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Decision Support System for Determining the Level of Employee Salary Increase at PT. Srikandi Inti Lestari Medan by Using the Simple Additive Weighting (SAW) Method

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ABSTRACT

Employees are seen as one of the company's important assets and need to be managed and developed to support the survival and achievement of company goals. One form of employee organization that can be carried out by the company is to provide remuneration or salary payments suitable for employees. Salary increases greatly affect employee motivation and productivity in carrying out and completing their work. To determine the amount of salary increase, a system is needed that can support decision making by managers. Utilization of decision support systems using Simple Additive Weighting (SAW) method is very helpful for managers in making decisions that are faster and more accurate. The basic concept of SAW method is look for weighted sums of performance ratings on each alternative and on all attributes that require a decision matrix normalization process (X) a scale that can be compared with all available alternative ratings. This method was chosen because it was able to select the best alternative from a number of alternatives based on the specified criteria. Research was carried out by examining the weights for each attribute and then ranking it which would determine the optimal alternative.

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1. INTRODUCTION

PT. Srikandi Inti Lestari Medan is a company that pays employees through the bank every month. The salary amount is calculated based on the position of each employee, if it is among managers, supervisors and leaders, the salary received is in accordance with the criteria for each individual assessment which is carried out every year, while the operator's salary is fixed by the UMK every year. The Regency/City minimum wage (UMK) is prepared by the Regency/City government concerned. In addition to the UMK, the determination of the operator's salary is also calculated based on working hours. The company has also determined the amount of remuneration provided to employees, if the

working hours exceed the working hours limit that has been set. So the salary received by employees is also greater [1].

Based on the results of research conducted. The payroll system that has been carried out so far has been in accordance with the procedure. However, there are still data collection carried out using a manual system which is most likely to cause calculation errors for each individual. The large number of employees and the calculation of working hours are different, so the payroll system that still uses this manual system often has an impact on delays in employee payroll every month.

The development of technology and information that continues to progress rapidly can be used to facilitate all activities within the company [2] [3]. Decision support systems are part of a computer-based information system that is included in a knowledge-based system or knowledge management that can be used to support decision making in an organization or company [4] [5] [6]. Decision support systems can help decision makers with data information that has been processed relevantly and needed to make decisions about a problem more quickly and accurately [7] [8] [9].

Simple Additive Weighting (SAW) is a method for making decisions using various criteria and assessments for each criterion, so the basic concept of the SAW method is to find the weighted sum of the performance ratings on each alternative and on all attributes that require a normalization process. decision matrix (X) to a scale that can be compared with all available alternative ratings [10] [11] [12] [13]. The SAW method was chosen because it is able to select the best alternative from a number of alternatives based on the specified criteria.

By using a decision support system, the SAW method is estimated to be able to overcome the problems that arise at PT. Srikandi Inti Lestari Medan, namely by determining the decision criteria for the level of employee salary increases, collecting employee data based on predetermined criteria so that it can be calculated using the SAW method. and an application was built to make it easier to determine the level of salary increase decisions for each employee.

According to Kusumadewi (2006:74) in his book entitled "Fuzzy Multi Attribute Decision Making", the SAW method is often also known as the weighted addition method. The basic concept of the SAW method is to find the weighted sum of the performance ratings for each alternative on all attributes. The SAW method requires the process of normalizing the decision matrix (X) to a scale that can be compared with all existing alternative ratings [14] [15] [16].

