Electronic Credit and Furniture Decision Support Systems using the Weighted Product Method

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Article Info	A B S T R A C T
	To do Electronic Credit and furniture is quite difficult and less effective and efficient. Because the system used is still manual or not computerized, and the number of consumers who want to credit goods in Metro, it takes a few days or a long time to make a decision so that a system is needed, namely a Decision Support System using the Weighted Product method. The Weighted Product method is a method that uses multiplication to relate the attribute rating, where the rating of each attribute must first be ranked with the attribute's weight. The Weighted Product method uses multiplication as a liaison for attribute ratings, where the rating of each attribute must be ranked first with the weight in question. This research will produce an application or a furniture and electronic credit decision support system that can help make the credit granting process in the metro easier and more precise. The criteria used in this study are income, BPKB guarantee, KTP, family card (KK), home status, tutoring concerned and child dependents. Of the 5 examples of consumers who have been given in this study from A1, A2, A3, A4, to A5 then the highest ranking result of these 5 consumers is given to alternative A1 because the value obtained by A1 is higher than other alternatives. This system is designed using UML with the programming language PHP, CSS, Java script and HTML with the MySQL database.

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1. INTRODUCTION

The development of technology is currently developing optimally and expanding to cover all human activities, especially doing work. It cannot be denied that in this day and age technology makes it easier for someone to do their job more effectively and efficiently. Therefore, workers in companies are provided with computerized technology facilities to run and make it easier to do work, especially in companies or agencies. METRO is a growing company in the world of electronics and furniture sales. Such as ES Cabinets, Laptops, Washing Machines, Springbeds, Sofas and many more. To make credit, of course, it is different from those who buy in cash. Credit is the provision of loans by other parties that will be returned at a certain time with the amount of interest, compensation or profit sharing or those received now will be returned in the future, whereas in an economic sense, credit is a sign[1]. Due to the requirements that must be fulfilled in making purchases on credit, namely having to have a KTP and family card. To do Electronic Credit and furniture is quite difficult and less effective and efficient in choosing consumers to give electronic and furniture credit. Because the system used is still manual or not komputerized, and the number of consumers who want to credit goods in Metro, it takes several days or a long time to make a decision so that a system is needed, namely a Decision Support System. Based on the results of previous research in 2018 there is also a

Decision Support System for Electronic Credit Issuance at Pt.Premium Central Indosarana Using the Simple Additive Weighting (Saw) Method with criteria namely Character (personality), Capacity (ability), Capital (Capital), Home Ownership and Years of service [2]. By producing an application that makes it easier for consumers to apply for credit and employees to make decisions easily. In addition, in 2015 the Decision Support System for Providing People's Business Credit (KUR) Using the Weighted Product Method (Case Study: PT BPR Arta Jaya Mandiri Tasikmalaya) with a value that was declared worthy of credit. The indicators used are credit status, business conditions, income, guarantees, and collateral conditions[3]. This research produces a decision support application for KUR recipient eligibility assessment that can assist in the decision-making process so that the assessment process for KUR applicant customers is easier and more precise so that it can reduce the level of bad credit. Decision Support Systems (DSS) are interactive information systems that provide information, modeling and manipulation of data. The system is used to assist decision-making in semistructured and unstructured situations, where no one knows exactly how the decision should be made[4]. DSS aims to provide information, guide, provide predictions and direct information users to make better decisions[5]. The weighted product method is a method of solving by using multiplication to relate the attribute rating, where the rating must first be ranked with the attribute weight in question.[6]. The Weighted Product (WP) method is one of the settlement methods in a decision support system. This method evaluates several alternatives to a set of attributes or criteria, where each attribute is independent of one another.[7]. The WP method is more efficient than other methods because the calculation time it uses is shorter and more precise. The purpose of this research is to reduce problems or make it easier for METRO to provide Electronic and Furniture credit to consumers. By using the criteria of income, BPKB guarantee, KTP, family card (KK), home status, tutoring concerned and dependent children.

