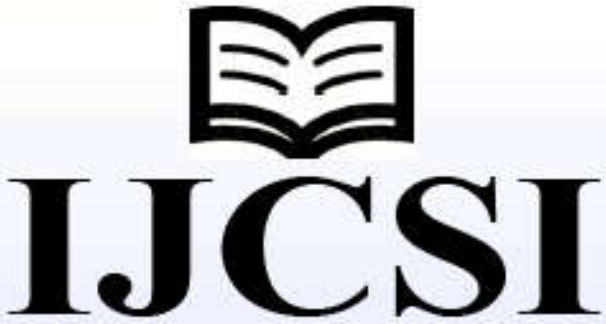

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Simple Additive Weighting Calculation Analysis for Bina Iman Anak Pandu School

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Abstract

Technology is currently growing very rapidly. With the development of these technologies, the latest information can be obtained more efficiently and effectively. Today's technology is widely used by organizations for computerized systems. The system is still done manually without computerization often occurs human error. With a computerized system, the human error can be reduced. Bina Iman Anak Pandu School is a kid church organization that often performs activities. Currently this organization is still doing its activities without a computerized system so that often occurred a problem caused by human error. Applications that will be created by the author is to reduce the problems that often occurs and help the teachers. The author will also use the Decision Support System with Simple Additive Weighting method to assist teachers in determining the best students in each class.

Keywords: *Church, Decision Support System, Simple Additive Weighting, System.*

1. Introduction

The development of technology also makes many organizations use a computerized system, so information can be obtained quickly. In addition, computerization can also minimize the human error that often occurs. Bina Iman Anak Pandu School is a Sunday school activity at Pandu church. This week's school activities can be done in church and out-of-church settings, if activities are conducted outside the church, then the Sunday school entry schedule may change. This Sunday school pupils are separated by age range, so the Pandu Bina Iman School has several classes, and in each class, there is a teacher

who will accompany the children to attend Sunday school event. Each class also has its own inventory; this inventory can be used to support Sunday school activity activities, students can also borrow inventory equipment if they do not carry the required equipment. The inventory may be borrowed during the weekly school activities, if the Sunday school activity is over, the student borrowing the inventory is obliged to return it.

Every Sunday school activity takes place, the Sunday school teacher will provide a stamp of attendance on a Sunday school book and on a children's religious book. Students can get rewards by answering questions given by the Sunday school teacher. Because the records are still manual, there are frequent miscommunications and unrecorded student points.

In each month, the secretary will report the financial statements to the Sunday school chairman. The financial statements contain income and expenditures from the Pandu Children's Faith School that month. Weekly income can be earned through collections held every Sunday school, or through donations. For school expenses there are two stages of school week:

1. Sunday school teachers apply receipt or bill of payment related to the Sunday school event,
2. The second stage is the approval of the treasurer.

At the end of the school year, the Sunday school teacher will determine the best student of each class for a prize. Students are selected only 1 person from each class. Because the assessment to determine the best students is still manual, the assessment becomes often subjective, so that a method is needed to help the Pandu Bina Iman School to determine the best students from each class based on predetermined criteria.

The Sunday school system is still manual, this week's school has various problems, such as parents becoming difficult to know what activities will be done in Sunday school, so sometimes there are students who come to Sunday school is not in accordance with the schedule that should be. In addition, teachers have difficulties in making financial statements, inventory, and student attendance, because it takes a long time and often a mistake in writing a nominal report. In the management of inventory, attendance, and financial often errors in nominal writing. For that required an application to handle the activities undertaken at the School of Faith Child Development Pandu.

2. Literature Review

2.1 Information System

Information Systems is a system within an organization that brings daily transaction management needs, supports operations, is managerial, and strategic activities of an organization and provides certain outside rights with the required reports [1]. The purpose of information systems is to present information for decision making on planning, organizing, organizing, controlling activities, subsystem operations, and presenting organizational synergies [2].

Computer based information system consists of the following components:

1. Hardware, hardware components to complete activities of data entry, data processing, and data output.
2. Software, programs and instructions provided to the computer.
3. Database, collection of data and information organized in such a way that is easily accessible to users of information systems.
4. Telecommunications, communication that connects between users of the system with computer systems together into an effective network.
5. Human, personnel of information systems, including managers, analysts, programmers, and operators, and responsible for system maintenance [2].