2. RESEARCH METHODS

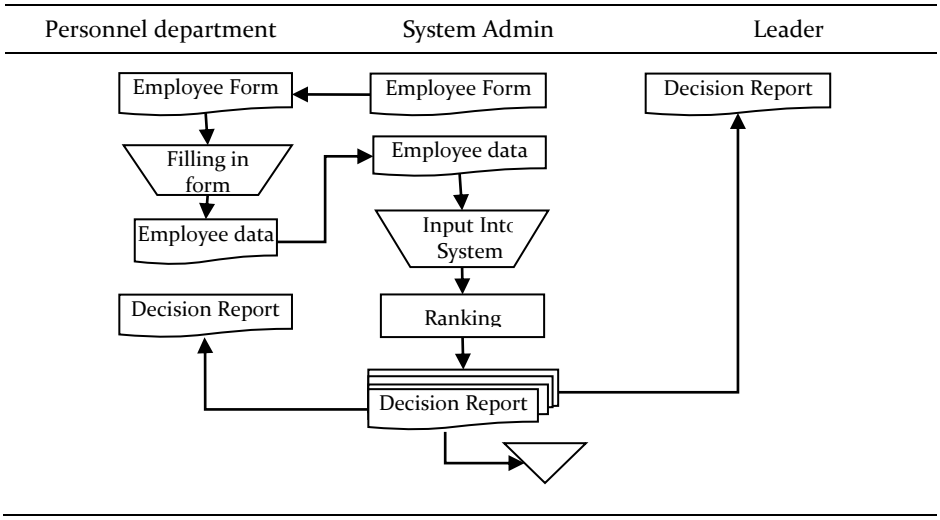
Several research methods were carried out by the author in order to collect the data needed for research needs. Among them is by way of observations made by the author directly at the research site. For more details below, the authors explain the research methods that the authors use, namely: correlational; evaluation; survey; case study; basic theory

2.1 System Requirements Analysis

Based on the results of observations made by the author on the case study company, the author describes the system requirements in the form of a flow of document, as shown in the table below:

Table 1. Flow Of Document System Requirements

Personnel department	System Admin	Leader



Based on observations, the analysis of system requirements can be seen from the flow of document table above, the system requires employee data form documents as input data so that the system can perform the ranking calculation process using the SAW method.

2.2 Simple Additive Weighting (SAW) Method

The SAW method is often also known as the weighted addition method. The basic concept of the SAW method is to find the weighted sum of the performance ratings for each alternative on all attributes. The SAW method requires the process of normalizing the decision matrix (X) to a scale that can be compared with all existing alternative ratings. The formula for the Simple Additive Weighting (SAW) method can be seen below:

$$r_{ij} = \begin{cases} \dfrac{x_{ij}}{Max\ x_{ij}} \ Jika\ j\ adalah\ attribut\ keuntungan\ (benefit) \\ \dfrac{i}{Min\ x_{ij}} \\ \dfrac{i}{x_{ij}} \ jika\ j\ adalah\ attribut\ biaya\ (cost) \end{cases} \quad \text{..... (1)}$$

Description:

rij = normalized performance rating value
xij = attribute value owned by each criterion
Max xij = the largest value of each criterion
Min xij = the smallest value of each criterion
Benefits = if the largest value is the best
cost = if the smallest value is the best

Where rij as the normalized performance rating of alternative Ai on attribute Cj ; i=1,2,...,m and j=1,2,...,n . The preference values for each alternative (Vi) can be seen below:

$$V_i = \sum_{j=1}^{n} W_j \ r_{ij} \quad \text{..... (2)}$$

Description:

Vi = ranking for each alternative
Wj = weight value of each criterion
rij = normalized performance rating value

A larger Vi value indicates that alternative Ai is preferred.

2.3 Steps to Solve Using the SAW Method

The steps for solving problems using the Simple Additive Weighting (SAW) method according to Kusumadewi (2006:74):

a. Determine the criteria that will be used as a reference in decision making, namely Ci.
b. Determine the suitability rating of each alternative on each criterion.

c. Make a decision matrix based on the criteria (Ci), then normalize the matrix based on the equation that is adjusted to the type of attribute (profit attribute or cost attribute) in order to obtain a normalized matrix R.
d. The final result is obtained from the ranking process, namely the addition of the normalized matrix multiplication R with the weight vector so that the largest value is chosen as the best alternative (Ai) as the solution.

