JoCoSiR
Journal of Computer Science Research
ISSN 2986-2337 (Online)

The Best Caregiver at SOS Children's Villages Using a Decision Support System

Muhammad Iqbal[a], Maulisa Syahputri[b]

[a,b]*Master of Information Technology, Pancabudi Development University, Medan, Indonesia*
Email: [a]muhammadiqbalpb@gmail.com, [b] maulisa.syahputri@gmail.com

ARTICLE INFO

Keywords:
Best Caregiver;
Decision Support System;
SOS Children's Villages;.

IEEE style in citing this article:
M. Iqbal and M. Syahputri, "The Best Caregiver at SOS Children's Villages Using a Decision Support System", *JoCoSiR: Jurnal IlmiahTeknologiSistemInformasi*, vol. 3, no. 1, pp. 17-23, 2025.

ABSTRACT

This study focuses on the development and implementation of a Decision Support System (DSS) designed to determine the best caregiver at SOS Children's Villages. The main objective is to enhance efficiency and objectivity in the decision-making process related to caregiver performance evaluation. The research methodology includes collecting caregiver performance data, analyzing organizational needs, and applying an appropriate decision-making model. The DSS developed in this study utilizes Artificial Intelligence (AI) techniques to process and analyze performance data, generate performance scores, and identify the best caregiver based on predetermined criteria. The results show that the implementation of the DSS improves the objectivity of performance evaluations and provides significant support in the decision-making process. With this system, the organization is expected to better identify and optimize the potential of each caregiver, thereby increasing productivity and strengthening the competitiveness of SOS Children's Villages in Medan. The collected data is processed and evaluated using the Simple Additive Weighting (SAW) method. The results are presented in the form of rankings and scores for each caregiver, facilitating a more accurate and transparent decision-making process. This study is expected to contribute positively to improving the efficiency and effectiveness of human resource management at SOS Children's Villages.

1. Introduction

The rapid advancement of technology has significantly contributed to human life, facilitating various daily activities such as working, learning, shopping, and other tasks. This development has driven continuous human progress over time. Within this context, computers play a crucial role in the creation of various intelligent systems designed to support effective decision-making processes. Such systems are capable of addressing complex problems that cannot be solved manually by humans and are widely known as Decision Support Systems (DSS).

SOS Children's Villages, located at Jalan Seroja Raya No. 150, Medan Tuntungan District, Medan, is a social foundation with several branches across different cities. Through its subsidiary institutions, this organization focuses on providing care for children who have lost parental support. The foundation currently employs around 50 caregivers.

The main issue faced by the organization lies in the monitoring and evaluation of caregiver performance, which is still conducted manually. The foundation's staff must record assessment points on paper, which are later summarized at the end of the month. This manual process often leads to inefficiencies, including the accumulation and wastage of paper assessment sheets as well as the risk of losing or misplacing important evaluation records. Such conditions hinder the performance evaluation process, which is essential for managerial review and decision-making. Therefore, a technological solution in the form of a Decision Support System is needed to overcome these problems. One of the commonly applied methods in DSS development is the Simple Additive Weighting (SAW) method.

A study conducted by Henderi, titled *Decision Support System for Employee Performance Assessment by Applying the SAW Method at PT Gada Agni Indonesia*, demonstrated that the developed system effectively facilitated the company's decision-making process and provided results aligned with organizational expectations. The SAW method proved to be sufficiently accurate in assisting decision-making processes according to desired objectives [1].

Another study by July, titled *Decision Support System for Employee Performance Assessment for Promotion at PT SMS Cengkareng Barat Using the Profile Matching Method*, produced a system capable of addressing subjective biases often present in employee evaluations [2].

Furthermore, research by Christiana & Mailoa, entitled *Website-Based Employee Performance Assessment Decision Support System Using the TOPSIS Method*, developed a system that generates performance rankings, indicating the order of employee performance from best to lowest. The system also includes a report printing feature, allowing assessment results to be documented and archived effectively [3].

