

National Car Development in Indonesia with Multiplicative Analytic Hierarchy Process

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ABSTRACT

Indonesia's economic growth causes people's purchasing power and the need for vehicles to ease performance is increasing. So the necessary development of national vehicles that can be used in accordance with the needs of society in Indonesia. To produce vehicles in accordance with the needs of the community, it is necessary to analyze the needs of vehicle characteristics in accordance with the characteristics of the society in Indonesia. In this research used seven characteristics of vehicle and method Multiplicative Analytic Hierarchy Process (MAHP). The MAHP model is used to obtain effective and consistent conclusions. Consistency in MAHP model will result in the best vehicle conclusion for national car development in Indonesia.

General Terms

Decision Supporting Systems.

Keywords

National Car Development, MAHP, Effective and Consistent.

1. INTRODUCTION

Given the increasingly complex human activities and the need for transportation tools that facilitate human work, the need for vehicles will continue to increase [1]. One means of public transportation in Indonesia is the car. The Indonesian Automotive Industry Association in 2015 recorded a considerable increase in car sales in Indonesia. The growth of car sales in 2010-2014 reached 57%. The number of passenger cars until 2014 is 12,497,072 units [2]. Indonesia's economic growth increases people's purchasing power and vehicle needs to alleviate human work. The impact is increasing productivity, moving goods and services faster. With the increase in revenues from the tax sector will have an impact on sustainable development. Sustainable development will improve the positive investment climate. With a positive domestic investment climate, people's welfare will increase with the opening of new companies and the availability of job vacancies. The potential of the domestic market is large and the need for vehicles is so great that it needs the development of vehicles that can be used according to the needs of the people in Indonesia. This is in line with government programs in creating and improving productivity and competitiveness in international markets.

Choosing the type of car is decision making with multi-criteria and multi-objective. The method that can be used to solve multi-criteria problems is the MAHP Method. The advantages of MAHP methods compared to other methods are the ability to overcome multi-criteria and multi-objective problems [3]. The fundamental difference that exists between the classical AHP model by Saaty and the AHP Multiplicative

model by Barzilai is how to combine criteria and alternatives in modeling based on available data [4].

Choosing a vehicle MPV as a research object is a conclusion of private vehicle users in the streets of Indonesia is dominated by the type of MPV vehicles from various manufacturers. Almost all families in Indonesia choose multi-function vehicles. MPV vehicles are generally used as private vehicles and vehicles to transport small items that do not require a large area. With the design of the vehicle is quite spacious and comfortable seats for transportation of family members then make most families in Indonesia choose MPV as a personal vehicle. In addition, the type of MPV vehicle fits perfectly with the street characteristic in Indonesia that is not so wide and mostly flat road with a bit of hilly. The large potential of the domestic MPV market causes the need for the development of national car type MPV in the country.

Research on the characteristics of vehicle [2] has been carried out by previous researchers including the Estimation and Use of Dynamic Transmission Models of Automobile Ownership [5]. A nested logit model of automobile holdings for one vehicle households [6]. A dynamic empirical analysis of household vehicle ownership and utilization [7]. Joint mixed logit models of stated and revealed preferences for alternative-fuel vehicles [8]. From the previous study the choice of vehicle types can be deduced that most of the options of existing vehicle types examine the characteristics of the vehicle (eg, purchasing and operating costs, and power generated), household characteristics (eg, household structure and income), and owner characteristics (eg gender and age) as factors affecting the behavior of purchasing motor vehicles [1].

The differences and objectives of this study compared with previous studies that have been conducted are the use of seven characteristics of vehicles used in choosing private vehicles and the use of Multiplicative AHP models to generate the best vehicle conclusions for the development of MPV national cars in Indonesia.

2. RESEARCH METHODOLOGY

2.1 Multiplicative Hierarchy Process

The MAHP method is included in the Multi-Criteria Decision Making Method (MCDM) [9]. The basic problem of MCDM in most outcomes is a competing alternative based on several conflicting criteria. Analytic Hierarchy Process (AHP) is a tool that generates broad multicriteria that uses concepts that can be used to process results and available alternative sequences [10]. Although AHP has a strong ability to handle common problems, AHP has limitations in terms of consistency in outcomes [11]. The MAHP method can be used to solve consistency in the AHP Method [12]–[14]. MAHP

also accommodates λ to reduce extreme judgments. Thus the MAHP Method can be used to determine unbalanced and too flashy values.

