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Home Purchase Decision Support System Using the Brown-Gibson Method

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ABSTRACT

Thesis. The application program was built by applying the Brown-Gibson method which is capable of measuring both qualitative and In making a decision to buy a house, a buyer will consider a variety of complex criteria, such as qualitative (non-numeric) and quantitative (numeric) criteria to get the best decision. To simplify the process, a home purchase decision-making application program was created in this quantitative criteria. The algorithms in the Brown-Gibson method used in this application program include: "Performance Measurement" to measure quantitative criteria, such as house selling price, land area, building area and number of bedrooms; “Pairwise Comparison” to measure qualitative criteria, such as architectural style, position of the building, proximity to the work environment, proximity to shopping centers, proximity to the educational environment, state of the home environment, building status, house certificate; and "Preference of Measurement" which combines the quantitative and qualitative criteria to produce a priority weight that can be accepted as a measurement result for each alternative house as a whole. The final result of this thesis is an application program that provides the highest value for an alternative home. The house that gets the highest score is an alternative house that has the most suitable specifications according to the criteria considered by the buyer. The house that gets the highest score is an alternative house that has the most suitable specifications according to the criteria considered by the buyer. the condition of the house environment, the status of the building, the certificate of the house; and "Preference of Measurement" which combines the quantitative and qualitative criteria to produce a priority weight that can be accepted as a measurement result for each alternative house as a whole. The final result of this thesis is an application program that provides the highest value for an alternative home. The house that gets the highest score is an alternative house that has the most suitable specifications according to the criteria considered by the buyer. and "Preference of Measurement" which combines the quantitative and qualitative criteria to produce a priority weight that can be accepted as a measurement result for each alternative house as a whole.

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1. INTRODUCTION

The ability to make quick and careful decisions will be the key to success in global competition in the future. Having a lot of information alone is not enough if you are not able to process it quickly into the best alternatives in decision making.

In general, a decision is made in order to solve a problem (problem solving), every decision made must have a goal to be achieved. Just as a home buyer decides the type of housing and the desired housing location in order to meet the goals he wants to achieve. Making a decision means choosing the best alternative among many alternatives. Decisions are made by almost everyone, either individually or on their own behalf, by the leadership of an organization or company and so on. “Choosing Housing” is an example of an individual problem where each individual has the right to choose more than 2 desired housing alternatives, and various criteria are set by each individual. The many and complex criteria in choosing housing where it takes a quick time to decide can cause problems if a system that supports decision making is not made. The system is a “Decision-Making Support System”. The criteria that are used as references come from companies such as house prices, location, type of property, home environment, educational environment, learning environment and so on. Because of these criteria, a decision support system was determined using the Brown-Gibson method.

The Brown-Gibson method is basically similar to the product positioning method or the method of determining the location of a place. The advantage of this method lies in the calculation of the two factors, namely the objective factor and the subjective factor. In using this method, the calculation is based on objective factors, which are related to a value or measure, and subjective factors, in which there is a comparison of criteria that have no numerical size. The use of this method will be able to determine the best housing and best suit the wishes of home buyers.

2. METHOD

The method used to design a web-based support system for taking Labuan Bajo tour packages is done by:

1. Preparation
   What is meant by this preparation is that it begins with the preparation of proposals and administering permits in research.
2. Data collection
   In data collection consists of:
   a. Direct consultation with parties who are experts in the field, in this case the supervisors, parties from the tourism and culture office of Labuan Bajo, and also parties involved in this system.
   b. Observations were made by making direct observations with existing physical situations and conditions.
   c. Literature study to obtain existing literature, in the form of books, internet media and references related to this title.
3. Analysis
   The analysis phase carried out is an analysis of the main problems faced. In this stage will produce a cause-and-effect analysis. The stage of collecting data on system requirements and analyzing it, data collection carried out includes interviews, observations and literature studies.

