Journal of Technology and Computer (JOTECHCOM)
Vol. 1, No. 3, August 2024, pp. 11~16
ISSN: 3048-0477 (Media Online)

Decision Support System to Determine the Accuracy of Price Estimation and Processing Time in Making Plaques Using the Simple Additive Weighting (SAW) Method

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Article Info

Article history:

Received July 16, 2024
Revised July 26, 2024
Accepted August 02, 2024

Keywords:

Decision Support System
Simple Additive Weighting

ABSTRACT

When in the business world an entrepreneur must have a goal to do business, namely how his business gets good profits by providing the goods and services needed to run his business process. Internet technology is currently developing very rapidly. The existence of the internet can support the expected goals to the maximum. Therefore Printing Adil Grafika is an entrepreneurial business engaged in printing. Printing Adil Grafika often experiences many obstacles in its business processes, namely frequent mistakes in making plaques in the form of price orders that do not match the capital costs in making plaques so that the company loses in buying the material, then the absence of price provisions that make only provide prices according to calculations, many complaints from customers about delays from the hour that should have been completed in making plaques, as well as many customer complaints about other errors. With these various problems, an application is needed to determine the price of the plaque processing time fund so that it matches the standard price and processing time in the printing company adil grafika. The research method used is a data collection method consisting of field research and library research while the system development method used is the simple additive weighting (SAW) method. The results of system testing using black box testing show that the system runs according to the expected results. The result is a Decision Support System to Determine the Accuracy of Estimated Price and Working Time in Plaque Making Using the Saw Method which can reduce complaints from customers and can make it easier for companies to determine the price of plaques, on time workmanship, and also follow standards in making plaques. [1]

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1. INTRODUCTION

By entering the world of globalization, humans are familiar with increasingly advanced and modern technology to facilitate various activities in life. Advances in transportation, communication, health, education, and other fields are examples of examples that humans increasingly need technology in this life. Currently, the world has recognized a technology called the internet. With the internet, everyone can communicate with other people in different parts of the world. Through the internet, everyone can obtain and convey various

information needed anytime and anywhere. Now with the presence of the internet, humans can do business more easily. [2]

According to the results of research conducted by Pandu Pratama Putra et al entitled "Decision Support System for Determining Blt Recipients Using the Saw Method". With the design and manufacture of the Cash Langsuang Assistance Determination Decision Support System, this application can be used and assist in determining recipients of direct cash assistance in Sidomulyo Village, in the calculations in the system the results are the same as manual calculations so that with this system it will be more effective and efficient. [3]

When failing to determine the price of production capital can result in high losses for the company in making plaques so that it does not match the benefits obtained by the company and is interrelated when the price is not appropriate to make the work longer because it does not match the target previously desired. With the problems faced by Adil Grafika Printing, a decision support system is needed in determining the accuracy of prices and processing time. this is very important because with this system it will be able to help with existing obstacles. The price will be stable and the processing time will be much faster and more effective because it is in accordance with the standards that have been made. [4]

2. METHOD

Decision Support System (DSS) is a computer-based information system that approaches to produce various alternative decisions in helping certain parties, and handles problems using data and models. [5] According to the Big Indonesian Dictionary, analysis is an investigation of an event (essay, action, and so on) to find out the real situation (causes, sitting the case, and so on). According to Komaruddin, analysis is a thinking activity to decompose a whole into components so that it can recognize the signs of the components, their relationship with each other and their respective functions in an integrated whole. [6]

According to Umar, analysis is a work process from a series of stages of work before research is documented through the report writing stage. According to Darminto, et al, analysis is defined as the decomposition of a subject into its various parts and the study of the parts themselves, as well as the relationship between the parts to obtain a precise understanding and understanding of the meaning of the whole. Based on the quotation above, analysis is an activity that contains a number of activities such as parsing, distinguishing, sorting out something to be classified and regrouped according to certain criteria and then looking for connections and interpreting their meaning. In other words, analysis is a set of activities, activities and processes that are interrelated to solve problems or break components into more detail and recombine them and then draw conclusions. [7]