The following is a simple MAHP model integrated with existing [3].

$$v_i = c \prod_k w_{ik}^{\beta_k} \quad (1)$$

With v_i is the alternative value i , c is the criterion, w_{ik} is the alternative weight i , k criterion, and β_k is the relative importance weight of criteria k . Further modeling involving multiple levels of criteria can use the following model.

$$v_i = \prod_k (v_i^k)^{\beta_k} \quad (2)$$

With v_i is an alternative value i , v_i^k is an alternative value of i criterion k , and β_k is the relative importance weight of criterion k . To find β can be calculated by using the following equation.

$$\beta_k = \lambda w_k \quad (3)$$

With β_k is the relative importance weight k , λ is the relative weight of the criterion, and w_k is the criterion weight.

Stages used in this study using the stages of MAHP. The stages used to generate the following v_i values [3] :

1. Establish the relative importance weight of each criterion w_k .
2. Determine the pairwise pairs of A_{ijk} against C_k . Where $a_{ijk} = a_{ik} / a_{jk}$. Combine into the matrix $A = \{ a_{ijk} \}$ to calculate the weight of the w_{ik} local criterion for each i , k .
3. Set the change value λ and calculate the value of $\beta_k = \lambda w_k$.
4. Determine the value of v_i based on the equation (1).

From the stage of MAHP will get a model that is hierarchical. The model obtained is a pairwise comparison of criteria and alternatives that are consistent and effective. The results from the model are then combined to produce value comprehensively.

3. RESEARCH DESIGN

3.1 Material and Tools

The research material used in this research is seven characteristic of the vehicle according to vehicle characteristic stated [1], society generally uses seven characteristics of the vehicle in choosing a private vehicle that is cost, engine capacity, fuel efficiency, wide car, security, seat, and the availability of spare parts.

The tool used for data collection of this research is by using questionnaire. Questionnaires will be divided into several structured questions. The questionnaire can be seen in Table 1. Research data obtained from the brochure and the results of the questionnaires distributed to the community. Questionnaire data on vehicle characteristics will be taken in some cities in Indonesia. The method used in sampling is Slovin method with error tolerance limit of 10%. The results of this questionnaire can reflect the characteristics of the population or people of Indonesia in choosing private vehicles. MPV vehicle data used as the best MPV vehicle model obtained from brochures and interviews. Furthermore, this research can be used developers and government as a reference in developing vehicles that fit the needs of people in Indonesia.

3.2 Research Procedure

The procedure of this study is shown in Figure 1 as follows:

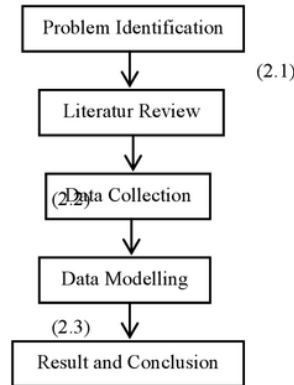


Fig 1. Research procedure

4. DATA COLLECTION

4.1 Sampling Selection

In the last six years, the oil and gas regulatory body has stated that 68.72% of the demand for vehicles is dominated by communities in Java [2]. So the sample research will be conducted in Java, especially the capital city of Jakarta, West Java, Central Java and East Java.

4.2 Characteristic Respondent

The results of the research data can be seen in Table 2. Research data will illustrate three number of respondents is time, gender and occupation.

4.2.1 Age

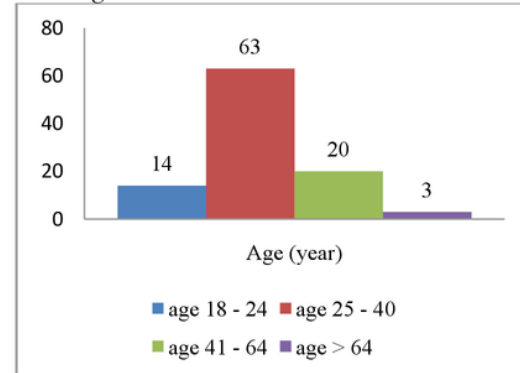


Fig 2. Age of questionnaire respondent

Based on Figure 2, it can be concluded that most of the respondents who were sampled in this study aged between 25 to 40 years 63 percent. While as many as 20 percent of respondents aged 41 to 64 years and 14 percent of respondents aged 18 to 24 years. Only 3 percent of respondents aged over 64 years.

