
DECISION SUPPORT SYSTEM FOR PROVIDING WORK ALLOWANCES AND PUNISHMENTS TO EMPLOYEES USING THE AHP AND SMART METHOD

Berti Sari Br Sembiring¹, Mahdianta Pandia², Fransisca Br Sebayang³, Harianta Sembiring⁴
bertisari0@gmail.com

Program Studi Sistem Informasi, STMIK Kristen Neumann Indonesia, Jl Jamin Ginting KM 10.5
Medan

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From the results of the study it can be concluded, among others: The decision support system that was built was very helpful to speed up data processing in decision making for the provision of work benefits and punishments to employees. The SMART method is a suitable method to be applied in decision making by sharing alternatives, especially determining the provision of work benefits and punishments to employees quickly and precisely. The level of accuracy of the test results using the SMART method is 100%. The decision support system application that is built is dynamic in terms of determining criteria and weighting. So, it can be changed according to the needs of the company in providing work benefits and punishments.

Keywords: AHP, SMART, Work Allowances, Punishments

1. Introduction

Human resources are a very central factor in the organization. Whatever form and purpose, the organization is made based on various visions for human interest. Similarly, in the implementation of its mission it is managed and managed by humans. Thus humans are a very strategic factor in all organizational activities. In order to be able to regulate and manage human resources based on the organization's vision so that organizational goals are achieved, knowledge, methods and approaches to human resource management are needed or often referred to as human resource management (Aullya Rachmawati, 2013: 1) .

The role of human resources or employees in an organization is very important. To increase enthusiasm, effectiveness, and comprehensive performance of human or employee resources, it is quite significant if at the end of one work period employee is given reward and punishment. Reward is an award or gift for something that has been achieved. Whereas punishment is a negative reinforcement, but it is needed in the company. Punishment referred to here is unlike imprisonment or cutting hands, but an educational punishment. Besides this punishment is also used as a tool to make employees aware of the right things. What punishment that everyone will give must have differences in perception and opinions. (Aullya Rachmawati, 2013: 1). Hairul Bahriah, Zara Yunizar (2016) This designed decision support system can speed up the process of rewarding and punishment, because this process is carried out automatically. Where the selection team inputs the data in the input section form correctly and in accordance with the existing provisions.

Rumiris Siahaan (2013) Reward and Punishment have a significant influence on work discipline. Through reward and punishment, employees feel that they can get attention, guidance, guidance, self-direction of their superiors, so that by themselves employees try to give the best to the company where they work. The better the application of reward and punishment, the better the employee's work discipline to the company. Endang Retnoningsih (2014) Decision Support System (SPK) WITH AHP method can be used in decision making for problems encountered in choosing a desktop web browser by providing criteria and alternatives.

Faizal, et al. (2017) The Smart Method Successfully Resolved the PKH Assistance Recipient Selection Problem with the Results of 20 People Who Successfully Entering the Decil 1 and 5 People

who were PKH Assistance Recipients. Criteria affect smart calculations, the more criteria used, the better the results obtained.

2. Method

Analytical Hierarchy Process (AHP) is a method of supporting decision making developed by Thomas L., when in 1980. AHP is a decision maker that describes a complex problem in the hierarchical structure with many levels consisting of objectives, criteria, and alternatives. The hierarchy is defined as a representation of a complex problem in a multilevel structure where the first level is the goal, which is followed by the level of factors, criteria, subcriteria, and so on down to the last level of the alternative. With a hierarchy, a complex problem can be described into its groups which are then arranged into a form of hierarchy so that the problem will appear more structured and systematic. Basically, the procedure or rare AHP method includes (Syahrani Dhimas Prabowo, Eko Budi Setiawan, 2013: 29):

1. Define the problem and determine the desired solution, then compile a hierarchy of the problems faced. The preparation of the hierarchy is to set goals which are the target of the system as a whole at the top level.

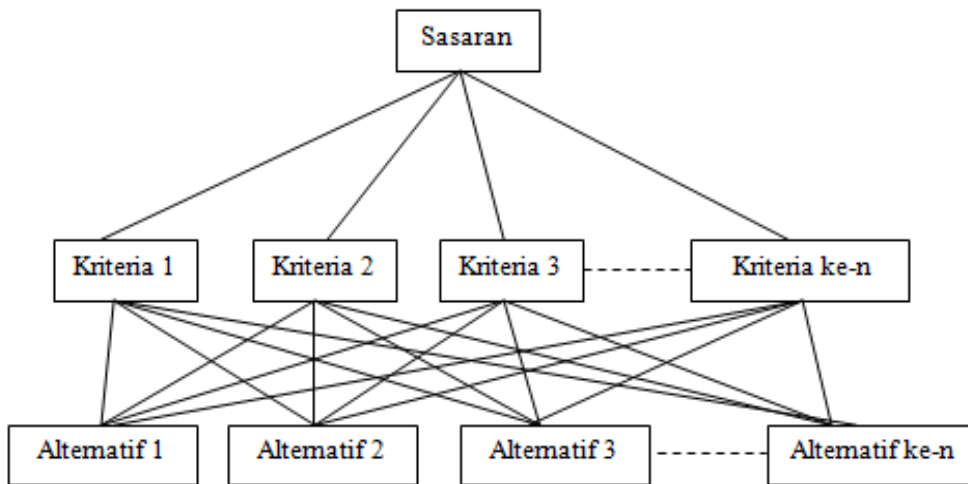


Figure 1. AHP hierarchical structure
(Source: Syahrani Dhimas Prabowo, Eko Budi Setiawan, 2013)