3. RESULTS AND DISCUSSION

3.1 System Implementation

a. Software Requirements

The software requirements used to run the system created are as follows:

Table 2. Software

No	Software Name	Specification
1	Operating system	Windows 7 32/64 bit
2	.Net Framework	3.5 or higher
3	Microsoft Access	2007
4	Visual Studio	2008 or 2010
5	Microsoft OleDB	12.0

b. Hardware Requirements

The hardware requirements used for the smooth running of the system are as follows:

Table 3. Hardware

No	Hardware Name	Specification
1	Processor	Intel Atom 1.1 Ghz or higher
2	RAM	2Gb or higher
3	HDD	128Gb or Higher
4	Monitor	14 Inch
5	Keyboard	There is
6	Mouse	Optional

Hardware is needed for the smooth process of implementing the system, if the hardware specifications are below the standard specified in the table above, it is possible that the system will run smoothly.

3.2 System Implementation Stages

To implement the system, it is necessary to carry out the stages of implementation, namely as follows:

a. Login form

The login form is required for authentication of users who may and may not use the system, the system that is allowed to access the system is a user who has a username and password obtained from the administration system.

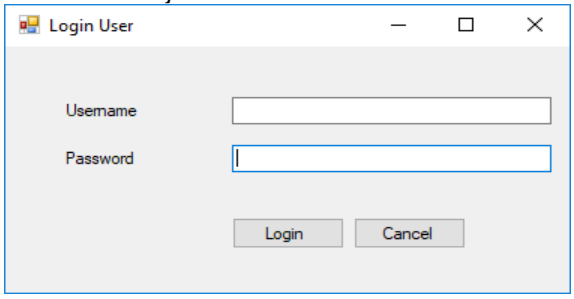


Figure 1. Login Form

b. Main Menu Form

The main menu form will open after the user who has logged in successfully, while the function of the main page is to contain menus that can call each page needed for system purposes.

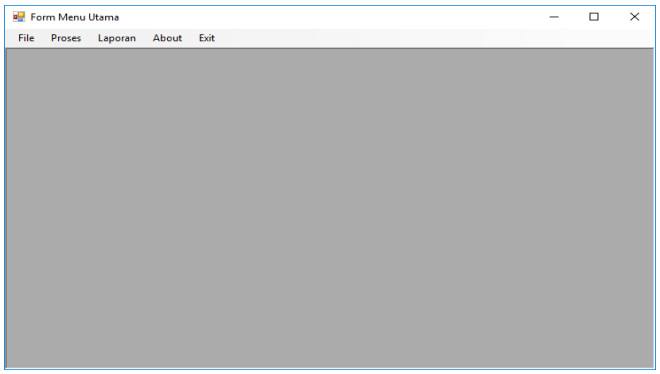


Figure 2.Main Menu Form

c. Employee data

Employee data forms are required to fill out and add employees who will be ranked in the system, additional employees can be accessed by filling out the form and clicking the save button, then changes to employee data can be made by clicking the edit, delete or new button.

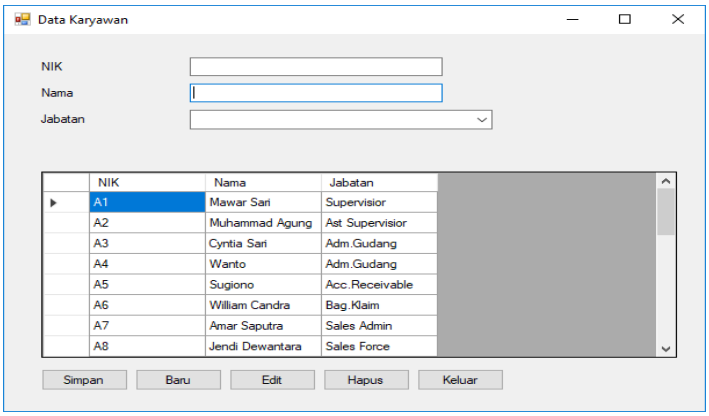


Figure 3. Employee Data Form

Meanwhile, to exit the employee data form page, the user can click the exit button. The employee data form above will be directly connected to the database, so by making changes to employee data, other data related to employee data such as ranking data will also automatically change.

d. Rating Data

The assessment data form can be accessed from the main menu form by clicking on the file menu and the assessment data. While the function of the assessment data is to conduct an assessment of each criterion for each employee, the assessment is carried out by filling in the criteria numbers which can be seen in the fuzzy table in the previous chapter. The numbers in the criteria column will directly affect the ranking results resulting from calculations using the SAW method.