ISSN 2502-3357 (Online)

2. State of the Art

The development of Decision Support Systems (DSS) has become one of the main focuses in improving the efficiency and objectivity of caregiver performance evaluation processes in various institutions or organizations. Previous studies have made significant contributions to understanding and applying the DSS concept in the context of caregiver performance assessment.

One commonly used approach is the application of Artificial Intelligence (AI) techniques such as machine learning and data mining, which are utilized to process and analyze caregiver performance data effectively and efficiently. Findings from these studies indicate that the implementation of such technologies can enhance the accuracy and speed of decision-making, while also providing adaptive solutions to the dynamic changes in the work environment.

In addition, several studies have concentrated on developing more comprehensive performance evaluation models that consider various factors such as competence, achievement of work targets, and contributions to teams or projects. This approach helps to build a holistic evaluation framework that aligns with the specific needs of an organization or foundation.

However, the development of DSS for caregiver performance assessment still faces several challenges, including the integration of data from various sources, managing data uncertainty, and addressing ethical issues related to the use of technology in decision-making processes that affect individuals. Therefore, recent research seeks to overcome these challenges by developing new methods and designing more advanced and adaptive frameworks. Although significant progress has been achieved in this field, further research is still required to optimize the application of DSS in employee performance evaluation, particularly in specific organizational or industrial contexts. Consequently, this study is expected to enrich both the literature and practical applications in human resource management.

The Simple Additive Weighting (SAW) method, also known as the weighted summation method, is one of the most commonly used techniques in decision-making systems. The basic principle of the SAW method is to calculate the weighted sum of each alternative's performance across all predetermined attributes. In its application, this method requires the normalization of the decision matrix (X) so that each attribute can be compared on a uniform scale.

The SAW method belongs to the category of Multiple Attribute Decision Making (MADM), which is used to determine the best alternative among several options based on specific criteria. In this method, decision-makers assign weights to each attribute, and the total score of an alternative is obtained by summing the products of normalized rating values and their respective attribute weights. Each rating value must be dimensionless, meaning it has already undergone the normalization process [6].

Caregiver performance can be defined as the optimal work results achieved by an individual in fulfilling their responsibilities. It represents a combination of ability, opportunity, and effort, which can be measured through observable work outcomes. The behavior demonstrated by each individual reflects their job performance, in accordance with their duties and responsibilities as a caregiver. Employee performance plays a vital role in organizational development; the higher the quality of human resources, the better the performance produced. Ultimately, this enables the organization to compete effectively and grow toward achieving its primary objectives—becoming a better and more advanced institution. Therefore, caregiver performance is considered a crucial factor in supporting the success of the foundation.

In the professional context, compensation serves as a form of appreciation granted to caregivers for their services and contributions to the organization (Mangkunegara, 2001:83). In principle, compensation refers to the rewards caregivers receive as recognition for their completed work. It can be provided in both physical and non-physical forms, such as money, goods, or other types of rewards, either directly or indirectly. The types of compensation commonly given according to organizational policy include salaries, incentives, and bonuses. Providing such compensation can motivate caregivers to work more actively and enthusiastically for the advancement of the foundation. Based on this explanation, it can be concluded that compensation has a significant influence on caregiver performance—the better the compensation provided, the higher the caregivers' motivation and enthusiasm in carrying out their duties, which ultimately contributes to improved individual performance and overall organizational growth.

Work motivation is defined as the driving force that encourages individuals to exert their abilities, skills, energy, and time in performing their duties and responsibilities to achieve the goals and objectives established by the organization [7].

3. Method

In this study, an analysis was carried out to identify all system requirements and user requirements, which include inputs, outputs, and other types of information needed by system users. The implementation of the Simple Additive Weighting (SAW) method aims to obtain decision results in determining the best caregiver at SOS Children's Villages, based on the criteria established in the Service department.

In the context of a Decision Support System (DSS), there are three main variables used, namely :

1. Alternatives,
2. Criteria, and
3. Weights.

DOI: https://doi.org/10.65126/jocosir.v3i1

ISSN 2502-3357 (Online)

An *alternative* refers to the research object that becomes the subject of evaluation or consideration. Meanwhile, *criteria* are parameters or assessment aspects used in the evaluation process, such as attendance, loyalty, and discipline. In this study, the criteria considered include attendance, loyalty, discipline, attitude, and creativity.

