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Determining the Target of Independent Graduation for Beneficiary Families of the Hopeful Family Program

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- Abstract: The Family Hope Program (Program Keluarga Harapan) or better known as PKH is the conditional social assistance to the Poor Families which are designated as PKH Beneficiary Families. Self-Graduation is one of the goals of the PKH program, Self-Graduation is a condition in which the PKH Beneficiary Families is declared 'passed' from PKH participation with their respective awareness. This recommendation system uses the Simple Additive Weighting (SAW) method to calculate the criteria for several website-based alternatives with the Model View Controller concept.
 - **Keywords:** Family Hope Program, Beneficiary Families, Self-Graduation, Simple Additive Weighting, Model View Controller

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1. Introduction

The Family Hope Program, hereinafter referred to as PKH, is a program of providing conditional social assistance to Poor Families (PF) designated as PKH Beneficiary Families. As an attempt to accelerate poverty alleviation, since 2007 the Government of Indonesia has implemented PKH. The Social Protection Program, which is also known internationally as Condition Cash Transfers (CCT), has proven to be quite successful in coping poverty happened in these countries, especially the problem of chronic poverty. As a conditional social assistance program, PKH opens access for the poor families, especially pregnant women and children, to take advantage of various health care facilities and available educational service facilities around them. Moreover, the benefits of PKH have encouraged to cover disabled and the elderly by maintaining their social welfare in accordance with the mandate of the constitution and the Nawacita of the Republic of Indonesia President [1].

When designated as a beneficiary, a family sometimes changes its social status and becomes no longer eligible to receive the assistance. To facilitate the implementation of the program, a decision support system is required to ease the family to decide whether to stay in the program or leave the social assistance program.

This study will apply the criteria that can be used as an assessment of the family condition. The results of this study are expected to find out the top ranking of the family as a priority to be targeted for Self-Graduation by PKH HR.

The operation of a good system in a company cannot be separated from the support of business partners. However, but it is impossible to be obtained if the partners or suppliers do not work according to the company's own targets. DSS system can assist the board in determining suitable suppliers to work with [2]. As is the case in this study later on, the beneficiaries of this hope family program are expected to have self-graduation due to their welfare conditions were enhanced. Without the beneficiary families, this program will not be implemented so the beneficiary families must present the real data according to their conditions. Thus there will be no blunder in choosing the self-graduation target.

A decision support system using the Simple Additive Weighting (SAW) method can be developed into a Web-based DSS. The applied method begins with communication with the management, especially the perpetrators of employee performance appraisals. The web-based system is used in the performance appraisal process which is still done manually (paper-based) so the reports are not real-time [3]. It is similar with the self-graduation target assessment which can be developed in the form of a website using the MVC concept so that the assessment goes well and quickly

A decision support system is a computer-based information system that develops various alternative solutions to assist the management in dealing with structured and unstructured problems. It uses data or models, one of which is the problem of recruiting new teachers so the decisions are taken to the right direction In this research, the SAW method will be applied. The SAW method requires the decision maker to determine the weight for each attribute. The total score for the alternatives is obtained by adding up all the multiplication results between ratings (which can be compared across attributes). The rating of each attribute must be dimensionfree in the sense that it has passed the previous matrix normalization process. Certainly, data relating to PKH recipients is very necessary[4].

Official Travel Order Information System (SPPDP) which is still operated manually. Thus, it is necessary to construct an information system to provide the complete service flow of official travel orders. The design of the application system is created with PHP programming with the concept of MVC (Model-View-Controller) using framework code igniter [5]. Similarly, a decision support system using the Model View Controller concept will be designed as a solution to speed up the decision making on self-graduation targets. Just like the case before.

In PKH recipients' decision making, there is a Simple Additive Weighting (SAW) method that can be used in solving quantitative problems [6]. Dashboard is an information system application model that is provided for the managers to present performance quality information, from a company or organizational institution [7]. The need for the development of information systems in a company is a basic need that must be met by every company in order to run its business processes properly [8]. One of the technological developments which triggered the need of software, to encourage the productivity of an institution, is a website. However, to create a website requires expertise and skills. Moreover, it is to be precise and think ahead to carry out the content. The content distributed through the website must also be responsive to various user devices [9]. The implementation of the Framework Codeigniter in E-Commerce Website Development of Batik Tulis HR Ambar applies the framework codeigniter. The advantages of using this framework are that it is open source, reuses code and can save development time [10]. In this study, there will be a Dashboard, and it uses bootstrap so the display on the website can bring up responsively. In addition, later we will use the Codeigniter framework to speed up the creation of a website-based decision support system.