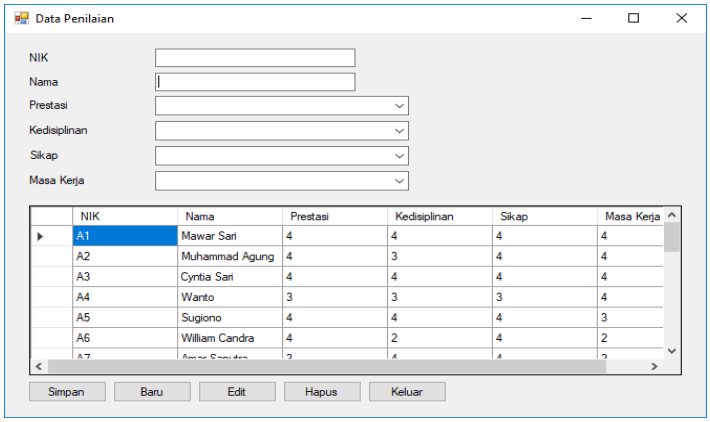


Figure 4. Assessment Data Form

e. Ranking Data

The ranking data form can be accessed from the main menu form by clicking on the process menu and ranking data. While the function of the ranking data form is to calculate and see the highest ranking data as indicated by the percentage increase in salary, the largest salary increase is 0.15 or equal to 15%, while a 0.1 increase in line is the same as a 10% increase in salary.

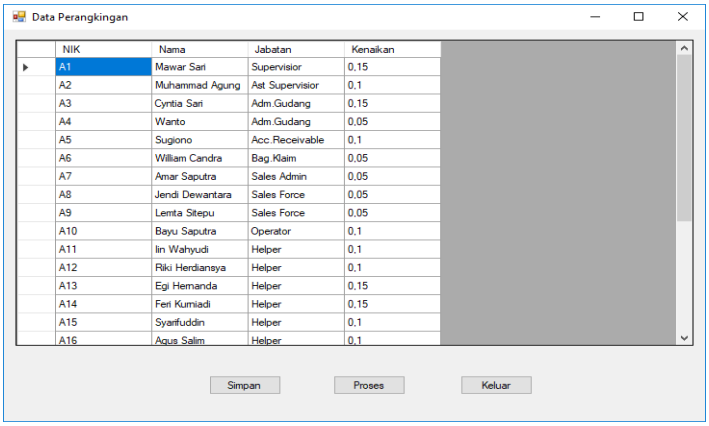


Figure 5. Ranking Data Form

From the results of tests carried out on the system and comparing it with the results of manual calculations, it can be seen that the results of the two calculations are the same and there is no difference at all, it can be concluded that the system built is running as expected or in accordance with the specified goals. For the ability of the system to rank, it depends on how much alternative data is to be calculated, the more alternative data that is calculated, it is natural that the slower the system works, but as far as the authors carry out the test, there are no significant obstacles that can hinder the running of the system.

4. CONCLUSION

The conclusions obtained from writing this thesis are as follows

The process of determining the level of salary increases begins with inputting employee data, inputting assessment data then processing by ranking until results are obtained and then the rate of increase is determined, after which the increase (output) is processed in the form of a report.

The application of the Simple Additive Weighting (SAW) method in making decisions to determine the level of salary increases is done by finding the weighted sum of the criteria for each alternative and on the attributes that require normalization of the decision matrix, then a ranking

process is carried out to the preference value to determine the alternative that gets an increase. salary between 5% - 15% or not getting a raise at all.

The decision support system for determining the level of salary increase is designed using the Unified Modeling Language (UML) with Microsoft Visual Basic 2008 (VB.Net) programming language and Microsoft Access 2007 database.

REFERENCES

[1] A. Mulyapradana, S. Psi, and M. B. A. Muhammad Hatta, *Pekerja Melek Hukum; Jadi Karyawan Kaya*. Visimedia, 2016.

