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Decision Support System for Admission of New Employees with Weighting Method (Weight Product Model)

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Abstract

Firli Group is an e-commerce and digital marketing company. At every new employee recruitment, Firli Group is still manual or semi-computerized, making it difficult to determine prospective new employees. Therefore, we need a system that can be petrified to facilitate decision making, namely by using the Weight Product Model (WPM). WPM is a model of Decision Support System (DSS), namely by ranking, this analysis is carried out with a sample of 5 people. Decision support system on the acceptance of new employees, is expected to help the company.

Keywords: Decision Support System, Employee Recruitment, Weight Product Model

1. Introduction

The development of information technology (IT) at this time is so rapid, all fields have used technology to make work easier. Maybe some people use technology as a lifestyle, the proof is that technology is a necessity at work and in everyday life, especially the benefits of information technology. Technology continues to develop every year, technology will determine the future development of the industry every year. because the development of technology is very useful for business. It is important for business people to know the development of technology continuously (Sims et al., 2010). Information systems and technology are very important in business, Information technology can help business. The benefits are many, increasing the efficiency and effectiveness of business processes, managerial decisions and work group collaboration (Simatupang & Sridharan, 2008).

Firli Group is a company in the field of e-commerce and digital marketing, located in Building B, Bandung Techno Park Jl. Telekomunikasi No 1 Dayeuh Kolot, has 35 employees, 10 Coctumer Service team work form home (WFH) and 25 people work Work Form Office (WFO). carry out various brands such as firli fashion, miniplant.id, QuranFidaus.com, BYS, Digitrain, and Probiz.id. To do this work, employees who are able to work professionally are needed, every new employee acceptance must be carried out in a good and right way to work.

In the selection process for recruiting new employees at Firli Group, there are 6 criteria including: communication skills, expertise, work experience, age, psychological tests and interviews. acceptance of new employees at Firli Group if any employee resigns.

The problems at Firli Group in recruiting employees are as follows:

a) The recruitment process is not effective, because the system used is still manual or not yet computerized.
b) Employee acceptance is still subjective, which causes it to not meet expectations

To solve the problem, a decision support system (DSS) is needed as a solution, especially in the process of accepting new employees in the company. DSS was first delivered by G. Anthony Gorry and Michael S. Scott Morton, they developed a framework of thinking about the benefits of computer applications in the decision-making process at the management level. Based on the framework that decision support systems are related to information systems or analytical models, to obtain accurate information (Power, 2002). DSS is a system in processing data and information for decision makers. Processed data is a predetermined variable (Vercellis, 2011). The system must be easy to understand, easy to use and easy to apply (Dey, 2001). Decision Support System (DSS) is used in decision making and how to solve problems using several problem solving methods (Turban, 2001).

2. Literature Review

2.1. Information

An information system is an organized combination of people, hardware, software, communications networks and data resources used to collect, transform and disseminate information within an organization (Al-Mamary et al., 2014). Information is data that is processed to make it more useful and meaningful to the recipient and to reduce uncertainty in the process of making decisions about a situation.

2.2. System Characteristics

A system consists of parts that are interconnected and operate to achieve a goal. A system is not just a collection of irregularly arranged elements, but a system composed of elements with complementary aims and purposes. According to (Amanov & Umirova, 2022) the system must have the following characteristics:

a) Components
b) Environment
c) Boundary
d) Interfaces
e) Input system
f) Output system
g) Processing system
h) Target systems

2.3. Recruitment

Finding competent prospective employees is not easy. One of the obligations of company leaders is to choose the best prospective employees who are able to contribute to the company. Recruitment is making prospective employees interested in becoming part of a company or organization and occupying the job position to be applied for (Brown et al., 2004).

2.4. Decision Support System

Decision support systems are closely related to information systems or analytical models designed to assist decision makers and professionals to obtain accurate information (Zhang et al., 2022). Decision support system is a system based on a model in which there are steps in processing data and information and considering them so that the goals desired by decision makers can be achieved. The system must be easy to understand and easy to use and can be easily applied.

Decision Support System Components:

a) Data Management
b) Model Management
c) Communication

Knowledge Management

3. Materials and Methods

3.1. Materials

3.1.1. Object of Research

Firli Group is a company in the field of e-commerce and digital marketing, located in Building B, Bandung Techno Park Jl. Telekomunikasi No 1 Dayeuh Kolot, has 35 employees, 10 Coctumer Service team Work Form Home (WFH) and 25 people work Work Form Office (WFO). carry out various brands such as firli fashion, miniplant.id, QuranFidaus.com, BYS, Digitrain, and Probiz.id. To do this work, employees who are able to work professionally are needed, every new employee acceptance must be carried out in a good and right way to work.