2. Theoretical Review

2.1. Simple Additive Weighting

This method is a weighted decision-making method. In this method there are criteria and sub-criteria, each criterion is given a weight according to the needs of decision making. The final result used for decision making is in the form of ranking results.

2.2. Model View Controller

In creating the Decision Support System, it uses the MVC (Model View Controller) concept to make it easier and faster to build the system. By using the MVC concept, the system will be more structured.



Figure 1: MVC Flow

In this MVC concept, the Backend and Frontend sections are created separately to make it easier for the developer. The Model and Controller in this concept will be the Backend. In the Backend, the two modules are invisible to website users. While the View in this concept will be the Frontend, in which the View the results will be visible to the user. In MVC the application is divided into 3 (three) modules, namely Model, View and Controller.

The steps in the MVC framework are divided into 6 steps as follows [11]:

- User sends a request to the Controller
- Controller analyzes the User requests and calls the Model according to the demand
- Model is required business logic and connect to the Database
- Model sends the result to the Controller

- Controller passes the result of the request to the View
- The request is completed when the result reaches the User.

2.3. Family Hope Program

The Family Hope Program, hereinafter abbreviated as PKH, is the provision of conditional cash transfer to underprivileged families in the Integrated Welfare Data (DTKS) and has components as requirements which are determined as PKH participants. PKH recipients can be distinguished based on the following components:

- 1. Health Component such as pregnant/postnatal/breastfeeding mother and early childhood.
- 2. Education Component such as school-age children. The school-age children are a child whose age between 6 to 21 years old. Moreover, they have not finished the compulsory education. They study in Elementary School and its equivalent or Junior High School and its equivalent and/or High School and its equivalent.
- 3. Welfare Component which consist of Elderly and Disabled.

The recipients of the PKH assistance program are called the Manaaf Recipient Families. Beneficiary Families, hereinafter abbreviated as KPM, are PKH social assistance recipient families that have met the requirements and are stipulated in the Director General's decision [1].

2.4. Self-Graduation

Self-Graduation is a condition in which the Beneficiary Family wants to resign as PKH recipients due to the changes of their welfare getting better [1]. Different from several other social service programs, the Family Hope Program encourages the empowerment of beneficiary communities [12].

3. Finding and Discussion

In this study, we will explore a decent Self-Graduation Target to be encouraged to have Self-Graduation. Not all Beneficiary Families (KPM) realize that they are economically capable. The results of this study will later determine the highest ranking in calculations using the Simple Additive Weighting method; the implementation of decide the support system will apply the Model View Controller concept

3.1. The Implementation of applying the Simple Additive Weighting

In this study, the first step to estimate using the SAW method is to determine alternative data, in this case the alternative data is Beneficiary Families. There are five KPM who are the respondents in this study which are coded as A1 to A5. The next step is to determine the criteria [13] There are nineteen criteria used in this study, which are shown in Table 1 below.

Tabl	le 1:	Cri	teria

Code	Criteria Name	Maximal	Value
C1	Residential Ownership	15	5,00%
C2	Land ownership status for residential buildings	15	$5,\!00\%$
C3	Building floor area (per person)	28	$5,\!00\%$
C4	The widest type of house floor	20	$5,\!00\%$
C5	The widest type of house walls	25	$5,\!00\%$
C6	Defecation facilities	28	$5,\!00\%$
C7	Source of drinking water	48	$5,\!00\%$
C8	Lighting source	36	$5,\!00\%$
C9	Type of cooking fuel	15	$5{,}00\%$
C10	Ownership of Social Security Card	18	$5{,}00\%$
C11	Head of household last education	12	$5{,}00\%$
C12	Asset ownership of livestock	16	$5,\!00\%$
C13	Asset ownership of electronics	16	$5,\!00\%$
C14	Holding gold and money savings	16	$5,\!00\%$
C15	Ownership of transportation means	16	$5,\!00\%$
C16	Land ownership	12	$5{,}00\%$
C17	Number of Household members	32	$5{,}00\%$
C18	Head of household occupational status	48	$10,\!00\%$

In each of the criteria listed in table 1.1 above, there are sub-criteria and their values, in which each sub-criteria value is different.

