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Motorcycle Credit Purchase Decision Support System With Additive Ratio Assesstment (ARAS) Method

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Abstract

In the era of globalization as it is today, life is felt to be growing rapidly, the number of people's needs for private vehicles to facilitate all daily activities. The development of increasingly advanced technology makes us to know the importance of the use of computers in the process of processing data quickly and practically. CV. Aneka Teknik is a company engaged in motorcycle sales services by way of cash and credit. This company cooperates with several Leasing. So far, the company only accepts application files from consumers without testing files from consumers whether they deserve credit or not. This makes leasing difficult to handle so that the process of granting credit becomes slow. To overcome this, the author makes an application for a decision support system in determining the application of prospective customers to obtain credit facilities. After CV. Aneka Teknik processes incoming consumer files, so the files that are eligible to get credit are sent or submitted to leasing. The highest score in the ranking obtained by the ARAS method decision support system in the highest position is A9 with the name Apriandi Alfa Reza Saragih with a value of 0.1538 who has the right to be selected as a motorcycle loan recipient

Keywords: Decision Support System, Motorcycle Credit, ARAS Method

INTRODUCTION

CV. Aneka Teknik is a company engaged in motorcycle sales services by way of cash and credit. The company is looking at some Leasing. So far, the company only accepts requests from consumers without testing files from consumers whether they are creditworthy or not. This makes leasing difficult to handle so that the process of granting credit becomes slow. To overcome this, the author makes an application for a decision support system in determining the demand for prospective customers in obtaining credit facilities. After CV. Aneka Teknik processes incoming consumer files, so the files that are eligible to get credit are sent or submitted to leasing. This research is carried out by a research journal with the title "Analysis of the Application of Additive Ratio Assessment (ARAS) Methods in Providing Sales Sales Incentives to Support Management Decisions". This study concludes that in providing incentives to sales based on criteria, the results are more accurate and on target. Sales will make the best use of work time, take responsibility for the tasks and work they do, sales also strive to improve the quality of their work for good work results for the purpose. (Syafrida, et al. 2019)

RESEARCH METHODS

In This Study, The Weighting Of The Criteria Which Are More Important Than The Criteria And The Ranking Of The Best Teacher Assessments Will Be Carried Out Using The Additive Ratio Assessment (ARAS) Method. Cedar Is The Method Used For Ranking. With This Ranking Method, The Application Of The Best Teacher Assessment Will Be More Precise And Accurate Because It Is Based On The Criteria And Weights That Have Been Determined, So That It Will Get Satisfactory Results. And Further Research Is Supporting Journals In The Application Of The Additive Ratio Assessment (ARAS) Method, SAINTEKS Research (Syafrida, Et Al. 2019).

Decision Support System As A Computer-Based System Consisting Of Components Including Language System Components, System Components Knowledge And Components Of Problem Processing Systems That Interact With Each Other, Which Helps Decision Making Through The Use Of Data And Decision Models To Solve Semi-Structured And Unstructured Problems. This Research Uses The ARAS Method. In Giving Incentives To Sales Sales Based On Criteria By Using A Formula Whose Results Are More Accurate And On Target. This Study Aims To Describe The Benefits Of Providing Incentives In Improving Sales Performance. That Is, Given Incentives, There Will Be Sales Efforts To Improve Performance. Sales Will Make The Best Use Of Working Time, Be Responsible For The Tasks And Work They Do, Sales Will Also Try To Improve The Quality Of Their Work For Good Work Results For Achieving Goals.

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RESULTS AND DISCUSSION

Analysis And Design

CV Aneka Teknik has 50 customers in the company. The data used in this study is consumer data in 2021 as many as 50 consumers while the sample data used is 10 consumers.