4.2.2 Gender

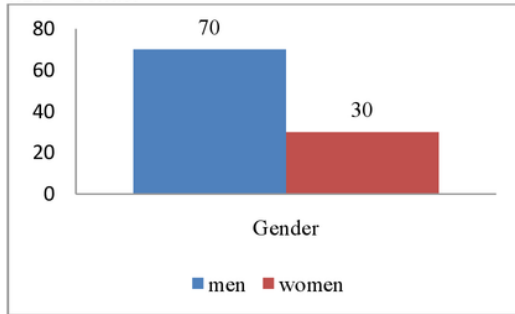


Fig 3. Gender of questionnaire respondent

Based on Figure 3, based on the gender of respondents can be concluded that most of the respondents who were sampled in this study male gender as much as 70 percent of the total respondents. The remaining 30 percent of the total sample of the female.

4.2.3 Work

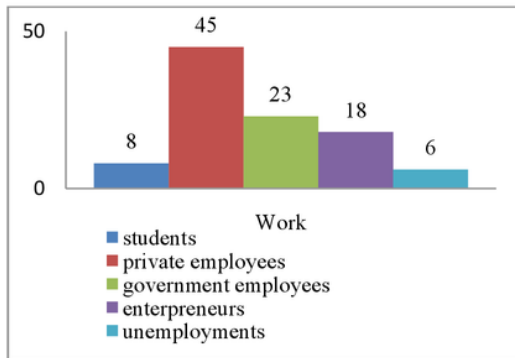


Fig 4. Occupation of questionnaire respondent

Based on Figure 4, it can be concluded that most of the respondents who were sampled in this study had a job as a private employee of 45 percent of the total respondents. As many as 23 percent of respondents work as civil servants and 18 percent of respondents work as entrepreneurs or as entrepreneurs. Only 6 percent of the respondents are unemployments and 8 percent still have higher education.

5. RESULT

5.1 Vehicle Model Development

The vehicle model developed is a type of MPV adapted to the characteristics of the needs of the Indonesian people based on seven characteristics of the vehicle.

5.1.1 Cost

In this section, 70 percent of respondents stated that it has cost more than 100 million rupiah to buy a car and 52 percent of them stated that the ease of the vehicle credit facility makes added value in the eyes of the prospective buyer. Thus it can be concluded that Indonesia's economic growth will continue to grow in line with the growing ability of purchasing power of Indonesian society.

5.1.2 Engine Capacity

Determine the type of car and engine capacity as part of determining the car. In fact, cars with large engine capacity

still remain the choice of the people of Indonesia, as many as 86 percent of respondents chose a vehicle with a capacity of more than 1000cc. 65 percent of Indonesians chose vehicles with Dual Overhead Camshaft (DOHC) engines with 72 percent choosing VVT-i technology. With the ability to produce more power and stable. Thus it can be concluded that most of the people of Indonesia prefer the parties that have a great thrust.

5.1.3 Fuel Efficiency

Based on the survey results, 96 percent of respondents want an efficient and environmentally friendly vehicle where the indicator used is the use of fuel vehicles to a minimum without reducing the ability of the vehicle as a whole. One technology used to improve efficiency in fuel use is injection. 82 percent of respondents chose a vehicle using injection technology and 84 percent of respondents chose a vehicle with a tank capacity of vehicle more than 40 liters. It can be concluded that respondents want a vehicle that has a large engine capacity without having to sacrifice efficiency and environmentally friendly aspects.

5.1.4 Security

Security elements are important in the design of a vehicle. 98 percent of respondents said that vehicle safety and material is a priority in choosing vehicles and vehicle constituents are part of consideration in choosing a family-friendly four-wheeled vehicle.

5.1.5 Wide Car

The width of the vehicle will affect the comfort level of passengers in the car. 80 percent of respondents chose the type of vehicle that has three rows of seats in the vehicle and 64 percent of them chose to have two seats in each row. 98 percent of respondents chose vehicles that have large luggage. Can be concluded that the luggage area will affect the amount of goods that can be brought in the car, the more extensive the baggage then the goods that can be brought into the car will be more.