- Residence ownership which consists of sub-criteria for self-owned (5), contract/lease (10), and rent free (15).
- Status of land ownership for residential buildings which consists of sub-criteria for selfowned (5), rent free (10), and leased (15).
- Building floor area (per person) consisting of sub-criteria more than 16 m2 (7), 13 16 m2 (14), 8 12 m2 (21), and less than 8 m2 (28).

- The widest type of house floor consisting of granite (20), ceramic/tile/tagel/terrazzo (10), cement/white stone tiles (15), and soil (20).
- The widest type of house wall consisting of sub-criteria plastering/high quality wood (5), walls without plaster (10), stucco woven bamboo/wire/calsibord (15), low quality wood/calcibord (50), and woven bamboo (25).
- Defecation facilities consisting of the sub-criteria for swan neck (7), plengsengan (14), shared/public toilets (21), and cemplung/cubluk (28).
- Source of drinking water consisting of sub-criteria branded bottled water (6), refilled water (12), led metered (18), drilled wells/pumps/protected wells (24), unprotected wells (36), protected springs (36), rainwater/PAH (42), and unprotected springs/river/lake/reservoir water (48).
- Lighting sources consisting of sub-criteria 1200 VA or more (6), non-PLN electricity (solar cell/generator set/biogas) (12), 900 VA (18), 450 VA (24), Bendeng (30), and no electricity (36).
- Type of cooking fuel which consists of sub criteria Gas ¿ 3kg (5), Gas 3 kg (10), and firewood / charcoal (15).
- Possession of a social protection security card consisting of the following criteria: Not getting a program (3), Getting 1 program (6), Getting 2 programs (9), Getting 3 programs (12), Getting 4 programs (15), and Getting 5 programs (18).
- The last education of the head of the household consisting of sub-criteria for Bachelor (2), Diploma (4), SMA/SMK//SMALB/Package C/M Aliyah (6), SMP/SMPLB/Package

B/M Tsanawiyah (8), SD/SDLB/Package A/M Ibtidaiyah (10), and not in school/didn't graduate from SD or equivalent (12).

- Ownership of assets on livestock consisting of sub-criteria goats and cattle (4), cattle (8), goats (12), and not owning (16).
- Ownership of assets on electronics consisting of sub-criteria Laptop/PC (4), Washing machine (8), Refrigerator (12), and Not having (16).
- Gold and money savings consisting of Gold ¿ 9 grams and money/savings ¿ 5 million (4), Money/savings ¿ 5 million (8), Gold ; 9 grams (18), and Not having (16).
- Ownership of transportation facilities consisting of sub-criteria Car (4), Boat engine (8), Motorcycle (12), and Not owning (16).
- Land ownership consisting of sub-criteria ¿ 1,000 m2 (3), 500 1,000 m2 (6), ¡ 500 m2 (9), and Not owning (12).
- Number of Household members consisting of sub-criteria 1 3 people (8), 4 people (16),
 5 people (24), and more than 6 people or Lone Elderly (32).
- Occupational status of the head family consisting of sub-criteria Traders/ wholesalers (8), PNS/TNI/Polri/BUMN/BUMD/legislative members/professionals/retired (16), Private employees/employees/village officials (24), Traders Smallholders (32), Farmers who own land (40), and Farmers who own land (48).
- Family members suffer from chronic catastrophic disease consisting of sub-criteria None (9), diabetes mellitus (18), heart disease/stroke (27), complication disease (36), and kidney failure/cancer (45).

The next step is to fill in the value for the alternative according to the conditions in reality.

There are five alternatives and nineteen criteria that are filled in based on the sub-criteria for field conditions. The alternative values are listed in Table 2 below.