Table 1. Consumer Data in 2021

o	Consumer Name	Work	Consumer Income	Consumer Expenditure	Home Status	Guarantor Status
1	RAHMAD AMIN	Farmer	RP 5.000.000	RP 2.500.000	One's own	brother-in-law
2	EKA PRANATA SURBAKTI	TNI	RP 3000.000	RP 1.750.000	One's own	Parent
3	DODI SYAHPUTRA	Farmer	RP 4000.000	RP 1.250.000	Family Owned	Parent
4	LAILA TUSSYUKRURIA	Farmer	RP 4000.000	RP 1.250.000	Rent	Husband
5	IMANUEL GINTING	Self-employed	RP 2000.000	RP 1.250.000	One's own	Parent
6	IRHAM ARDIANSYAH	POLRI	RP 5.000.000	RP 1.250.000	One's own	Wife
7	SRI DEVI	Farmer	RP 5.000.000	RP 1.250.000	One's own	Husband
8	PRIANTA PA	Self-employed	RP 3000.000	RP 1.750.000	Rent	brother-in-law
9	APRIANDI ALFA REZA SARAGIH	Trader	RP 8.000.000	RP 2.500.000	One's own	Parent

10	LILI ROSMAWITA	Trader	RP 5.000.000,-	RP 1.750.000	One's own	Husband

Application of Method

Each decision maker must choose an alternative that is in accordance with the objectives that have been formulated. Each alternative consists of a set of attributes and each attribute has a value. This value is averaged with a certain scale. Each attribute has a weight that describes how important it is compared to other attributes. This weighting and ranking is used to assess each alternative in order to obtain the best alternative. Weighting on the Additive Ratio Assessment (ARAS) uses a scale between 0 to 1, making it easier to calculate and compare values for each alternative.

Analysis of ARAS Method Test

In the analysis of the decision support system method used in the Purchase of Motorcycle Credit, the analysis is carried out with the right stages, the stages of decision support analysis using the ARAS (Additional Ratio Assessment) method are as follows:

1. Determine the Decision Criteria

The following are the criteria used in determining the Purchase of Motorcycle Credit, which can be seen in table I.2:

Table 2. Decision Criteria

No	Criteria Code	Criteria	Type	Information
1	C1	Work	*Benefit*	Criteria for judging Jobs
2	C2	Consumer Income	*Benefit*	Criteria that assess consumer income
3	C3	Consumer Expenditure	*Cost*	Criteria for judging consumer spending
4	C4	Home Status	*Benefit*	Criteria that assess the status of the house
5	C5	Guarantor Status	*Benefit*	Criteria judging guarantor status

2. Determining Criteria Weight

The following is the weight of the criteria used to Purchase Motorcycle Credit, the weight of the criteria used uses a value of 1 to 100:

Table 3. Table of Criteria Weight

Criteria	Criteria Name	Criteria Weight
C1	Work	25
C2	Consumer Income	20
C3	Consumer Expenditure	20
C4	Home Status	20
C5	Guarantor Status	15
Amount		100

3. Determine Parameters and Parameter Weights for Each Criterion

Table 4. Parameters and Parameter Weights for Each Criterion

Criteria Name	Sub Criteria	Sub Criteria Value
Work	Teacher/Lecturer	15
	Doctor	15
	POLRI/TNI	15
	Self-employed	10
	Farmer	10
	Trader	10
	Fisherman	10
	Taxibike	10
	IRT	5
Consumer Income	>7.000.000 – ≥10.000.000	40
	>4.000.000 – 7.000.000	30
	>2.000.000 – 4.000.000	20
	>500.0000 – 2.000.000	10
Consumer Expenditure	≥1.000.000	40
	>2.000.000 – 3.000.000	30
	>3.000.000 – 5.000.000	20
	>5.000.000-10.000.000	10
Home Status	One's own	40
	Rent	30

	Contract	20
	Family Owned	10
Guarantor Status	Parent	40
	Wife	30
	Husband	20
	brother-in-law	10