The steps involved in applying the Simple Additive Weighting (SAW) method include :

1. Determining the alternatives,
2. Establishing the criteria, and
3. Assigning weights to each predetermined criterion.

Table 1. Total Datasets

Alternative	Name
A1	Elly
A2	Novita
A3	Aryani
A4	Despa
A5	Atayya
A6	Cahya
A7	Fanny
A8	Nanda
A9	Sartika
A10	Lili

Table 2. Weight Values

Alternative	Bobot
Not Good (NG)	1
Good (G)	2
Verry Good	3

Table 3. Criteria

No.	Criteria Code	Criteria	Values
1	K1	Presence	20
2	K2	Loyalty	10
3	K3	Discipline	25
4	K4	Attitude	30
5	K5	Creativity	15
	Total		**100**

Table 3. Criteria

No.	Criteria Code	Criteria	Criteria Sub	Values
			Absent > 7 Times (NG)	1
		Presence	Absent 3- 5 Times (G)	2
1	K1		Attended < 2 Times (VG)	3
			Not Willing to Accept Additional Work (NG)	1
		Loyalty	Accepting Additional Work with little restrictions(G)	2
2	K2		Completing Additional Work on Time (VG)	3
			Late Attendance > 1 Hour (NG)	1
		Discipline	Late Attendance < 30 Minutes (G)	2
3	K3		Timely Attendance (VG)	3
			Disrespectful (NG)	1
		Attitude	Polite But Indifferent (G)	2
4	K4		Polite and Friendly (VG)	3
			Not Creative (NG)	1
		Creativity	A little creative (G)	2
5	K5		Very Creative (VG)	3

Table 5. Exampleof Alternative Values

Criteria	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
K1	VG	G	VG	NG	VG	G	G	VG	G	G
K2	G	G	VG	G	VG	VG	G	NG	VG	G
K3	VG	VG	VG	G	G	G	G	NG	VG	NG
K4	VG	VG	G	VG	G	NG	G	NG	VG	VG
K5	G	NG	G	G	G	G	NG	G	G	NG

DOI: https://doi.org/10.65126/jocosir.v3i1

ISSN 2502-3357 (Online)

Table 6. Alternative Suitability Rating Foreach Criteria

No	Alternative	Criteria				
		K1	K2	K3	K4	K5
1	A1	3	2	3	3	2
2	A2	2	2	3	3	1
3	A3	3	3	3	2	2
4	A4	1	2	2	3	2
5	A5	3	3	2	2	2
6	A6	2	3	2	1	2
7	A7	2	2	2	2	1
8	A8	3	3	1	1	2
9	A9	2	3	3	3	2
10	A10	2	2	1	3	1

The normalization process is carried out by converting the decision matrix (X) into a normalized matrix (R), where each attribute value for a criterion (Xij) is divided by the maximum value of that criterion (Max Xij).
For Employee 1 (A1) Assessment

R11=3/(Max{3;2;3;1;3;2;2;3;2;2})=3/3=1
R12=2/(Max{2;2;3;2;3;3;2;3;3;2})=2/3=0,67
R13=3/(Max{3;3;3;2;2;2;2;1;3;1})=3/3=1
R14=3/(Max{3;3;2;3;2;1;2;1;3;3})=3/3 =1
R15=2/(Max{2;1;2;2;2;2;1;2;2;1})=2/2=1

For Employee 2 (A2) Assessment

R21=2/(Max{3;2;3;1;3;2;2;3;2;2})=2/3=0,67
R22=2/(Max{2;2;3;2;3;3;2;3;3;2})=2/3=0,67
R23=3/(Max{3;3;3;2;2;2;2;1;3;1})=3/3=1
R24=3/(Max{3;3;2;3;2;1;2;1;3;3})=3/3 =1
R25=1/(Max{2;1;2;2;2;2;1;2;2;1})=1/2=0,5

Carry out the same calculations for alternative employee evaluations from A3 to A10 to obtain the table shown below.