Smart (Simple Multi Multi Attribute Rating Technique) is a method in multi-criteria decision making developed by Edward in 1977. This multi-criteria decision making technique is based on theory that each alternative consists of a number of criteria that have values and each criterion has a weight Describe how important it is compared to other criteria. This weighting is used to assess each alternative in order to obtain the best alternative. Smart uses a linear adaptive model to predict the value of each alternative. Smart is a flexible decision making method. Smart is more widely used because of its simplicity in responding to the needs of decision makers and how to analyze responses.

The linear utility function model used by smart is as follows (Faizal, et al., 2017: 14):

$$Maximize \sum_j^k = 1 w_j . u_{ij} \quad \forall i = 1, 2, \dots, k \dots \dots \dots (3)$$

Where :

- w_j = weight normalization of the j th criteria.
- u_{ij} = utility value alternative i on criterion j .

3. Results and Discussion

Calculation of reward and punishment giving using the smart method. The method was chosen because the decision support method was based on the concept that finding alternatives to a number of optimal alternatives with certain criteria which in this case would provide rewards and punishment as expected. The process of calculating the weight of the utility value with the employee code of P001 in providing the reward and punishment is as follows:

- a. Weight Value Utility Attitude/Behavior

$$= \frac{\text{Nilai } utility \text{ Sikap / Perilaku} - \text{Minimal Nilai } utility \text{ Sikap / Perilaku}}{\text{Maksimal Nilai } utility \text{ Sikap / Perilaku} - \text{Minimal Nilai } utility \text{ Sikap / Perilaku}}$$

$$= = 0.37 \frac{0.2 - 0.07}{0.42 - 0.07}$$
- b. Communication Utility Value Weight

$$= \frac{\text{Nilai } utility \text{ Komunikasi} - \text{Minimal Nilai } utility \text{ Komunikasi}}{\text{Maksimal Nilai } utility \text{ Komunikasi} - \text{Minimal Nilai } utility \text{ Komunikasi}}$$

$$= = 0.57 \frac{0.24 - 0.08}{0.36 - 0.08}$$
- c. Neatness Utility Value Weight

$$= \frac{\text{Nilai } utility \text{ Kerapihan} - \text{Minimal Nilai } utility \text{ Kerapihan}}{\text{Maksimal Nilai } utility \text{ Kerapihan} - \text{Minimal Nilai } utility \text{ Kerapihan}}$$

$$= = 1 \frac{0.4 - 0.07}{0.4 - 0.07}$$
- d. Weight Value Utility Responsibility

$$= \frac{\text{Nilai } utility \text{ Tanggung Jawab} - \text{Min Nilai } utility \text{ Tanggung Jawab}}{\text{Maks Nilai } utility \text{ Tanggung Jawab} - \text{Min Nilai } utility \text{ Tanggung Jawab}}$$

$$= = 1 \frac{0.39 - 0.07}{0.39 - 0.07}$$
- e. Weight Value Utility Accuracy

$$= \frac{\text{Nilai } utility \text{ Ketelitian} - \text{Minimal Nilai } utility \text{ Ketelitian}}{\text{Maksimal Nilai } utility \text{ Ketelitian} - \text{Minimal Nilai } utility \text{ Ketelitian}}$$

$$= = 0.52 \frac{0.24 - 0.07}{0.4 - 0.07}$$
- f. Achievement Utility Value Weight

$$= \frac{\text{Nilai } utility \text{ Prestasi} - \text{Minimal Nilai } utility \text{ Prestasi}}{\text{Maksimal Nilai } utility \text{ Prestasi} - \text{Minimal Nilai } utility \text{ Prestasi}}$$

$$= = 0.46 \frac{0.24 - 0.12}{0.38 - 0.12}$$

The results of calculating the weight of the utility value of the accuracy with code P001 can be seen in Table 1.

Table 1.
Weight of Utility Value Criteria

Employee Code	Criteria Name	Utility Value Weight
P001	Attitude / Behavior	0.37
	Communication	0.57
	Neatness	1
	Responsibility	1
	Accuracy	0.52
	Performance	0.46

The process of calculating the weight of the utility value with the employee code of P002 in the reward and punishment as me:

- g. Weight Value Utility Attitude/Behavior

$$= \frac{\text{Nilai } utility \text{ Sikap / Perilaku} - \text{Minimal Nilai } utility \text{ Sikap / Perilaku}}{\text{Maksimal Nilai } utility \text{ Sikap / Perilaku} - \text{Minimal Nilai } utility \text{ Sikap / Perilaku}}$$