4. Determine Alternative Data

Table 5. Alternative Data for Motorcycle Credit Purchases

No	Name Alternative	Work	Consumer Income	Consumer Expenditure	Home Status	Guarantor Status
1	A1	10	30	30	40	10
2	A2	30	20	40	40	40
3	A3	10	20	40	30	40
4	A4	10	20	40	20	20
5	A5	20	10	40	40	40
6	A6	30	30	40	40	30
7	A7	10	30	40	40	20
8	A8	20	20	40	20	10
9	A9	40	40	30	40	40
10	A10	40	30	40	40	20

5. Normalization of Decision Criteria Weight

Table 6. Normalization of Decision Criteria Weights

Criteria (C)	Criteria Name	Criteria Weight (wj)	Normalization wj/(∑_wj)
C1	Work	25	25/100 = 0,25
C2	Consumer Income	20	20/100 = 0,2
C3	Consumer Expenditure	20	20/100 = 0,2
C4	Home Status	20	20/100 = 0,2
C5	Guarantor Status	15	15/100 = 0,15

6. Transformasi Data Alternatif
Transformasi data alternatif Penjualan Tahun 2021 dapat dilihat pada tabel berikut:

Table 7. Decision Matrix

o	Alternative	C1	C2	C3	C4	C5
1	A0	40	40	40	40	40
2	A1	10	30	30	40	10
3	A2	30	20	40	40	40
4	A3	10	20	40	30	40
5	A4	10	20	40	20	20
6	A5	20	10	40	40	40
7	A6	30	30	40	40	30
8	A7	10	30	40	40	20
9	A8	20	20	40	20	10
10	A9	40	40	30	40	40
11	A10	40	30	40	40	20
Criteria Max		260	290	400	390	310

7. Formulating a Decision Matrix

$$Xij = \begin{matrix} 40 & 40 & 40 & 40 & 40 \\ 10 & 30 & 30 & 40 & 10 \\ 30 & 20 & 40 & 40 & 40 \\ 10 & 20 & 40 & 30 & 40 \\ 10 & 20 & 40 & 20 & 20 \\ 20 & 10 & 40 & 40 & 40 \\ 30 & 30 & 40 & 40 & 30 \\ 10 & 30 & 40 & 40 & 20 \\ 20 & 20 & 40 & 20 & 10 \\ 40 & 40 & 30 & 40 & 40 \\ 40 & 30 & 40 & 40 & 20 \end{matrix}$$

8. Normalization of Decision Matrix

C1

$$R0.1 = \frac{40}{260} = 0{,}15$$
$$R1.1 = \frac{10}{260} = 0{,}03$$
$$R2.1 = \frac{30}{260} = 0{,}11$$
$$R3.1 = \frac{10}{260} = 0{,}03$$
$$R4.1 = \frac{10}{260} = 0{,}03$$
$$R5.1 = \frac{20}{260} = 0{,}07$$
$$R6.1 = \frac{30}{260} = 0{,}11$$
$$R7.1 = \frac{10}{260} = 0{,}03$$

$$R8.1 = \frac{20}{260} = 0{,}07$$
$$R9.1 = \frac{40}{260} = 0{,}15$$
$$R10.1 = \frac{40}{260} = 0{,}15$$

C2

$$R0.2 = \frac{40}{290} = 0{,}13$$
$$R1.2 = \frac{30}{290} = 0{,}10$$
$$R2.2 = \frac{20}{290} = 0{,}06$$
$$R3.2 = \frac{20}{290} = 0{,}06$$
$$R4.2 = \frac{20}{290} = 0{,}06$$
$$R5.2 = \frac{10}{290} = 0{,}03$$
$$R6.2 = \frac{30}{290} = 0{,}10$$
$$R7.2 = \frac{30}{290} = 0{,}10$$
$$R8.2 = \frac{20}{290} = 0{,}06$$
$$R9.2 = \frac{40}{290} = 0{,}13$$
$$R10.2 = \frac{30}{290} = 0{,}10$$