The Simple Additive Weighting method or better known as SAW is a calculation method that is carried out by determining alternatives where each alternative will be assessed based on criteria that have also been determined and have been given a weight on each criteria assessment. The Simple Additive Weighting (SAW) method is a weighted summation method. [8] The basic concept of the SAW method is to find a weighted sum of the performance ratings on each alternative across all attributes. The SAW method requires normalizing the decision matrix (X) to a scale that can compare with all alternative ratings provided. The SAW method requires the decision maker to determine the weight for each attribute. The total score for alternatives is obtained by summing up all the results of the multiplication between the rating and the weight of each attribute. The formula used to perform normalization is as follows: [9]

$$r_{ij} = \begin{cases} \dfrac{x_{ij}}{Max_i(x_{ij})} \\ \dfrac{Min_i(x_{ij})}{x_{ij}} \end{cases}$$

Description:
Rij = Normalized performance rating of alternative Ai on attribute Cj :i=1,2, ...,m and j=1,2, ...,n
Max Xij = The largest value of each criterion i
Min Xij = The smallest value of each criterion i
Xij = The attribute value of each criterion
Benefit = If the largest value is the best
Cost = If the smallest value is the best
Preference formula
$Vi = \Sigma\, Wj.Rij$
Description:
Vi = Ranking for each alternative
Wj = Rank weight value (of each alternative)
Rij = Value of normalized performance rating The greater value of Vi indicates that alternative A is more chosen. [10]

Simple Additive Weighting (SAW) completion steps: [11]
a. Determine the criteria needed to be used as a reference in decision making.
b. Determine the alternative suitability rating on each required attribute.
c. Make a decision matrix based on criteria, then normalize the matrix based on equations that are adjusted to the type of attribute (profit attribute or cost attribute) so that a normalized matrix is obtained.
d. The final result is obtained from the ranking process, namely the summation of the multiplication of the normalized matrix R with the weight vector so that the largest value is selected as the best alternative as a solution. [12]

In research, a research method is needed, the research method used by the author is the waterfall method, the waterfall method is one of the software development models in the SDLC model. The waterfall model is often called the linear sequence model or classic life flow. System development is done sequentially starting from analysis, design, coding, testing and supporting stages. [13]

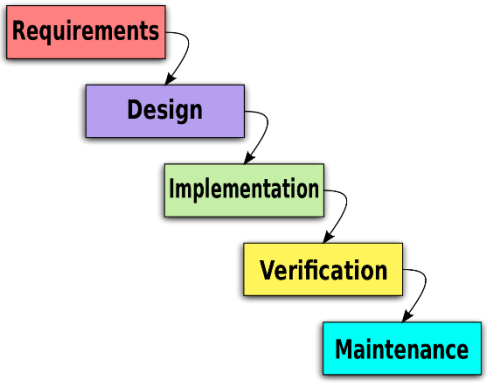

Figure 1. Waterfall Method

3. RESULTS AND DISCUSSION

Printing is a process of printing writing commonly referred to as photocopying or printing images for masks that are pressed using a heating press consisting of sublimation transfer paper paper material which is placed on the mask that you want to print so that it produces good prints. Printing is an important part of publishing. Many books, newspapers, brochures and magazines today are usually printed using offset printing techniques. [14]

Adil Grafika is a company engaged in printing. This company was founded and is managed by Mr. Nasrun. Printing Adil Grafika was established in 2008 which he immediately plunged into building and pioneering from the bottom of his company. He has experienced hardships and joys in building his business, Alhamdulillah for his hard work he was able to successfully establish Adil Grafika Printing. [15]

The system that is being used is still with the old system, but with the new system it can make a much better change. For more details about the old system can be seen in the table below: [16]

Table 1. Current System Analysis Table

NO	OLD SYSTEM	NEW SYSTEM
1	The process of recording, selling, purchasing, and stock-taking placards still uses books, so this is prone to errors resulting in inaccurate information generated.	The process of recording, selling, purchasing, and stock-taking of plaques that have been computerized so that they can provide a more accurate system.
2	It takes a long time to make a report because you have to recap the report data manually.	In making reports the time to be used is faster with the new system
3	In the process of making plaques, we still use a manual system so that the work on the plaque will take longer.	By using the new system, it will be faster and more effective in making plaques.