3. RESULTS AND DISCUSSIONS

3.1 Brown-Gibson Algorithm Analysis

Analysis of the house selection process using the Brown-Gibson method. In analyzing the Brown-Gibson application, sample data obtained from the survey results of the Era Master property company, the results of interviews with the Marketing Era Master property company, and the results of interviews with several home buyers are used:

a. Property Type Data

Table 1.
Property Type Data Table

Property Type Code	Property Type
TP01	House
TP02	Shop
TP03	Rukan

b. Region Data

Table 2.
Region Data Table

Area code	Region
W0001	North Yogyakarta
W0002	South Yogyakarta
W0003	West Yogyakarta
W0004	East Yogyakarta
W0005	Central Yogyakarta

c. Location Data

Table 3.
Location Data Table

Location Code	Location
L0001	Godean
L0002	Single Chess Depok Sleman
L0003	Chess Lean
L0004	Maguwoharjo
L0005	Pakualaman
L0006	Mantrijeron
L0007	Settings
L0008	Sengkan Sleman
L0009	Umbulharjo

d. Housing Data

Table 4.
Housing Data Table

House Selling Price	Facility
IDR 975,000,000.00	1 garage, 2200 Watts of electricity, 1 telephone, well
IDR 700,000,000.00	1 maid room, 1 main room, 1 garage, 2200 Watts electricity, 2 floors, well, WTP
Rp.850,000,000.00	1 bathroom, 2 floors, 1 maid's room, 2200 Watts of electricity, well, WTP
IDR 675,000,000.00	2 bathrooms, 1 maid's room, 1 master bedroom, 1300 Watts of electricity, 1 garage, well, 2 floors
IDR 550,000,000.00	1 bathroom, 1 floor, 1 master bedroom, 1300 Watts electricity, well
IDR 475,000,000.00	1 split AC, 2200 Watts electricity, 1 telephone
Rp.750,000,000.00	2200 Watts electricity, 4 Split AC, 2 telephones
IDR 425,000,000.00	3500 Watts electricity, 1 telephone

e. Numerical Criteria Data

Table 5.
Numerical Criteria Data Table

Criteria Code	Criteria Name
N01	House Selling Price
N02	Building area
N03	Surface area
N04	Bedroom

f. Non-Numeric Criteria Data

Table 6.
Non-Numeric Criteria Data Table

Criteria Code	Criteria Name
NN01	Architectural Style
NN02	Building Position
NN03	Proximity to Shopping Neighborhood
NN04	Proximity to the Work Environment
NN05	Proximity to the Educational Environment
NN06	Home Environment Keadaan
NN07	Home Status Type
NN08	Certificate Type

From the data above, home buyers are looking for houses located in the Condong Catur location and the numerical criteria chosen are the Selling Price of the House and Land Area, while the non-numeric criteria selected are Architectural Style, Proximity to the Educational Environment, and Condition of the Home Environment.

From the criteria chosen by home buyers, the numerical criteria chosen are the selling price of the house and the area of land. For the numerical criteria for the selling price of the house, buyers prioritize houses with good building conditions. For the numerical criteria for land area, buyers prioritize houses with a land area of less than 150 m2. Then the calculation process for the numerical criteria / objective factors is:

Table 7.
House Selling Price Factor (1)

Alternative Selected House	Selling price House	Condition Building	Total (Ci)	1/Ci
00013(Alternative A)	475,000,000,000	Standard	0.3	3.3333
00014(Alternative B)	750,000,000,000	Good	0.2	5
00015(Alternative C)	425,000,000,000	Good	0.1	10
Totals :				18.3333

The value of the Price Per m2 (1) factor for each alternative house is:

OFij = [Ci * (1/Ci)] 1 , whereas OFij = 1

OF(A1) = [(0,3) * (18,3333)] 1 = [5,4999] 1 = 0.1818

OF(B1) = [(0,2) * (18,3333)] 1 = [3.6666] 1 = 0.2727

OF(c_1) = [(0,1) * (18,3333)] 1 = [1.8333] 1 = 0.5454 +

OF(i_1)= 0.9999 1.0000

Table 8.
Objective Factors Land Area Factors (2)

Home Alternative Selected	(Hundreds of m²) **Surface area**	**Total (Ci)**	**1/Ci**
00013(Alternative A)	1.27	1.27	0.7874
00014(Alternative B)	1.76	1.76	0.5681
00015(Alternative C)	1.21	1.21	0.8264
Totals :			2.1819

The factor value of Land Area (1) for each alternative house is:

