Simple Additive Weighting Method to Determining Employee Salary Increase Rate," *Int. J. Sci. Res. Sci. Technol.*, vol. 3, no. 8, pp. 42–48, 2017.

[13] Onur Önay and B. F. Yıldırım, "Evaluation of NUTS Level 2 Regions of Turkey by TOPSIS , MOORA and VIKOR 1," *Int. J. Humanit. Soc. Sci.*, vol. 6, no. 1, pp. 212–221, 2016.

[14] Mesran, R. K. Hondro, M. Syahrizal, A. P. U. Siahaan, R. Rahim, and Suginam, "Student Admission Assessment using Multi-Objective Optimization on the Basis of Ratio Analysis (MOORA)," *J. Online Jar. COT POLIPT*, vol. 10, no. 7, pp. 1–6, 2017.

[15] N. W. Al-Hafiz, Mesran, and Suginam, "Sistem Pendukung Keputusan Penentukan Kredit Pemilikan Rumah Menerapkan Multi-Objective Optimization on the Basis of Ratio Analysis (Moora)," *KOMIK (Konferensi Nas. Teknol. Inf. dan Komputer)*, vol. I, no. 1, pp. 306–309, 2017.

[16] S. Syamsudin and R. Rahim, "Study Approach Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS)," *Int. J. Recent Trends Eng. Res.*, vol. 3, no. 3, pp. 268–285, 2017.

[17] M. I. Perangin-angin, A. H. Lubis, I. S. Dumayanti, R. B. Ginting, A. Putera, and U. Siahaan, "Implementation of Fuzzy Tsukamoto Algorithm in Determining Work Feasibility," *J. Comput. Eng.*, vol. 19, no. 4, pp. 52–55, 2017.

[18] T. Murti, L. A. Abdillah, and M. Sobri, "Sistem Penunjang Keputusan Kelayakan Pemberian Pinjaman pada PT Triprima Finance Palembang dengan Metode Fuzzy Tsukamoto," in *Seminar Nasional Inovasi dan Tren 2015 (SNIT2015)*, 2015.

[19] M. Iswan, W. Fitriani, N. Mayasari, and A. P. U. Siahaan, "Tuition Reduction Determination Using Fuzzy Tsukamoto," *Int. J. Eng. Sci. Invent.*, vol. 5, no. 9, pp. 68–72, 2016.

[20] E. K. Zavadskas, J. Antucheviciene, J. Saparauskas, and Z. Turskis, "MCDM methods WASPAS and MULTIMOORA: Verification of robustness of methods when assessing alternative solutions," *Econ. Comput. Econ. Cybern. Stud. Res.*, vol. 47, no. 2, 2013.

[21] S. Chakraborty and E. K. Zavadskas, "Applications of WASPAS Method in Manufacturing Decision Making," *Informatica*, vol. 25, no. 1, pp. 1–20, 2014.

[22] S. Barus, V. M. Sitorus, D. Napitupulu, M. Mesran, and S. Supiyandi, "Sistem Pendukung Keputusan Pengangkatan Guru Tetap Menerapkan Metode Weight Aggregated Sum Product Assesment (WASPAS)," *MEDIA Inform. BUDIDARMA*, vol. 2, no. 2, pp. 10–15, 2018.

[23] P. Simanjuntak, I. Irma, N. Kurniasih, M. Mesran, and J. Simarmata, "Penentuan Kayu Terbaik Untuk Bahan Gitar Dengan Metode Weighted Aggregated Sum Product Assessment (WASPAS)," *J. Ris. Komput.*, vol. 5, no. 1, pp. 36–42, 2018.