2.2 Decision Support System

Decision Support System (DSS) or decision support system is a computer-based information system that is useful for processing data and becomes information services a decision support of a semi-structured problem becomes specific [3]. Decision Support System is designed to support a decision in solving problems and evaluating opportunities. DSS can assist decision making that is complex and involves a lot of information by involving several measurable factors [4]. DSS is preferred to support management in carrying out analytical work in unclear and uncritical criteria conditions.

The purpose of the Decision Support System (DSS):

1. Assist managers in decision-making to solve semi-structured problems.
2. Supports managerial decisions, rather than alter or change those decisions.
3. Improve manager effectiveness in decision-making, rather than improving efficiency.

Stages of decision making process consists of the following steps:

1. Search Stage
   This stage is the process of searching, detection of the scope of problematics and the process of recognition of the problem. The data obtained is processed and tested to identify the problem.
2. Design Stage
   This stage is the process of discovering, developing and analyse possible actions. This includes understanding the problem and testing a feasible solution.
3. Election Stage
   At the stage a concrete decision is made and a commitment to follow a particular action.
4. Implementation Phase

2.3 Simple Additive Weighting

One method that implements Decision Support System (DSS) is Simple Additive Weighting (SAW). Simple Additive Weighting is chosen because it can determine the value of weight on each attribute, then in the next stage is select the best alternative. The SAW method is commonly referred to as a weighted sum method. In the SAW method it usually uses the weighted summing concept of all attributes in each alternative [5].

The advantages of the SAW method:

1. Determine the weight value for each attribute, then proceed with the process of refining that will select the best alternative.
2. Research will be more precise because it is based on predetermined criteria and pre-set weight. In the calculation by the SAW method it takes a normalization process from the original or raw data to a scale which is then compared on all the ratings of each alternative.

The basic concept of the Simple Additive Weighting (SAW) method is to find the weighted sum of the performance ratings of each alternative on all attributes. SAW method requires normalization [6].

3. Analysis and Design

3.1 Business Process

The business process in the information system is divided into sections, namely attendance presences, redemption points, schedule making, and determining the best students.

1. Presence
   This business process begins with students attending Sunday school events. If the student is enrolled, then the student will give a book absent to the Sunday school teacher to be stamped as the proof of presence, and the teacher will add the student absent. If it is not already registered, the student does not have the absentee book and needs to provide the self data for the Sunday school teacher to record. Upon completion of recording the identity of the new student, the Sunday school teacher will add the data to the student list. Then the Sunday school teacher will stamp and add the new student attendance list.
2. Point Redemption
   This process begins when the student asks to see the reward list, then the Sunday school teacher will give the student a list of prizes. Then the student will ask for the gift listed on the gift list, after which the Sunday school teacher will check the points and stock. If student points are sufficient and prize stock is available, the Sunday school teacher will present the gift to the student. If the points are not enough or the stock is not available, then the student needs to choose.
3. Schedule Creation
   The process of making the schedule begins with the planning of the monthly event schedule conducted by all Sunday school teachers. When finished designing the event, the secretary will record the schedule of the event. Then, the teachers will discuss about the officer in charge of the event. After finishing the discussion, the secretary will record officers at the event and distribute the schedule to all Sunday school teachers.
4. Determining the Best Student
   The business process begins when the class rises, the Sunday school teachers will have discussions to determine the best students to be rewarded. The Sunday school teachers will look at the student's historical list, then determine the best student.

3.2 Simple Additive Weighting Calculation Analysis

At Bina Iman Anak Pandu School, at the end of each year, students are selected from the best students of each class. The best student judgment for the moment is still subjective, therefore a method is needed to help determine the best student. For the best student criteria there are 4, namely age, attendance, points, and delays. Table 1 is the criterion that will be the reference for determining the best student. Table 2 is the reference data for determining the weight of the age criteria. Table 3 is the reference data for determining the weight of the criterion of points. Table 4 is the reference data for determining the weight of the attendance criteria. Table 5 is the reference data for determining the weights of the delay criteria. Table 6 is the student sample data. Table 7 is the weighted matching table for each alternative on each predefined criterion.