Table 7. Alternative Normalization Results

	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
K1	1	0.67	1	0.33	1	0.67	0.67	1	0.67	0.67
K2	0.67	0.67	1	0.67	1	1	0.67	1	1	0.67
K3	1	1	1	0.67	0.67	0.67	0.67	0.33	1	0.33
K4	1	1	0.67	1	0.67	0.33	0.67	0.33	1	1
K5	1	0.5	1	1	1	1	0.5	1	1	0.5

Next, a calculation process is carried out to obtain the final value (V), which is derived from the total sum of the preference weights W and the normalized matrix R that have been multiplied previously.

V1 = (1 *20) + (0,67 *10) + (1*25) + (1*30) + (1*15) = 96,6667
V2=(0,67*20)+(0,67*10)+(1*25)+(1*30)+(0,5*15)=82,50
V3 = (1 *20) + (1 *10) + (1*25) + (0,67*30) + (1*15) = 90,00
V4=(0,33*20)+(0,67*10)+(0,67*25)+(1*30)+(1*15)=75,00
V5=(1*20)+(1*10)+(0,67*25)+(0,67*30)+ (1*15)=81,6667
V6=(0,67*20)+(1*10)+(0,67*25)+(0,67*30)+(1*15)=65,00
V7=(0,67*20)+(0,67*10)+(0,67*25)+(0,67*30)+(0,5*15)=64,1667
V8 = (1 *20) + (1 *10) + (0,33*25) + (0,33*30) + (1*15) = 63,3333
V9=(0,67*20)+(1*10)+(1*25)+(1*30)+(1*15)=93,3333
V10=(0,67*20)+(0,67*10)+(0,33*25)+(1*30)+(0,5*15)=65,8333

Carry out identical calculations for employee alternatives A3 to A10 in order to generate the table shown below.

Table 8. Ranking

Alternative	Values	Rank
A1	96,6667	1
A9	93,3333	2
A3	90	3
A2	82,5	4
A5	81,6667	5
A4	75	6
A10	65,8333	7
A6	65	8
A7	64,1667	9
A8	63,3333	10

DOI: https://doi.org/10.65126/jocosir.v3i1

ISSN 2502-3357 (Online)

Based on the results of the calculations carried out, it was found that the alternatives with the highest scores in ranks 1 to 3 were A1 with a score of 96.6667, A9 with a score of 93.3333, and A3 with a score of 90.00, thus they were designated as the best employees.

4. Results and Discussion

The following are the results of the research developed in the form of a decision support system application, starting with the following display :

a. Login

The login page is the first page that appears when the application is run. On this page, the administrator can log in by entering the correct email and password. Once successful, the admin will be directed to the main page display. The appearance of the login page is as follows :

Figure 1. Login Form

b. Home Form

The home page appears after the administrator successfully logs in. This page displays several sections, including criteria data, sub-criteria data, weight data, assessment, calculations, and the final results.