Cretoria	Alternative		:		
Creteria	A1	$\mathbf{A2}$	A3	$\mathbf{A4}$	$\mathbf{A5}$
C1	5	5	5	5	5
C2	5	5	5	5	5
C3	21	28	7	21	21
C4	15	15	10	10	15
C5	10	5	10	10	10
C6	$\overline{7}$	7	7	7	7
C7	24	18	18	18	12
C8	24	24	24	18	24
C9	10	10	10	10	5
C10	6	9	6	3	6
C11	8	10	8	8	10
C12	16	16	16	16	12
C13	16	8	12	12	16
C14	16	16	16	16	16
C15	12	12	12	12	12
C16	6	9	6	9	9
C17	16	16	24	8	16
C18	32	48	48	32	48
C19	9	9	9	9	9

 Table 2: Alternative Value

For the next step is to create a normalization matrix. The formula for calculating the normalization matrix is as follows :

$$r_{ij} = \begin{cases} \frac{x_{ij}}{\max x_{ij}} & \text{if } j \text{ is a benefit attribute} \\ \frac{\min x_{ij}}{x_{ij}} & \text{if } j \text{ is a cost attribute} \end{cases}$$
(1)

Description:

 r_{ij} : Normalized performance rating, $Max x_{ij}$: Maximum value of each row and column,

 $Min x_{ij}$: Minimum value of each row and column, x_{ij} : The attribute value of each criterion,

Benefit: If the biggest value is the best, Cost: If the smallest value is the best.

In this study, all criteria are worth Cost because this research is seeking the best value from the smallest values. Thus, to calculate normalization using the formula 2

$$r_{ij} = \left(\frac{\min x_{ij}}{x_{ij}}\right) \tag{2}$$

The following is the result of the normalization calculation shown in Figure 2 below.

	1,00	1,00	1,00	1,00	1,00	٦
	1,00	1,00	1,00	1,00	1,00	
	0,33	0,25	1,00	0,33	0,33	
	0,67	0,67	1,00	1,00	0,67	
	0,50	1,00	0,50	0,50	0,50	
	1,00	1,00	1,00	1,00	1,00	
	0,50	0,67	0,67	0,67	1,00	
	0,75	0,75	0,75	1,00	0,75	
	0,50	0,50	0,50	0,50	1,00	
-	0,50	0,33	0,50	1,00	0,50	ŀ
	1,00	0,80	1,00	1,00	0,80	
	0,75	0,75	0,75	0,75	1,00	
	0,50	1,00	0,67	0,67	0,50	
	1,00	1,00	1,00	1,00	1,00	
	1,00	1,00	1,00	1,00	1,00	
	1,00	0,67	1,00	0,67	0,67	
	0,50	0,50	0,33	1,00	0,50	
	1,00	0,67	0,67	1,00	0,67	
	1 00	1 00	1 00	1 00	1 00	

Figure 2: Normalization Matrix

After calculating the normalization matrix, the next step is to calculate the preference value or final value, here is the formula to calculate this value:

$$V_j = \sum_{j=1}^n W_j r_{ij} \tag{3}$$

Description : V_i = The final value of the alternative, W_j = Predefined weight, r_{ij} = Matrix normaliz

The results of the calculations using the formula are shown in Table 3 below.

<u>a</u>	Alternative				
Creteria	A1	A2	A3	A 4	A5
C1	0,05	0,05	0,05	0,05	0,05
C2	$0,\!05$	$0,\!05$	$0,\!05$	$0,\!05$	$0,\!05$
C3	$0,\!02$	0,01	$0,\!05$	0,02	$0,\!02$
C4	0,03	0,03	$0,\!05$	$0,\!05$	$0,\!03$
C5	0,03	$0,\!05$	0,03	0,03	$0,\!03$
C6	$0,\!05$	$0,\!05$	$0,\!05$	$0,\!05$	$0,\!05$
C7	0,03	0,03	0,03	0,03	$0,\!05$
C8	0,04	0,04	0,04	$0,\!05$	$0,\!04$
C9	0,03	$0,\!03$	$0,\!03$	$0,\!03$	$0,\!05$
C10	0,03	$0,\!02$	$0,\!03$	$0,\!05$	0,03
C11	$0,\!05$	$0,\!04$	$0,\!05$	$0,\!05$	$0,\!04$
C12	$0,\!04$	$0,\!04$	$0,\!04$	$0,\!04$	$0,\!05$
C13	0,03	$0,\!05$	0,03	0,03	0,03
C14	$0,\!05$	$0,\!05$	$0,\!05$	$0,\!05$	$0,\!05$
C15	$0,\!05$	$0,\!05$	$0,\!05$	$0,\!05$	$0,\!05$
C16	$0,\!05$	0,03	$0,\!05$	0,03	0,03
C17	0,03	0,03	0,02	$0,\!05$	0,03
C18	0,1	0,07	0,07	0,1	$0,\!07$
C19	$0,\!05$	$0,\!05$	$0,\!05$	$0,\!05$	$0,\!05$

 Table 3: Preference Calculation Result

The final result of the calculation using the Simple Additive Weighting method is a ranking.