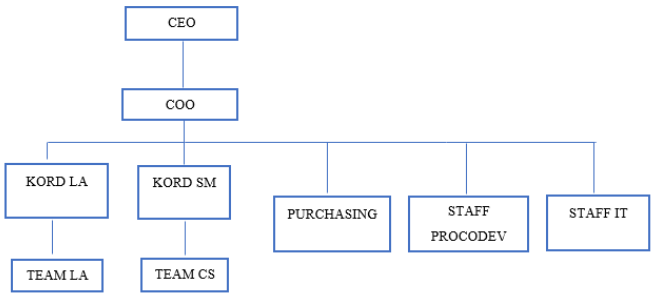

Figure 1: Firli Group Organizational Structure

3.1.2. Data Collection

Data collection techniques in research at the Firli Group:

a) Interview
b) Observation
c) Library Studies

3.1.3. Data source

Source of data obtained:

a) Primary Data
   Primary data is a source of data obtained directly based on research problems. In collecting primary data, interview and observation methods were used
b) Secondary Data

Secondary data obtained indirectly or through intermediaries to obtain information. Secondary data in the form of documentation, records, and archives owned by the Firli Group company.

3.2. Methods

Methods are techniques that are well generalized to be accepted and linked to practice. Research methods are needed as a guide when carrying out research. This is intended so that research is conceptualized and well-directed (Kernberg, 2006). Survey is one of the research methodologies that aims to determine certain attributes/variables carried out through measurement.

In this study, the method used is the quantitative descriptive method with data collection techniques of observation, interviews and literature study and the use of new employee recruitment data sourced from Firli Group as supporting data for new employee recruitment using the WPM data processing method. Approach to empirical studies to collect, analyze, and display data in numerical rather than narrative form (Yilmaz, 2013). Kanban comes from the Japanese word meaning 'signboard' or 'signboard', is one of the models in project management by creating an image or visualization using boards, columns, and cards to manage tasks and workflows effectively and planned (Ikonen et al., 2011).

WPM is a weighting method generally used for decision making such as for example: determining teacher performance and determining employee performance appraisal. This method is based on the process of calculating the weighting of the values of the criteria and alternatives that have been determined which will produce output in the form of decisions that are accurate, fast, and precise based on the criteria and alternatives that have been determined

3.2.1. Structure

Research articles should be divided into the sections listed below. Principal sections should be numbered consecutively (1. Introduction, 2. Materials and methods, etc.) and subsections should be numbered 1.1., 1.2., etc. Do not number the Acknowledgements or References sections.

Manuscripts must be written in English. Contributors who are not native English speakers are strongly advised to ensure that a colleague fluent in the English language or a professional language editor has reviewed their manuscript. Concise English without jargon should be used. Repetitive use of long sentences and passive voice should be avoided. It is strongly recommended that the text be run through computer spelling and grammar programs. Either British or American spelling is acceptable but must be consistent throughout.

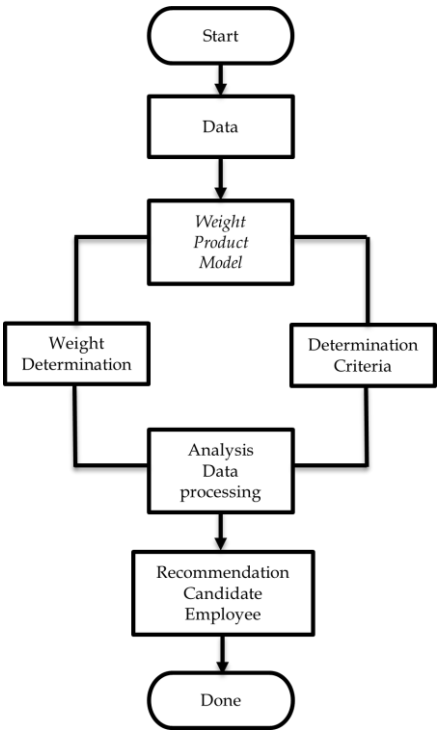

Figure 2: Framework

Decision Support System (DSS) has the ability to solve unstructured problems and is designed to be interactive with the user and is a development of a computerized management system. WPM is a weighting method used for decision making, such as determining employee performance appraisals. The WPM method uses multiplication to relate attribute ratings, each attribute must be raised to the power of the weight of the attribute in question. This process is the same as the normalization process (May & Finch, 2009). This method is based on the process of calculating the weighting of the values of the criteria and alternatives that will result in an accurate, fast, and precise decision based on pre-determined alternative criteria. The steps in the WPM method are as follows:

a) Determine the criteria that will be used as a reference in decision making (Cj, j = 1, 2, ..., m).
b) Determine the initial weight for each criterion. The initial weight value (w) is used to indicate the level of importan cerelatively of each criterion. This initial weight value is determined by the decision maker who determines the level of importan cerelatively each criterion. There are several ways that are usually done to determine this initial weight, including:

a) By providing parameter values for each criterion; or
b) Give a weight between 0 -100 which means the importance of each criterion.

Normalize the initial weight value by dividing each w value, by the total wj value. Normalization or improvement of this weight produces a normalized value of w; = 1 where j = 1,2, ..., n is the number of alternatives and wj;

The total value of the weights. There are 2 properties possessed by the initial weight based on the nature of each criterion, namely benefits and costs. To achieve the ideal solution, the criteria that have the nature of benefit value will be maximized (positive value) while the criteria that have the nature of cost will be minimized (value negative).

Normalization w $=\frac{wj}{\sum wj}$

c) Determine the value of the vector (S)

$S = \left(Wij^{Awj}.W\right)\left(Win^{Awn}.W\right)$

The value of this vector (S) is obtained by raising the value of the attribute owned by each criterion with the results of normalization of weights with a positive rank for the benefit criterion and a negative rank for the cost criterion.

d) Determine the value of the vector (V)

$$\boldsymbol{V_{Jn} = \frac{Si}{\sum Si}}$$

Information	:	
V	:	The alternative preferences are analogous to the vector V
W	:	Criteria/sub-criteria weight
j	:	Criteria

i	:	Alternative
n	:	Number of criteria
S	:	Alternative preferences are analogous to vector S
		Vector V is an alternative preference that will be used for ranking by dividing each number of vector values S by the number of all vectors S

4. Results and Discussion

The following is a table of criteria that has been determined by the Firli Group company in accepting new employees as Table 1.

Table 1: Employee Acceptance Criteria

Criteria	Information	Weight
C1	Communicating Ability	5
C2	Skill	4
C3	Work experience	4
C4	Age	3
C5	Written test	3
C6	Interview	3

Source: Firli Group (2022)

Then look for criteria that are worth profit and cost. If it is worth profit then the attribute value is fixed (positive) and if it is worth the cost it will change to (negative). In the above case all attributes are positive. The normalization of the rank weights is obtained from the number of "w" divided by each value from the predetermined criteria, namely by the formula:

$$\text{Wj} = Wj = \frac{wj}{\sum wj}$$

$$W1 = \frac{5}{5+4+4+3+3+3} = \frac{5}{22} = 0.23$$

$$W2 = \frac{4}{5+4+4+3+3+3} = \frac{4}{22} = 0.18$$

$$W3 = \frac{4}{5+4+4+3+3+3} = \frac{4}{22} = 0.18$$

$$W4 = \frac{3}{5+4+4+3+3+3} = \frac{3}{22} = 0.14$$

$$W5 = \frac{3}{5+4+4+3+3+3} = \frac{3}{22} = 0.14$$

$$W6 = \frac{3}{5+4+4+3+3+3} = \frac{3}{22} = 0.14$$

$$\sum w = 0.23 + 0.18 + 0.18 + 0.14 + 0.14 + 0.14 = 1$$

weight normalization results as Table 2:

Table 2: Weight Normalization Results

Criteria	Information	Weight	Weight Normalization
C1	Communicating Ability	5	0.23
C2	Skill	4	0.18
C3	Work experience	4	0.18
C4	Age	3	0.14
C5	Written test	3	0.14
C6	Interview	3	0.14
	AMOUNT	**22**	**1**

Next, look for the value of the vector "S", to find the value of the vector "S" it is necessary to determine the alternative first and the assessment of each alternative according to the criteria that have been determined. Alternative is a representation of prospective new employee data which is converted into variables A1, A2, A3 and so on. The following is an alternative table based on data obtained from employee recruitment on January 1, 2022 as Table 3 until Table 5:

Table 3: Research Alternative Data

Alternative	Name
A1	Muhammad Chalil Gilbran
A2	Riri Anisa Arisdila
A3	Fikri Al Farisi Rihaldian Abdurachman
A4	Mohamad Hanif Fariska
A5	Wilda Mardhiani

Table 4: Research Alternative Assessment Data

Alternative	Criteria					
	C1	C2	C3	C4	C5	C6
A1	70	80	1 year	21 years	70	70
A2	60	80	2 years	26 years	70	70
A3	75	55	1 year	25 years	70	70
A4	40	80	3 months	26 years	55	80
A5	85	70	2 years	25 years	69	70

Table 5: Data on the Suitability of Each Alternative

Alternative	Criteria					
	C1	C2	C3	C4	C5	C6
A1	4	5	1	1	4	4
A2	4	5	2	4	4	4
A3	4	3	1	3	4	4
A4	3	5	1	4	3	5
A5	5	4	2	3	4	4

Calculation of vector value (S) as follows:

$$S = \left(Wij^{Awj}.W\right)\left(Win^{Awn}.W\right)$$

$S_1 = (4^{0.23})\,(5^{0.18})\,(1^{0.18})\,(1^{0.18})\,(4^{0.14})\,(4^{0.14}) = 3.3$
$S_2 = (4^{0.23})\,(5^{0.18})\,(2^{0.18})\,(4^{0.18})\,(4^{0.14})\,(4^{0.14}) = 4.02$
$S_3 = (4^{0.23})\,(3^{0.18})\,(1^{0.18})\,(3^{0.18})\,(4^{0.14})\,(4^{0.14}) = 3.3$
$S_4 = (3^{0.23})\,(5^{0.18})\,(1^{0.18})\,(4^{0.18})\,(3^{0.14})\,(5^{0.14}) = 3.61$
$S_5 = (5^{0.23})\,(4^{0.18})\,(2^{0.18})\,(3^{0.18})\,(4^{0.14})\,(4^{0.14}) = 3.89$

Specifying the value of the Vector (V):

$$V_{Jn} = \frac{Si}{\sum Si}$$

$$V_1 = \frac{3.3}{3.3 + 4.02 + 3.3 + 3.61 + 3.89} = \frac{3.3}{18.12} = 0.182$$

$$V_2 = \frac{4.02}{3.3 + 4.02 + 3.3 + 3.61 + 3.89} = \frac{4.02}{18.12} = 0.221$$

$$V_3 = \frac{3.3}{3.3 + 4.02 + 3.3 + 3.61 + 3.89} = \frac{3.3}{18.12} = 0.182$$

$$V_4 = \frac{3.61}{3.3 + 4.02 + 3.3 + 3.61 + 3.89} = \frac{3.61}{18.12} = 0.199$$

$$V_5 = \frac{3.89}{3.3 + 4.02 + 3.3 + 3.61 + 3.89} = \frac{3.89}{18.12} = 0.214$$

The final value for each alternative, can be seen in the following Table 6:

Table 6: Final Value Data

Alternative	Name	Results	Information
A1	Muhammad Chalil Gilbran	0.182	Not Entering Employee Recruitment Qualifications
A2	Riri Anisa Arisdila	**0.221**	**The highest rank value (Enter the qualification for employee recruitment)**
A3	Fikri Al Farisi Rihaldian Abdurachman	0.182	Not Entering Employee Recruitment Qualifications
A4	Mohamad Hanif Fariska	0.199	Not Entering Employee Recruitment Qualifications
A5	Wilda Mardhiani	0.214	Not Entering Employee Recruitment Qualifications

Based on Table 6 above, it can be explained that the highest rating value was achieved by alternative 2 named Riri Anisa Arisdila with a value of 0.221, so that A2 can be concluded as being included in the qualification for employee recruitment at Firli Group with calculations using the WPM method.

5. Conclussion

Based on the research that has been done on the "Decision Support System for Admission of new employees at Firli Group with the weight product model method", the conclusion is that a decision support system can be implemented in Firli Group, the new employee recruitment system is more effective, efficient, becomes more objective and transparent.

Suggestions for further system development can add the number of criteria according to need, the system is used not only for new hires and is implemented in a program or application. So that the existence of technology can be felt by many parties both in terms of benefits and ease of use.

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