[2] S. Maharsi, "Pengaruh Perkembangan Teknologi Informasi Terhadap Bidang Akuntansi Manajemen," *J. Akunt. dan Keuang.*, vol. 2, no. 2, pp. 127–137, 2000.

[3] A. Sudirman *et al.*, *Sistem Informasi Manajemen*. Yayasan Kita Menulis, 2020.

[4] M. Syafrizal, "Sistem Pendukung Keputusan (Decisin Support System)," *Data Manaj. dan Teknol. Inf.*, vol. 11, no. 3, p. 77, 2010.

[5] A. Muharsyah, S. R. Hayati, M. I. Setiawan, H. Nurdiyanto, and Y. Yuhandri, "Sistem Pendukung Keputusan Penerimaan Jurnalis Menerapkan Multi-Objective Optimization On The Basis Of Ratio Analysis (MOORA)," *JURIKOM (Jurnal Ris. Komputer)*, vol. 5, no. 1, pp. 19–23, 2018.

[6] R. Ahmad, "Penggunaan Sistem Pendukung Keputusan Dengan Menggunakan Metode Analytical Hirarchy Process (AHP) Dalam Menyeleksi Kelayakan Penerima Beasiswa," *METIK J.*, vol. 2, no. 1, pp. 28–33, 2018.

[7] S. Pami, "Sistem Pendukung Keputusan Pemilihan Karyawan Terbaik Dengan Metode Promethee (Studi Kasus: PT. Karya Abadi Mandiri)," *Pelita Inform. Inf. dan Inform.*, vol. 6, no. 1, pp. 125–128, 2017.

[8] M. Angeline, "Sistem Pendukung Keputusan Pemilihan Karyawan Terbaik Menggunakan Metode Profile Matching," *J. Ilm. Smart*, vol. 2, no. 2, pp. 45–51, 2018.

[9] R. Yunitarini, "Sistem Pendukung Keputusan Pemilihan Penyiar Radio Terbaik," *J. Mikrotek*, vol. 1, no. 1, pp. 43–52, 2013.

[10] F. Nugraha, B. Surarso, and B. Noranita, "Sistem Pendukung Keputusan Evaluasi Pemilihan Pemenang Pengadaan Aset dengan Metode Simple Additive Weighting (SAW)," *J. Sist. Inf. Bisnis*, vol. 2, no. 2, pp. 2377–2502, 2012.

[11] E. L. Ruskan, A. Ibrahim, and D. C. Hartini, "Sistem Pendukung Keputusan Pemilihan Hotel Di Kota Palembang Dengan Metode Simple Additive Weighting (SAW)," *JSI J. Sist. Inf.*, vol. 5, no. 1, 2013.

[12] S. Abadi and F. Latifah, "Decision Support System Penilaian Kinerja Karyawan Pada Perusahaan Menggunakan Metode Simple Additive Weighting," *J. TAM (Technology Accept. Model.*, vol. 6, pp. 37–43, 2017.

[13] N. Nuraeni, "Penerapan Metode Simple Additive Weighting (Saw) Dalam Seleksi Calon Karyawan," *Swabumi*, vol. 6, no. 1, pp. 63–71, 2018.

[14] R. Fauzan, Y. Indrasary, and N. Muthia, "Sistem Pendukung Keputusan Penerimaan Beasiswa Bidik Misi di POLIBAN dengan Metode SAW Berbasis Web," *J. Online Inform.*, vol. 2, no. 2, pp. 79–83, 2018.

[15] P. Setiaji, "Sistem Pendukung Keputusan Dengan Metode Simple Additive Weighting," *Simetris J. Tek. Mesin, Elektro dan Ilmu Komput.*, vol. 1, no. 1, pp. 59–67, 2012.

[16] T. Limbong, "Implementasi Metode Simple Additive Weighting (SAW) Untuk Pemilihan Pekerjaan Bidang Informatika," *Proceeding SNIKOM*, vol. 3, no. 5, pp. 6–7, 2013.