From the above calculation, the normalized decision matrix can be obtained as follows:

$$X = \begin{bmatrix} 0{,}15 & 0{,}13 & 0{,}05 & 0{,}10 & 0{,}12 \\ 0{,}03 & 0{,}10 & 0{,}075 & 0{,}10 & 0{,}03 \\ 0{,}11 & 0{,}06 & 0{,}1 & 0{,}10 & 0{,}12 \\ 0{,}03 & 0{,}06 & 0{,}03 & 0{,}07 & 0{,}12 \\ 0{,}03 & 0{,}06 & 0{,}03 & 0{,}05 & 0{,}06 \\ 0{,}07 & 0{,}06 & 0{,}1 & 0{,}10 & 0{,}12 \\ 0{,}11 & 0{,}03 & 0{,}1 & 0{,}10 & 0{,}09 \\ 0{,}03 & 0{,}10 & 0{,}1 & 0{,}10 & 0{,}06 \\ 0{,}07 & 0{,}06 & 0{,}1 & 0{,}05 & 0{,}03 \\ 0{,}15 & 0{,}13 & 0{,}075 & 0{,}10 & 0{,}12 \\ 0{,}15 & 0{,}10 & 0{,}1 & 0{,}10 & 0{,}06 \end{bmatrix}$$

9. Determine the weight of the normalized matrix by multiplying the normalized matrix against the weight of the criteria.

D01 = x01 * w1 = 0.15*0,25 = 0.0375
D11 = x11 * w1 =0.03*0,25 = 0.0075
D21 = x21 * w1 =0.11*0,25 = 0.0275
D31 = x31 * w1 = 0.03*0,25 = 0.0075
D41 = x41 * w1 = 0.03*0,25 = 0.0075
D51 = x51 * w1 =0.07*0,25 = 0.0175
D61 = x61 * w1 =0.11*0,25 = 0.0275
D71 = x71 * w1 =0.03*0,25 = 0.0075

D81 = x81 * w1 =0.07*0,25 = 0.0175
D91 = x91 * w1 =0.15*0,25 = 0.0375
D101 = x101 * w1 =0.15*0,25 = 0.0375

D02 = x02* w2=0.13*0,2 = 0.026
D12 = x12* w2=0.10*0,2 = 0.02
D22 = x22* w2=0.06*0,2 = 0.012
D32 = x32* w2=0.06*0,2 = 0.012
D42 = x42* w2=0.06*0,2 = 0.012
D52 = x52* w2=0.06*0,2 = 0.012
D62 = x62* w2=0.03*0,2 = 0.006
D72 = x72* w2=0.10*0,2 = 0.02
D82 = x82* w2=0.06*0,2 = 0.012
D92 = x92* w2=0.13* 0,2 = 0.026
D102 = x102* w2=0.10*0,2 = 0.02

From the above calculations can be obtained matrix results as follows:

$$D = \left[\begin{array}{cccc|c} 0{,}0375 & 0{,}026 & 0{,}01 & 0{,}02 & 0{,}0144 \\ 0{,}0075 & 0{,}02 & 0{,}015 & 0{,}02 & 0{,}0045 \\ 0{,}0375 & 0{,}012 & 0{,}02 & 0{,}02 & 0{,}018 \\ 0{,}0275 & 0{,}012 & 0{,}006 & 0{,}014 & 0{,}018 \\ 0{,}0075 & 0{,}012 & 0{,}006 & 0{,}01 & 0{,}009 \\ 0{,}0075 & 0{,}012 & 0{,}02 & 0{,}02 & 0{,}018 \\ 0{,}0175 & 0{,}006 & 0{,}02 & 0{,}02 & 0{,}0135 \\ 0{,}0275 & 0{,}02 & 0{,}02 & 0{,}02 & 0{,}009 \\ 0{,}0075 & 0{,}012 & 0{,}02 & 0{,}01 & 0{,}0045 \\ 0{,}0075 & 0{,}026 & 0{,}015 & 0{,}02 & 0{,}018 \\ 0{,}0375 & 0{,}02 & 0{,}02 & 0{,}02 & 0{,}009 \end{array}\right]$$

10. Determine the value of the optimality function, by adding up the value of the criteria for each alternative from the results that have been done previously.