OFij = [Ci * (1/Ci)] 1 , whereas OFij = 1

OF(A2) = [(1.27) * (2.1819)] 1 = [2.7710) 1 = 0.3608

OF(B2) = [(1.76) * (2.1819)] 1 = [3.8401] 1 = 0.2604

OF(C2) = [(1.21) * (2.1819)] 1 = [2,6400] 1 = 0.3787 +

OF(i2) = 0.9999 1.0000

Based on this data, the objective factors for each alternative house can be searched with the following formula:
OFi = [Ci * (1/Ci)] 1 , whereas OFi = 1
Meanwhile, the non-numeric criteria/subjective factors selected were Architectural Style, Proximity to the Educational Environment, and the State of the Home Environment. Then home buyers are asked to give an assessment of the subjective factors that have been selected in pairs, and the results are for example as follows:

1. Architectural Style (1) x Proximity to the Educational Environment (2); Here Proximity to the Educational Environment is considered more important to consider than Architectural Style.
2. Architectural Style (1) x State of the Home Environment (3); In this case, the State of the Home Environment is considered more important to consider than the Architectural Style.
3. Proximity to the Educational Environment (2) x Condition of the Home Environment (3); Here Proximity to the Educational Environment is considered more important to consider than the State of the Home Environment.

From the information above, it can be concluded that the Subjective-factor Importance Index (wj), namely:

Table 9.
Objective Factors Land Area Factors (2)

Subjective Factor	Pariwise Comparison			Number of Preferences	Relative portance Index (wj)
	1	2	3		
Architectural Style (1)	0	0		0	0/3 = 0.0000
Proximity to the Environment Education (2)	1		1	2	2/3 = 0.6666
Home Environment (3)		1	0	1	1/3 = 0.3333
			Totals :	3	= 0.9999 = 1.0000

In the assessment, a point of 1 will be given to the factor that is considered more important while the one that is considered less important is scored with 0. In cases where the pair being compared turns out to be equally important, each factor is scored equal to 1 Furthermore, with the same procedure, separately evaluate each alternative house to obtain a ranking (Rij). For the selected alternative houses, the following conclusions are drawn:

Table 10.
Comparison of Choice House Alternatives based on Architectural Style Factors (1)

Home Alternative	Pariwise Comparison			Number of Preferences	Rank (Rij)
	1	2	3		
A	1	0		1	1/3 = 0.3333
B	0		0	0	0/3 = 0.0000
C		1	1	2	2/3 = 0.6666
Totals :				3	= 0.9999

Table 11.
Evaluation of Subjective Factors

Subjective Factor	Pariwise Comparison (Alternative)			(wj)
	A	B	C	
1	0.3333	0.0000	0.6666	0.0000
2	0.0000	0.5000	0.5000	0.6666
3	0.6666	0.0000	0.3333	0.3333
			Totals :	0.9999 1.0000

To determine the value of the subjective factor (SFi) for each alternative, it can be obtained by entering the data into the following formula:
SFi = wj * Rij, where ∑ SFi = 1

SFi = $w_1 P\iota_1 \omega_2 P\iota_2 \omega_3 P\iota_3 \square \ \omega_n P\iota_n$

So that the subjective factor values for each alternative house are:

SF(A) = (0*0.3333) + (0.6666*0) + (0.3333*0.6666) = 0 + 0 + 0.2221 = 0.2221

SF(B) = (0*0) + (0.6666 * 0.5) + (0.3333 * 0) = 0 + 0.3333 + 0 = 0.3333

SF(C) = (0*0.6666) + (0.6666*0.5) +(0.3333*0.3333) = 0 + 0.3333 + 0.1110 = 0.4443

4. CONCLUSION

The conclusion obtained from the creation and development of the Home Purchase Decision Support System application program is that the use of a computerized method in the Home Purchase Decision Support System can be an alternative method to serve home buyers at a property company because it can increase the efficiency of employees' working time, and able to improve the quality of good decisions and able to improve the quality of service to home buyers. The application of the Brown_Gibson method in making this system application program succeeded in obtaining an application program that could assist employees/marketing and home buyers in conducting the house selection process with complex criteria and factors in a property company. The use of the method of differentiating access rights for admin and marketing in making this program is able to maintain the security and accuracy of the data stored in the system database. The use of the search facility in this application program can increase time efficiency and save operational costs

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