2. RESEARCH METHOD

The research framework contains the steps in conducting a study that will be carried out by the researcher to solve the problem. The following are the stages in the research framework:
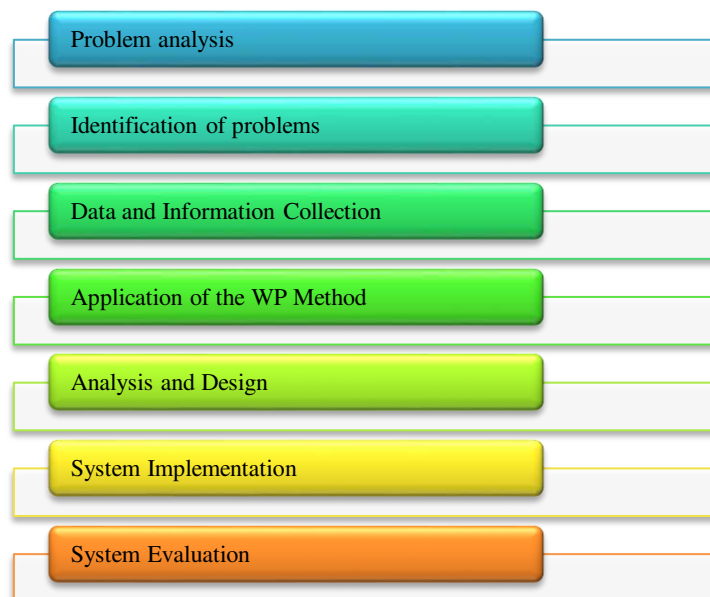

Figure 1. Research Framework

3. RESULTS AND DISCUSSION

Criteria data that have been obtained in conducting interviews with Metro Perbaungan in the Decision Support System for determining electronic credit and furniture using the Weighted Product method. The criteria to be used are as follows:
1. Income (C1)
2. BPKB Guarantee (C2)

3. ID card of husband and wife (2) (C3)
4. Family card (KK) (C4)
5. Home status (C5)
6. Lesing concerned (C6)
7. Dependent children (C7)

It is known that the value of each initial weight of each criterion can be seen in the table below:

Table 1. Weights for income criteria

Income	Variable	Weight
≤ 2,000,000	Very Low (SR)	1
≤ 3,000,000	Low (R)	2
≤ 4,000,000	Enough (C)	3
≤ 5000,000	Height (T)	4
> 5000,000	Very High (T)	5

Table 2. Weights for the BPKB guarantee criteria

BPKB guarantee	Variable	Weight
BPKB Kereta	Enough (C)	3
Car BPKB	Height (T)	4

Table 3. Weights for KTP criteria

ID card	Variable	Weight
1 KTP	Enough (C)	3
2 KTP	Height (T)	4

Table 4. Weights for the family card criteria

Family card	Variable	Weight
None (Marriage book)	Enough (C)	3
There is	Height (T)	4

Table 5. Weights for home status criteria

Home Status	Variable	Weight
House for rent	Enough (C)	3
My own house	Height (T)	4

Table 6. The weights for the relevant sling criteria

Lesing is concerned	Variable	Weight
2	Enough (C)	3
1	Height (T)	4
There is no	Very high	5

Table 7. Weights for dependent children

Dependent Children	Variable	Weight
≥ 4 children	Low (R)	2
≥ 2 children	Enough (C)	3
1 child	Height (T)	4
There is no	Very High (T)	5

Determine the weight of preference or level of importance (W) for each criterion [5 (C1); 2 (C2); 4 (C3); 4 (C4); 5 (C5); 4 (C6); 3 (C7)]

Creating a match rating table for each alternative on each criterion. Here are 5 determinations of consumers who want credit.

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<div align="center">Table 8. Sample data from 5 consumers</div>

Alternative	Income	BPKB	ID card	KK	Home Status	Lesing is concerned	Dependent child
A1	3,500,000	Motorcycle	2	There is	Alone	There is no	1
A2	1,500,000	Motorcycle	2	There is	Rent	There is no	There is no
A3	2000,000	Motorcycle	1	Not	Rent	There is no	1
A4	4000,000	Motorcycle	2	There is	Alone	1	There is no
A5	5,000,000	Motorcycle	1	There is	Alone	2	2

<div align="center">Table 9. Fuzzy weight for each criterion</div>

Alternative	Criteria weights						
	C1	C2	C3	C4	C5	C6	C7
A1	3	3	4	4	4	5	4
A2	1	3	4	4	3	5	5
A3	1	3	3	3	3	5	4
A4	3	3	4	4	4	4	5
A5	4	3	3	4	4	3	3

Normalization or repair of weights

Perform the calculation of the weighted product method, which starts with making improvements to the weight of the criteria according to the equation where the value $\Sigma Wj = 1$.