5.1.6 Seats

The seating material will affect the comfort level of the passengers while they are in the car. In accordance with the results of the survey, 92 percent of respondents chose vehicles based on the material seats and 74 percent of other considerations in choosing a vehicle is the height and breadth of the seat. 84 percent of respondents want a control position of the front seat or backward in the car, it makes the chair can be changed position forward or backward. The presence of supporting facilities (garbage cans, where to put drinking water, and electrical resources) around the seats is an added value for 86 percent of respondents, thus the passengers will be more comfortable while in the car.

5.1.7 Service and Spare Part

The availability of spare parts in the market will have an impact on vehicle operations, quality and number of spare parts the vehicle will attract someone to buy the vehicle. 98 percent of respondents chose a vehicle based on the quality and availability of official parts. 90 percent of them consider the high selling price of official spare parts of vehicles and 84 percent of respondents among them choose a vehicle that has a sustainable after-sales service. It is felt very helpful owner to always know the best conditions of the vehicle he has. The after-sales service in question is information on periodic service and information about purchased vehicles. The existence of a 24-hour crane facility is the expected value of

74 percent of respondents. Maintaining the condition of the vehicle to remain in the best condition when used is the thing that must be done by the manufacturer in an effort to provide the best service to its loyal customers.

5.2 MAHP

The data used are the characteristics of MPV vehicles in Indonesia. The sample of MPV used in the study can be seen in Table 3. The problems in this study are limited to one level of hierarchy. Dataset used based on brochures and interviews. The model used is a structured hierarchical model. In the uppermost hierarchy layer is the expected conclusion, the best MPV vehicle in Indonesia. In the second layer is a criterion used in selecting MPV vehicles and the bottom layer in the hierarchy is an alternative choice of available MPV vehicles. Implementation of MAHP model in this research can be seen as in Figure 5.

Table 4. Dataset Alternative and Criteria

	C1	C2	C3	C4	C5	C6	C7
A1	190	1.400	0	7	6	12,18	281
A2	221,3	1.496	0	7	4	11,79	298
A3	213,5	1.496	0	6	5	11,83	170
A4	185,75	1.329	0	7	6	11,65	232
A5	208,55	1.499	0	7	8	13,31	112
A6	133,99	1.198	0	7	6	9,73	121

From Table 4 above it is concluded that there are six alternatives and seven criteria used to determine the best vehicle model. Next, do a direct comparison using the equation $a_{jk} = a_{jk} / a_{jk}$. The comparison results can be seen in Table 5.

The result of the calculation will be combined so as to produce Aijk pairwise comparison matrix. The results can be seen in Table 6.

Table 6. Pairwise Comparison Matrix

	A1	A2	A3	A4	A5	A6
A1	1,000	1,026	1,119	1,053	1,119	1,246
A2	0,974	1,000	1,089	1,026	1,030	1,253
A3	0,894	0,918	1,000	0,940	0,951	1,157
A4	0,950	0,975	1,064	1,000	1,007	1,230
A5	0,893	0,971	1,051	0,993	1,000	1,218
A6	0,803	0,798	0,864	0,813	0,821	1,000
$\sum A_i$	5,514	5,688	6,187	5,825	5,929	7,104

Next, do the normalization matrix. Normalization is done to determine the average value of an alternative to other alternatives. The results of normalization can be seen in Table 7.

Table 7. Normalization of pairwise comparison matrix

	A1	A2	A3	A4	A5	A6
A1	0,181	0,180	0,181	0,181	0,189	0,175
A2	0,177	0,176	0,176	0,176	0,174	0,176

A3	0,162	0,161	0,162	0,161	0,160	0,163
A4	0,172	0,171	0,172	0,172	0,170	0,173
A5	0,162	0,171	0,170	0,170	0,169	0,171
A6	0,146	0,140	0,140	0,140	0,139	0,141
$\sum A_i$	1,000	1,000	1,000	1,000	1,000	1,000

To understand the advantages of MAHP model in overcoming the extreme distance and the effectiveness of the multiplicative model method it will be given $\lambda=0.5$, $\lambda=1$, and $\lambda=1.5$. So the results obtained as shown in Table 8.