S0 = 0,0375 + 0,026 + 0,01 + 0,02 + 0,0144 = 0,1079
S1 = 0.0075 + 0.02 + 0.015 + 0.02 + 0.0045 = 0,067
S2 = 0.0375 + 0.012 + 0.02 + 0.02 + 0.018 = 0,1075
S3 = 0.0275 + 0.012 + 0.006 + 0.014 + 0.018 = 0,0775
S4 = 0.0075 + 0.012 + 0.006 + 0.01 + 0.009 = 0,0445
S5 = 0,0075 + 0,012 + 0,02 + 0,02 + 0,018 = 0,0775
S6 = 0,0175 + 0,006 + 0,02 + 0,02 + 0,0135 = 0,087
S7 = 0,0275 + 0,02 + 0,02 + 0,02 + 0,009 = 0,0965
S8 = 0,0075 + 0,012 + 0,02 + 0,01 + 0,0045 = 0,054
S9 = 0,0075 + 0,026 + 0,015 + 0,02 + 0,018 = 0,1465
S10 =0,0375 + 0,02 + 0,02 + 0,02 + 0,009 = 0,0865

Menentukan tingkatan peringkat tertinggi dari setiap alternatif, denga cara membagi nilai alternatif terhadap alternatif 0 (A0)

$K0 = \frac{0{,}1079}{0{,}9524} = 0{,}1132$

$K1 = \frac{0{,}067}{0{,}9524} = 0{,}0703$

$$K2 = \frac{0,1075}{0,9524} = 0,1128$$
$$K3 = \frac{0,0775}{0,9524} = 0,0813$$
$$K4 = \frac{0,0445}{0,9524} = 0,0467$$
$$K5 = \frac{0,0775}{0,9524} = 0,0813$$
$$K6 = \frac{0,087}{0,9524} = 0,0913$$
$$K7 = \frac{0,0965}{0,9524} = 0,1013$$
$$K8 = \frac{0,054}{0,9524} = 0,0566$$
$$K9 = \frac{0,1465}{0,9524} = 0,1538$$
$$K10 = \frac{0,0865}{0,9524} = 0,0908$$

From the calculation of dividing the alternative value against alternative 0 (A0), the results of the ranking table for each alternative can be obtained as follows:

Table 8. Ranking Values

Alternative	Information	Value (K)	Rank
A9	APRIANDI ALFA REZA SARAGIH	0,1538	I
A2	EKA PRANATA SURBAKTI	0,1128	II
A7	SRI DEVI	0,1013	III
A6	IRHAM ARDIANSYAH	0,0913	IV
A10	LILI ROSMAWITA	0,0908	V
A3	DODI SYAHPUTRA	0,0813	VI
A5	IMANUEL GINTING	0,0813	VII
A1	RAHMAD AMIN	0,0703	VIII
A8	PRIANTA PA	0,0566	IX
A4	LAILA TUSSYUKRURA	0,0467	X

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CONCLUSION

The results of the above study indicate that the use of the ARAS method can determine decisions in the Motorcycle Credit Purchase Assessment with the Additive Ratio Assessment (ARAS) method. it is concluded that the application of the ARAS (Additive Ratio Assessment) method is able to provide recommendations to users in the form of an assessment based on the weight of the assessment criteria that have been determined. and the ARAS (Additive Ratio) method Assessment) can be used to solve problems in the Motorcycle Credit Purchase Assessment with the Additive Ratio Assessment (ARAS) Method.

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