To get the results, it will be ranked based on the largest value that has been obtained.

No	Alternative Code	Total Value	Ranking
1	A4	0,8542	1
2	A3	0,8000	2
3	A5	0,7775	3
4	A1	0,7750	4
5	A2	0,7608	5

Table 4: Final Result of Calculations

Based on the results of Table 4 above, the results are in the form of total scores and rankings. The results illustrate the alternative code A4 with a total value of 0.8542 as a priority in decision making as a KPM is eligible to be a Self- Graduation Target so that it can pass as a recipient of PKH assistance.

3.2. Model View Controller Implementation

The implementation applies the Model View Controller concept to ease in making a Decision Support System. There are many frameworks that can be used to implement this system. In this study, the researcher will use the Codeigniter framework. Codeigniter is a website-based architecture, later the decision support system can appear when the researcher browses the address on a web browser.

Database preparation

In this system the database is entitled graduation, in the graduation there are six tables, the tables as follows:

a. data_group

This table contains the groups' names along with the addresses of those groups. This table will later be an option when entering KPM data. It is because when entering KPM data later, the group identity will be shown.

b. data_kpm

This table contains the identity of the KPM, the barcode number, the name of the KPM, the name of the group according to the options provided, and the address of the KPM. In this study, it uses 5 KPM data.

c. data_criteria

This table contains the names of the criteria and the weights for each criterion that will

be used as weights for the final assessment. In this criterion there are 19 criteria.

d. data_sub_criteria

Loading sub-criteria data based on criteria, there are also values for each sub-criteria. In this data, there are 87 sub-criteria data and their values.

e. value

This table contains the values for each KPM.

Model

Models have data management functions and are components used to manipulate data as well. This model is used to execute insert, select, update and delete on databases that have been linked in MVC. In this model a model according to our needs can be created and can be used repeatedly without rewriting the code.

View

This view contains an interface, usually a view created using HTML, CSS or other languages. In addition to using the language, you can also use a framework, meaning that the function in creating the view is already provided by the framework. An example of such a framework is bootstrap. In this decision support system, the social assistant is a user in this system. In a decision support system, it can be called as a manager / user. Users here will interact directly with the decision support system through the interface. Users will later enter supporting data to support decision making. These data include Group Data, KPM Data, Criteria Data, Sub Criteria Data, and Value Data. To connect the system by entering the address in the URL of the web browser, the URL address in this study is http://localhost/grad/admin/dashboard, the results of the address search are as shown in the Figure 3 below. Andre Argisitawan, Widyastuti Andriyani, Bambang Purnomosidi DP, and Domy Kristomo



Figure 3: Daskboard

Dialog Management System in the decision support system contained in the interface display on the website.

Controller

Controller here served as a bridge between the view and the model. The controller is the part in charge of forwarding requests from users who are social companions via a web browser. The results

The results of the implementation of a decision support system with the MVC concept The results of the implementation in the Model View Controller are shown in Figures 3, and Figure 4



Figure 4: Model View Control

Based on the total value above, it can be concluded that the calculation of the decision support system using the Simple Additive Weighting method without using MVC and using MVC obtained the highest value result. The result is KPM with alternative id A4 with a value of 0.8542 as priority KPM as a self-graduation target. Based on these results, the results are similar.

No	ID Alternative	Total Value
1	A1	0.775
2	A2	0.7608
3	A3	0.8
4	A4	0.8542
5	A5	0.7775

Table 5: Total Value

4. Conclusion

The conclusion of this study are as follows :

- a. From the calculation using the Simple Additive Weighting method using 19 criteria, the alternative id A4 was obtained with a value of 0.8542 as a self-graduation target.
- b. A decision support system using the Simple Additive Weighting method was successfully created using the Model View Controller concept.
- c. The results of the implementation using the MVC concept and without using the MVC concept are similar.

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