Table 8. Result MAHP with six alternative

	$\lambda = 0.5 v_i$	$\lambda = 1 v_i$	$\lambda = 1.5 v_i$
A1	0,174	0,181	0,189
A2	0,171	0,176	0,181
A3	0,164	0,162	0,159
A4	0,169	0,172	0,174
A5	0,168	0,169	0,170
A6	0,153	0,141	0,129

From the table above can be concluded that the model of MPV vehicle that has the highest value is A1 and become the best in Indonesia. This is because the value of A1 is greater than the other available alternatives. The results of this calculation must have been consistent because the dataset used is the actual data and not using the scale. This is contrary to the classical AHP model where it is required to calculate the consistency level of the dataset used, if the scale does not represent the dataset correctly then the result obtained is not appropriate. The presence of λ in MAHP affects the final result. The existence of the difference in value that is too far can be reduced by decreasing the value λ so that the results obtained maximum and logical. Conversely, if the difference of v_i value of each available alternative is too small then the value of λ can be increased to reinforce the difference of each available alternative.

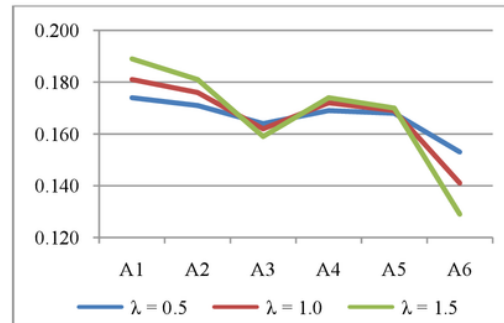


Figure 6. Chart of result MAHP with six alternative

In the graph can be seen the change result of the reduction and addition of value λ . The existence of the value λ to reduce and reinforce the differences between each available alternative.

The MAHP method also overcomes the consistency that exists in classical AHP by comparing two methods directly and avoiding data inconsistencies. To prove the consistency that

existed in MAHP then will be eliminated alternative A6. The results shown in Table 9.

Table 9. Result MAHP with five alternative

	$\lambda = 0.5 \ v_i$	$\lambda = 1 \ v_i$	$\lambda = 1.5 \ v_i$
A1	0,206	0,212	0,219
A2	0,202	0,204	0,207
A3	0,194	0,188	0,182
A4	0,200	0,199	0,199
A5	0,198	0,196	0,194

In Table 9 above the results of calculations performed using MAHP resulted in the same conclusions in Table 8. The impact of elimination on λ can be seen in Figure 7.

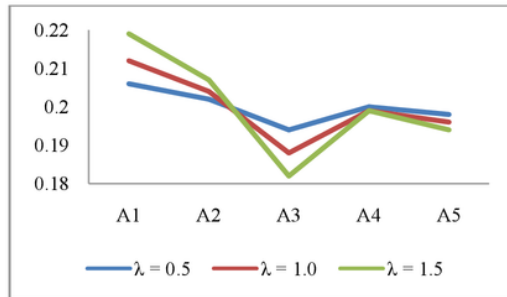


Figure 7. Chart of result MAHP with five alternative

No ranking changes and results are consistent. The inconsistencies that occur in classical AHP are largely due to errors in determining the reach and use of the Saaty rating scale. If there is a change of data then what happens in classic AHP is to change the final value and rank. This can lead to errors in decision making.

6. CONCLUSION

The conclusions of this study can be spelled out into three parts, the preferred vehicle characteristics of Indonesian society, the best MPV model, and the effectiveness of MAHP modeling in solving multi-attribute and multi-object decision making problems.

1. Characteristics of vehicles desired by the people of Indonesia in general is a vehicle that has a capacity of engines that are not too large, supported by the capacity of the vehicle tank is not too large and technology that can improve the fuel efficiency of vehicles will be the attraction for prospective customers. The comfortable seat level with seat position control and the availability of other support facilities is important. Luggage area and vehicle compilers are also a concern. With an adequate luggage area and vehicle composition materials that can enhance safety become more valuable. Ease of vehicle loan management should be a means of promotion to attract consumers who have constraints on revenue. Equally important is the availability of vehicle service centers and sustainable after-sales services.
2. Based on the calculation of MAHP with the assessment of the objective attribute then obtained the best MPV vehicle model fell to A1. Value A1 0.181 greater than other alternatives. It can be concluded that based on the

seven characteristics of the vehicle and the calculation comprehensively stated that A1 is the best MPV vehicle. So developers and government have a basis and model to conduct the development of MPV vehicles in Indonesia.