- $$= = 0.37 \frac{0.2 - 0.07}{0.42 - 0.07}$$
- h. Communication Utility Value Weight
- $$= \frac{\text{Nilai } utility \text{ Komunikasi} - \text{Minimal Nilai } utility \text{ Komunikasi}}{\text{Maksimal Nilai } utility \text{ Komunikasi} - \text{Minimal Nilai } utility \text{ Komunikasi}}$$
- $$= = 0.39 \frac{0.19 - 0.08}{0.36 - 0.08}$$
- i. Neatness Utility Value Weight
- $$= \frac{\text{Nilai } utility \text{ Kerapihan} - \text{Minimal Nilai } utility \text{ Kerapihan}}{\text{Maksimal Nilai } utility \text{ Kerapihan} - \text{Minimal Nilai } utility \text{ Kerapihan}}$$
- $$= = 0.21 \frac{0.14 - 0.07}{0.4 - 0.07}$$
- j. Weight Value Utility Responsibility
- $$= \frac{\text{Nilai } utility \text{ Tanggung Jawab} - \text{Min Nilai } utility \text{ Tanggung Jawab}}{\text{Maks Nilai } utility \text{ Tanggung Jawab} - \text{Min Nilai } utility \text{ Tanggung Jawab}}$$
- $$= = 0.37 \frac{0.19 - 0.07}{0.39 - 0.07}$$
- k. Weight Value Utility Accuracy
- $$= \frac{\text{Nilai } utility \text{ Ketelitian} - \text{Minimal Nilai } utility \text{ Ketelitian}}{\text{Maksimal Nilai } utility \text{ Ketelitian} - \text{Minimal Nilai } utility \text{ Ketelitian}}$$
- $$= = 0.33 \frac{0.18 - 0.07}{0.4 - 0.07}$$
- l. Achievement Utility Value Weight
- $$= \frac{\text{Nilai } utility \text{ Prestasi} - \text{Minimal Nilai } utility \text{ Prestasi}}{\text{Maksimal Nilai } utility \text{ Prestasi} - \text{Minimal Nilai } utility \text{ Prestasi}}$$
- $$= = 0 \frac{0.12 - 0.12}{0.38 - 0.12}$$

The results of calculating the weight of the utility value of the accuracy with the P002 code can be seen in Table 2.

Table 2.

Weight of Utility Value Criteria

Employee Code	Criteria Name	Utility Value Weight
P001	Attitude / Behavior	0.37
	Communication	0.57
	Neatness	1
	Responsibility	1
	Accuracy	0.52
	Performance	0.46
P002	Attitude / Behavior	0.37
	Communication	0.39
	Neatness	0.21
	Responsibility	0.37
	Accuracy	0.33
	Performance	0

1. Calculate Final Score

The process of calculating the final value of the P001 employee code from the provision of rewards and punishments is as follows:

Final Value = (normalization of attitude / behavior weight * attitude / behavior utility value weight) + (communication weight normalization * communication utility value weight) + (normalization of tidiness weight * tidiness utility value weight) + (normalization of responsibility weight * responsibility utility value weight) + (normalization of accuracy weight * weight of utility value of accuracy) + (normalization of achievement weight * weight of achievement utility value) =

$$(0.38 * 0.37) + (0.24 * 0.57) + (0.15 * 0.1) + (0.11 * 1) + (0.08 * 0.52) + (0.05 * 0.46) = 0.15 + 0.14 + 0.15 + 0.11 + 0.04 + 0.02 = 0.61$$

The process of calculating the final value of the P002 employee code from the provision of rewards and punishments is as follows:

Final Value =(normalization of attitude / behavior weight * attitude / behavior utility value weight) + (communication weight normalization * communication utility value weight) + (normalization of tidiness weight * tidiness utility value weight) + (normalization of responsibility weight * responsibility utility value weight) + (normalization of accuracy weight * weight of utility value of accuracy) + (normalization of achievement weight * weight of achievement utility value) = (0.38 * 0.37) + (0.24 * 0.39) + (0.15 * 0.21) + (0.11 * 0.37) + (0.08 * 0.33) + (0.05 * 0) = 0.14 + 0.09 + 0.03 + 0.04 + 0.03 + 0 = 0.34

Table 3.
Decision table

Score	Information
0 to 0.35	Giving Work Benefits
>=0.36 to 1	Rewards

The following is an assessment of the code P001 and P002 with the criteria of attitudes/behaviors, communication, neatness, responsibilities, accuracy, and achievements with the assessment that has been determined using the smart method. The final value of the calculation of reward and punishment is 0.61. Based on the weighting of the final value, it can be concluded that employees can give rewards with a value of 0.61 with the P001 code. While P002 won punishment with a final value of 0.34.

5. Conclusions

From writing a thesis entitled Supporting System for Giving Work Allowances and Punishment to Employees with the Application of AHP and Smart Methods, Conclusions can be as follows, The decision support system that was built is very helpful to accelerate data processing in decision making for reward and punishment to employees, Smart method is a suitable method to be applied in decision making by sharing alternatives, specifically determining reward and punishment to employees quickly and precisely. The accuracy of the test results using the Smart method is 100%, Application of decision support systems built is dynamic to the determination of criteria and weighting. So, it can be changed according to the needs of the company in providing rewards and punishment

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