Table 1: Best Student Criteria

Criteria (C)	***Information***
C1	Age
C2	Presence
C3	Point
C4	Delays

Table 2: Age Criteria

Variable	***Weight***
Age 2	1
Age 3	0.75
Age 4	0.5
Age 5	0.25
Age 6	0

Table 3: Point Criteria

Variable	*Weight*
Point >500	1
Point 400-500	0.75
Point 300-400	0.5
Point 200-300	0.25
Point <200	0

Table 4: Presence Criteria

Variable	*Weight*
Presence 40-52	1
Presence 30-40	0.75
Presence 20-30	0.5
Presence 10-20	0.25
Presence < 10	0

Table 5: Delays Criteria

Variable	*Weight*
Delays 0-2	1
Delays 3-5	0.75
Delays 5-8	0.5
Delays 8-10	0.25
Delays >10	0

Table 6: Data Sample

Students	*Criteria*			
	C1	C2	C3	C4
Student 1	3	400	40	1
Student 2	4	450	30	2
Student 3	4	360	45	3

Table 7: Data Sample

Alternative	*Criteria*			
	C1	C2	C3	C4
Student 1	0.75	0.75	1	1
Student 2	0.5	0.75	0.75	1
Student 3	0.5	0.5	1	0.75

The next step is to normalize the data that has been matched weight.

C1
R11=0.75/0.75 = 1
R21=0.5/0.75 = 0.66
R31=0.5/0.75 = 0.66

C2
R12=0.75/0.75 = 1
R22=0.75/0.75 = 1
R32=0.5/0.75=0.66

C3
R13=1/1 = 1
R23=0.75/1 = 0.75
R33=1/1 = 1

C4
R14=1/1 = 1
R24=1/1 = 1
R34=0.75/1 = 0.75

Table 8: Normalization Result

Alternative	*Criteria*			
	C1	C2	C3	C4
Student 1	1	1	1	1
Student 2	0.66	1	0.75	1
Student 3	0.66	0.66	1	0.75

Table 8 is a table of normalization calculations. The ranking process:

Student 1:
(0,1x1) + (0,4x1) + (0,2x1) + (0,3x1) = 1
Student 2:
(0,1x0,66) + (0,4x1) + (0,2x0,75) + (0,3x1) = 0,916
Student 3:
(0,1x0,66) + (0,4x0,66) + (0,2x1) + (0,3x0,75) = 0,755

The result found that student 1 is the best student.

There are 6 roles, namely teacher, chairman, vice chairman, secretary, treasurer, and parent. Parents can view schedules, view songs, view gift lists, make gift requests, view points, view and change profiles, sign in, and change passwords. The schedule visible to parents is just a schedule for the current month. For the Sunday school chairman has the features of the management of the members of the Sunday school teacher, the management of the new school year, the management of the criteria for determining the best student, and the management of the week school teacher

position. The vice chairman has features for teacher management and management criteria to determine the best pupils.

The Sunday school treasurer can perform revenue management and expenditure management, on revenue management, the treasurer can check on the expenditure funds submitted by the Sunday school teacher and be able to approve the fund. The Sunday School secretary features for weekly event management schedules, weekly out-of-school events management, photo management for parent pages, song management, and student classroom management.

All the Sunday school teachers can sign in, do student management, inventory management, view weekly event schedules, view weekly out-of-school schedules, enroll students for week out-of-school events, add expenses by including proof of payment, view week school songs, attend weekly attendance presences, attendance at out-of-school events, add prize requests, approve gift requests, change passwords, and view and modify profiles.

4. Conclusions

The conclusions that the author obtained from the results of analysis, manufacture, and testing of this system are:

1. Information System for School of Faith Child Development Pandu can assist processing and storage of data attendance Sunday school because it has been computerized. The teacher does not need to bring the student attendance book back.
2. This system can manage revenue and expenditure, in addition to proof of payment also will not disappear though treasurer, because it is stored in the website storage.
3. This system can manage inventory data, minimize the loss of inventory in a class. Previously, inventory in each class was not recorded, causing frequent inventory loss, since the teacher did not count the amount of inventory that students restocked for weeks.
4. This system can perform the management of Sunday school activities, both weekly school week activities, as well as activities from outside the Sunday school. Thus, recording student attendance at out-of-school outings is easier. In addition, teachers can also see weekly programming as well as easier, since previously weekly events are only distributed through chat only.
5. The system can create reports in pdf format, including financial reports, inventory reports, prize reports, weekly school report reports and best student reports. The existence of this report is very helpful to the secretary and treasurer, because the report has been automatically created by the system, so the secretary does not need to create reports manually.

This system has the features to determine the best student. The determination of the best students is done by SAW method, with 4 criteria, namely age, attendance, points, and number of delays. This method helps the teachers of the Sunday School to determine the best students objectively.

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