3. Modeling MAHP successfully solved the problem of decision making the best MPV vehicle model involving many attributes and many objects. MAHP managed to solve inconsistencies and extreme values resulting in effective and logical decisions. Modeling MAHP can be used in solving various decision-making issues that have many attributes that require consistency and flexibility in data addition and subtraction.

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LIST TABLE
Table 1. Research Questionnaire

No.	Question	Option	
1.	The cost of buying a vehicle		
	The cost that you have prepared to buy a car is 100 million	Yes	No
	The credit facility	Yes	No
2.	Vehicle engine capacity		
	The ideal capacity of the car engine more than 1000cc	Yes	No
	DOHC engine	Yes	No
	The VVT-i engine	Yes	No
3.	Fuel efficiency		
	The fuel efficiency of the car becomes a major consideration	Yes	No
	Injection car	Yes	No
	Car fuel tank of more than 40 liters	Yes	No
4.	Vehicle safety		
	Vehicle material compilers	Yes	No
5.	Wide car		
	The ideal line number of 3 rows of seats	Yes	No
	The number of seats in the car in each row of seats 2 pieces of seats	Yes	No
	Wide car luggage is important	Yes	No
6.	Material chair		
	The constituent material of the chair into consideration	Yes	No
	Control seat position	Yes	No
	Special chair elderly or child	Yes	No
	Support facilities (such as a music player, air conditioning and door lock)	Yes	No
7.	Service and spare part		
	Quality of spare parts	Yes	No
	The price of the original spare parts	Yes	No
	Vehicle post-sale service	Yes	No

Table 2. The results of the questionnaire

No.				No.			
1.	The cost of buying a vehicle			6.	Material chair		
	Yes (%)	No (%)	Total		Yes (%)	No (%)	Total
	64	36	100		90	10	100
	52	48	100		82	18	100
2.	Vehicle engine capacity				52	48	100
	Yes (%)	No (%)	Total		94	6	100
	84	16	100	7.	Service and spare part		
	64	36	100		Yes (%)	No (%)	Total

	70	30	100		98	2	100
3. Fuel efficiency					90	10	100
	Yes (%)	No (%)	Total		84	16	100
	94	6	100				
	80	20	100				
	82	18	100				
4. Vehicle safety							
	Yes (%)	No (%)	Total				
	100	0	100				
5. Wide car							
	Yes (%)	No (%)	Total				
	80	20	100				
	64	36	100				
	96	4	100				

Table 3. Sample of MPV car in Indonesia

	Cost (Million IDR)	Machine Capacity (cc)	Fuel Efficiency (km / liter)	Seats	Vehicle Security	Wide Vehicle (mm)	Service and Spare Parts
Suzuki Ertiga 1.5 GA M/T	190	1.400	0	7	1. Central lock 2. Air bag 3. Car sensor 4. Power window 5. Crash sensor 6. Brake assist.	4.265 x 1.695 x 1.685	281
Toyota Avanza 1.5 G M/T	221,3	1.496	0	7	1. Crash sensor 2. Air bag 3. Car sensor 4. Power window.	4.190 x 1.660 x 1.695	298
Honda Mobilio 1.5 E M/T	213,5	1.496	0	6	1. Crash sensor 2. Central lock 3. Air bag 4. Alarm mobil 5. Power window.	4.386 x 1.683 x 1.603	170
Daihatsu Xenia 1.3 R M/T	185,75	1.329	0	7	1. Crash sensor 2. Central lock 3. Air bag 4. Car sensor 5. Power window 6. Folding mirrors	4.140 x 1.660 x 1.695	232

Mitsubishi Expander 1.5 GLS M/T	208,55	1.499	0	7	1. Crash sensor 2. Central lock 3. Air bag 4. Parking sensor 5. Car sensor 6. Power window 7. Folding mirrors 8. Brake assist.	4.475 x 1.750 x 1.700	112
Datsun Go+ 1.2 T-Style	133,99	1.198	0	7	1. Crash sensor 2. Central lock 3. Air bag 4. Parking sensor 5. Car sensor 6. Power window.	3.995 x 1.635 x 1.490	121

(*source April 2018)