W1 = 0.1855/(5+2+4+4+5+4+3) 5/27
W2 = 0.0742/(5+2+4+4+5+4+3) 2/27
W3 = 0.1484/(5+2+4+4+5+4+3) 4/27
W4 = 0.1484/(5+2+4+4+5+4+3) 4/27
W5 = 0.1855/(5+2+4+4+5+4+3) 5/27
W6 = 0.1484/(5+2+4+4+5+4+3) 4/27
W7 = 0.1113/(5+2+4+4+5+4+3) 3/27

Normalization or repair of weights

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W4 = 0.1484/(5+2+4+4+5+4+3) 4/27
W5 = 0.1855/(5+2+4+4+5+4+3) 5/27
W6 = 0.1484/(5+2+4+4+5+4+3) 4/27
W7 = 0.1113/(5+2+4+4+5+4+3) 3/27

$$Vi = \frac{\prod_{j=1}^{n} x_{ij}^{w_{ij}}}{\prod_{j=1}^{n} \left(x_{ij}^{*}\right)^{w_{ij}}}$$

V1 = = = 0.227 $\frac{3.837}{3.837+3.043+2.726+3.806+3.483} \frac{3.837}{16.89}$
V2 = = = 0.180 $\frac{3.043}{3.837+3.043+2.726+3.806+3.483} \frac{3.043}{16.89}$
V3 = = = 0.161 $\frac{2.726}{3.837+3.043+2.726+3.806+3.483} \frac{2.726}{16.89}$
V4 = = = 0.225 $\frac{3.806}{3.837+3.043+2.726+3.806+3.483} \frac{3.806}{16.89}$
V5 = = = 0.206 $\frac{3.483}{3.837+3.043+2.726+3.806+3.483} \frac{3.483}{16.89}$

$$= \frac{\prod_{j=1}^{n} x_{ij}^{w_{ij}}}{\prod_{j=1}^{n} \left(x_{ij}^{*}\right)^{w_{ij}}}$$

V1 = = = 0.227 $\frac{3.837}{3.837+3.043+2.726+3.806+3.483} \frac{3.837}{16.89}$

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$$V3 = = = 0.161 \frac{2.726}{3.837+3.043+2.726+3.806+3.483} \frac{2.726}{16.89}$$

$$V4 = = = 0.225 \frac{3.806}{3.837+3.043+2.726+3.806+3.483} \frac{3.806}{16.89}$$

$$V5 = = = 0.206 \frac{3.483}{3.837+3.043+2.726+3.806+3.483} \frac{3.483}{16.89}$$

Based on the calculation results of the selection of furniture and electronic credit granting to Metro, it can be seen in the table below :

Table 10. Calculation of the selection results

No.	Alternative	Vi
1.	A1	V1 = 0.227
2.	A2	V2 = 0.180
3.	A3	V3 = 0.161
4.	A4	V4 = 0.225
5.	A5	V5 = 0.206

The selection results show that alternative A1 has a value of V1 = 0.227, alternative A2 has a value of V2 = 0.180, alternative A3 has a value of V3 = 0.161, alternative A4 has a value of V4 = 0.225, and alternative A5 has a value of V5 = 0.206. The order of the results of the ranking of furniture and electronic credit granting in Metro can be seen in the table below.

Table 11. The order of the ranking results

No.	Alternative	Vi
1.	A1	V1 = 0.227
2.	A4	V4 = 0.225
3.	A5	V5 = 0.206
4.	A3	V3 = 0.18
5.	A2	V2 = 0.161

Based on the results of the ranking calculation that has the highest value is V1 with a value of 0.227 which was chosen as the best alternative for creditworthiness.

4. CONCLUSION

By applying the weighted product method for determining the provision of electronic and furniture loans, it really helps the leadership in selecting who deserves to receive it by looking at the results of the calculations according to the criteria and weights that have been given.

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