4	When customers order plaques, they still give a predicted time and price without giving a definite time and price.	Using the new system will provide more accurate time and prices because it is computerized in detail.
5	Penggunaan bahan-bahan dalam pembuatan plakat yang terkadang dapat merugikan perusahaan di karenakan tidak sesuai memberikan harga kepada pelanggan	The use of materials in the manufacture of plaques that can sometimes harm the company because it is not appropriate to provide prices to customers.

This decision support system uses the PHP programming language, then uses the sublime text editor. So that this system can run and be completed, for that the following are the results and discussion.

1) Login Page

The login display is a display that will appear for the first time after running the program which contains an email form and password to enter the dashboard page. Can be seen in the picture below:

Figure 2. Login Page

2) Dashboard Page

The dashboard page is a page that will appear after logging in as for the image can be seen below:

Figure 3. Dashboard page

3) Plaque Order Data Page

The plaque order data page is a page that contains all the data that has been ordered by the customer so that this data can be known by customers who are ready to work on it, as for the image can be seen below:

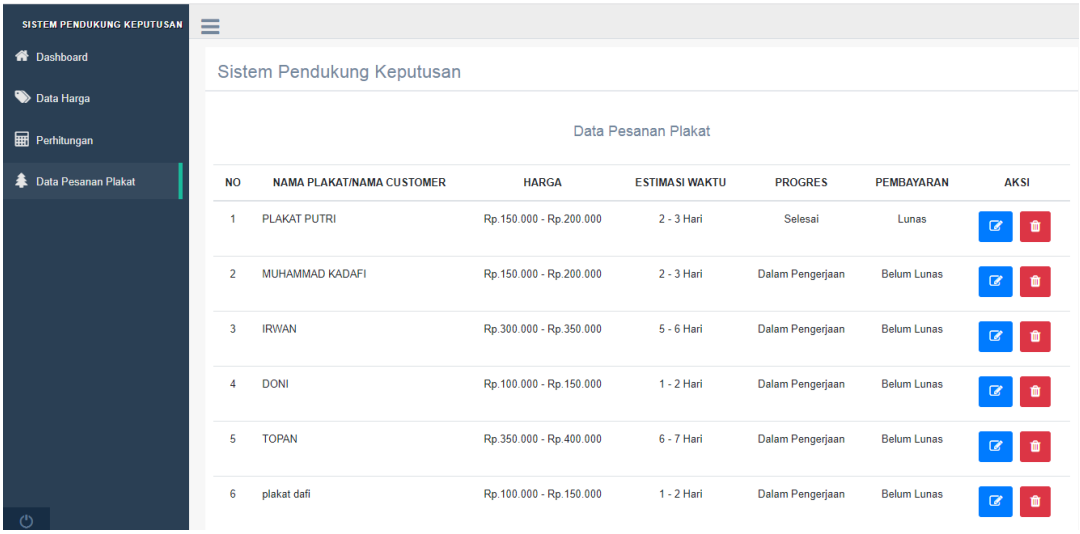

Figure 4. Plaque Order Data Page

4. CONCLUSION

This research aims to develop and implement a Decision Support System (DSS) using the Simple Additive Weighting (SAW) method to improve the accuracy of price estimation and processing time in making plaques. Based on the results of research and data analysis, it can be concluded as follows:

1) Effectiveness of SAW Method:
   The implementation of SAW method in DSS is proven to be effective in determining the estimated price and processing time of plaques. This method allows the integration of various assessment criteria objectively, resulting in a more accurate estimate compared to the manual method.
2) Improved Estimation Accuracy:
   DSS with SAW method is able to increase the accuracy of price and time estimation. By normalizing and weighting criteria such as material, size, design, and workmanship complexity, the system produces estimates that are close to the actual realization, thus minimizing the difference between the estimate and the final result.
3) Efficiency of Estimation Process:
   The implementation of DSS with SAW method shows an increase in efficiency in the estimation process. The system simplifies and accelerates the estimation calculation process, significantly reducing the time needed to determine the price and time of work.
4) Objectivity and Transparency:
   SDM with SAW method increases objectivity and transparency in the estimation process. The system reduces subjectivity that often occurs in manual methods, so the estimation results are more accountable and easily understood by customers and management.
5) System Validity:
   The validation conducted by comparing the manual estimation results and the estimation results using DSS shows a high level of conformity. The system is able to produce estimates that are consistent and in accordance with historical data of plaque work.

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