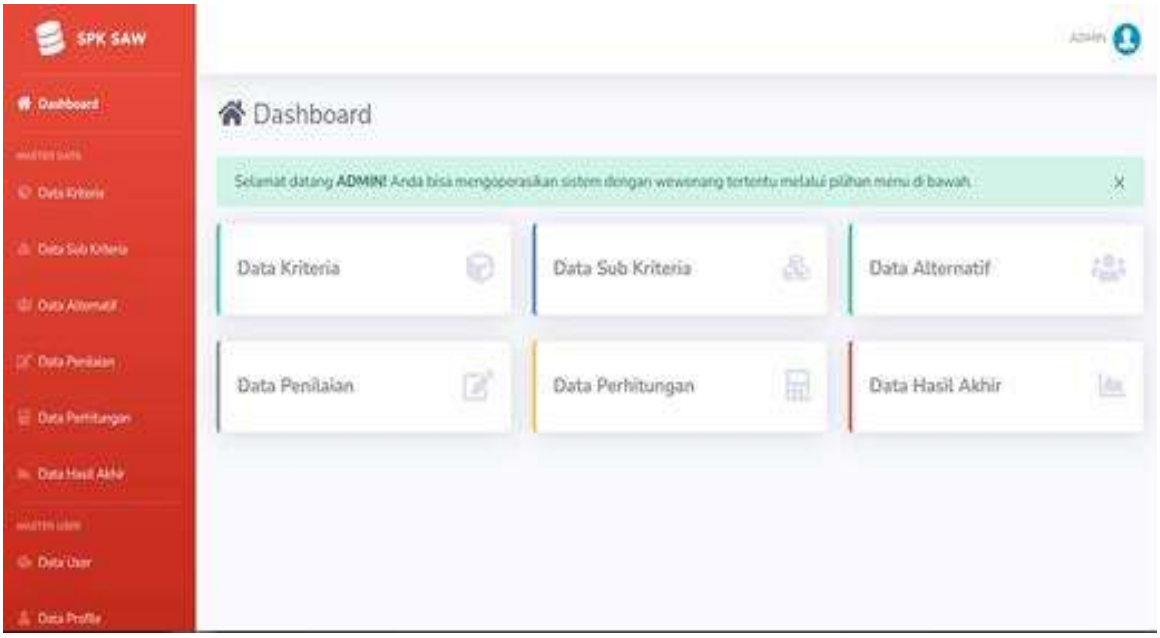

Figure 2. Home Form

DOI: https://doi.org/10.65126/jocosir.v3i1

ISSN 2502-3357 (Online)

c. Calculation Data Form

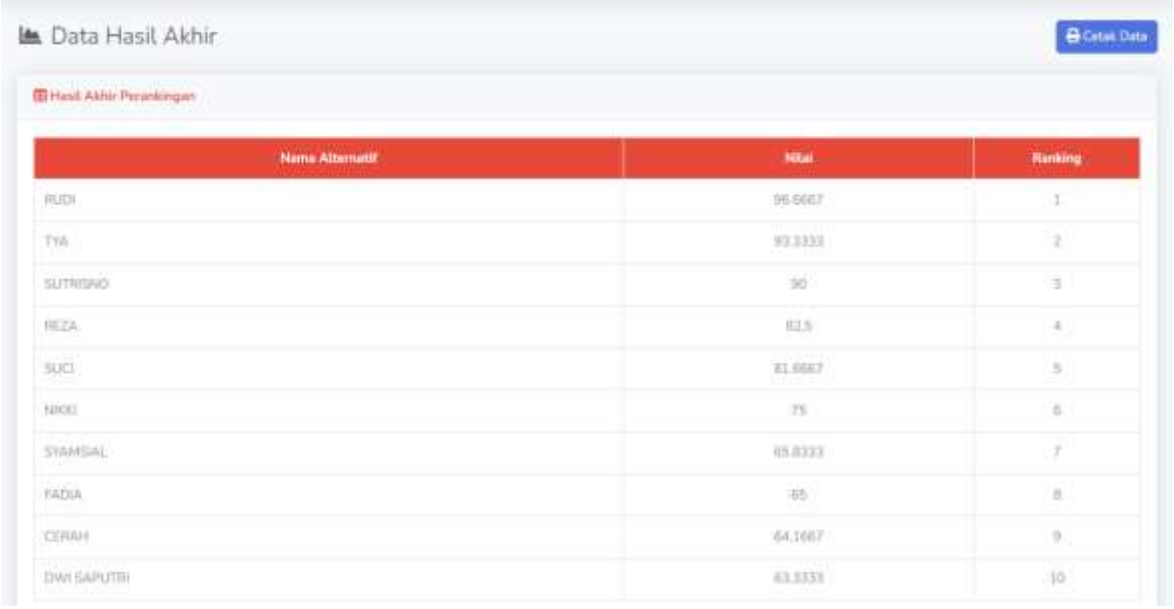

Figure 3. Calculation Data Form

5. Conclusions

This study concludes that in the research entitled "Implementation of a Decision Support System to Determine the Best Caregiver at SOS Children's Villages Medan," the following results were obtained : The developed system is able to assist the institution in determining the best caregiver more easily and objectively. The variables used in this study fall under the Benefit category without involving the Cost variable. There are five criteria used, with each weight determined by the institution through the interview process. The decision-making procedure has also been adjusted to match the data calculated manually by the related foundation.

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