Table 5. Direct comparison of seven alternatif criteria

Perbandingan Berpasangan	C1	C2	C3	C4	C5	C6	C7	A_{ijk}
A1 / A2	0,462	0,483	0,000	0,500	0,600	0,508	0,485	1,026
A2 / A1	0,538	0,517	0,000	0,500	0,400	0,492	0,515	0,974
A1 / A3	0,471	0,483	0,000	0,538	0,545	0,507	0,623	1,119
A3 / A1	0,529	0,517	0,000	0,462	0,455	0,493	0,377	0,894
A1 / A4	0,506	0,513	0,000	0,500	0,500	0,511	0,548	1,053
A4 / A1	0,494	0,487	0,000	0,500	0,500	0,489	0,452	0,950
A1 / A5	0,509	0,500	0,000	0,538	0,429	0,478	0,715	1,119
A5 / A1	0,491	0,500	0,000	0,462	0,571	0,522	0,285	0,894
A1 / A6	0,544	0,530	0,000	0,500	0,500	0,556	0,699	1,245
A6 / A1	0,456	0,470	0,000	0,500	0,500	0,444	0,301	0,803
A2 / A3	0,509	0,500	0,000	0,538	0,444	0,499	0,637	1,089
A3 / A2	0,491	0,500	0,000	0,462	0,556	0,501	0,363	0,918
A2 / A4	0,544	0,530	0,000	0,500	0,400	0,503	0,562	1,026
A4 / A2	0,456	0,470	0,000	0,500	0,600	0,497	0,438	0,974
A2 / A5	0,515	0,499	0,000	0,500	0,333	0,470	0,727	1,030
A5 / A2	0,485	0,501	0,000	0,500	0,667	0,530	0,273	0,971
A2 / A6	0,623	0,555	0,000	0,500	0,400	0,548	0,711	1,253
A6 / A2	0,377	0,445	0,000	0,500	0,600	0,452	0,289	0,798
A3 / A4	0,535	0,530	0,000	0,462	0,455	0,504	0,423	0,940
A4 / A3	0,465	0,470	0,000	0,538	0,545	0,496	0,577	1,064
A3 / A5	0,506	0,499	0,000	0,462	0,385	0,471	0,603	0,951
A5 / A3	0,494	0,501	0,000	0,538	0,615	0,529	0,397	1,051
A3 / A6	0,614	0,555	0,000	0,462	0,455	0,549	0,584	1,157
A6 / A3	0,386	0,445	0,000	0,538	0,545	0,451	0,416	0,864

A4 / A5	0,471	0,470	0,000	0,500	0,429	0,467	0,674	1,007
A5 / A4	0,529	0,530	0,000	0,500	0,571	0,533	0,326	0,993
A4 / A6	0,581	0,526	0,000	0,500	0,500	0,545	0,657	1,230
A6 / A4	0,419	0,474	0,000	0,500	0,500	0,455	0,343	0,813
A5 / A6	0,609	0,556	0,000	0,500	0,571	0,578	0,481	1,218
A6 / A5	0,391	0,444	0,000	0,500	0,429	0,422	0,519	0,821

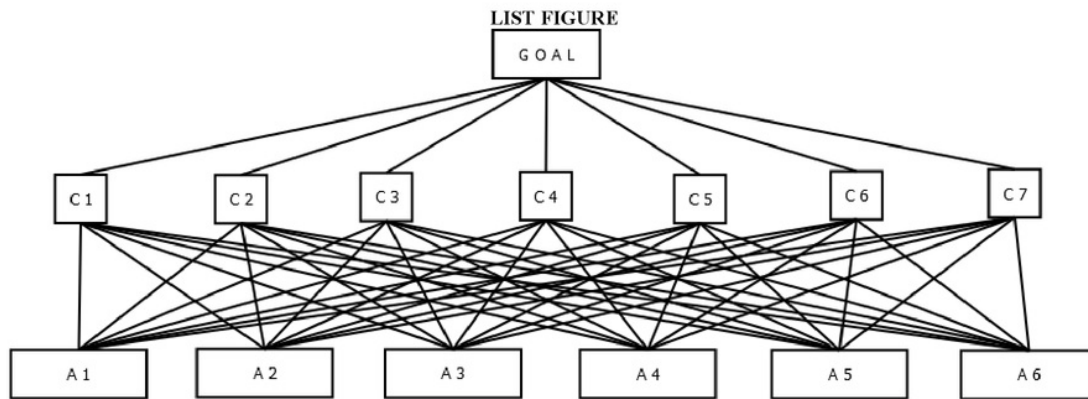


Figure 5. Hierarchy Model

National Car Development in Indonesia with Multiplicative Analytic Hierarchy Process

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