IMPLEMENTATION OF THE WEIGHT PRODUCT METHOD IN THE SYSTEM NEW STUDENT ADMISSION

Siti Nurhasanah Nugraha [1] ; Rangga Pebrianto [2] ; Fani Nurona Cahya [3] ; Irwan Herliawan [4]

[1.] Information Systems
Universitas Nusa Mandiri
nusamandiri.ac.id
[1] siti.nhg@nusamandiri.ac.id

[2.3] Information System
Universitas Bina Sarana Informatika
bsi.ac.id
[2] rangga.rpo@bsi.ac.id , [3] fani.foc@bsi.ac.id

[4] Informatics
Universitas Nusa Mandiri
nusamandiri.ac.id
[4] irwan.ien@nusamandiri.ac.id

Abstract — The development of information technology is something that cannot be separated from life today. The development of information technology, especially the internet, is certainly welcomed by all circles, and has even penetrated the world of education since the last few years, thus creating competitive competition in every educational institution. Currently, there are not many schools in Indonesia that hold new student admissions (PPDB) by utilizing the online system. Of course, this will take a very long time, because after selecting the prospective students, the committee must recap the names and grades of the students accepted. We need a system that will support decisions in the selection of new student admissions so that the resulting output is more accurate. To solve this problem, it is necessary to have a decision support system for the selection process for new admissions using the Weight method Products . From the results of calculations with 4 criteria, namely C1 Mathematics, C2 English, C3 Indonesian and C4 Tadarus which were applied to 4 alternative students as samples, it showed that students who had a vector value of more than 0.250 were declared to have passed the PPDB selection. And from the results of calculations that have been carried out there are 3 students who have passed the selection, while 1 student is declared not to have passed the selection. With this method the PPDB selection calculation will be more objective because the calculation is based on predetermined weights and assessment criteria. So that the creation of an optimal system that will facilitate the PPDB selection process.

Keywords : New Student Admission , Decision Support System , Weight Products.

Intisari — Perkembangan teknologi informasi merupakan suatu hal yang tidak lepas dari kehidupan saat ini. Perkembangan teknologi informasi khususnya internet tentunya disambut dengan baik oleh semua kalangan, bahkan telah merambah ke dunia pendidikan sejak beberapa tahun terakhir, sehingga menciptakan persaingan yang kompetitif di setiap lembaga pendidikan. Saat ini belum banyak sekolah di Indonesia yang menyelenggarakan penerimaan peserta didik baru (PPDB) dengan memanfaatkan sistem online. Tentunya hal ini akan membutuhkan waktu yang sangat lama, karena setelah menyeleksi calon siswa tersebut panitia harus merekap ulang daftar nama dan nilai siswa yang diterima. Diperlukannya sebuah sistem yang akan mendukung keputusan dalam seleksi penerimaan peserta didik baru sehingga output yang dihasilkan lebih akurat. Untuk memecahkan masalah tersebut diperlukan adanya suatu sistem pendukung keputusan proses seleksi penerimaan siswa baru dengan menggunakan metode Weight Product. Dari hasil perhitungan

dengan 4 kriteria yaitu C1 Matematika, C2 Bahasa Inggris, C3 Bahasa Indonesia dan C4 Tadarus yang diterapkan pada 4 alternatif siswa sebagai sampel menunjukkan bahwa siswa yang memiliki nilai vektor lebih dari 0.250 dinyatakan lulus seleksi PPDB. Dan dari hasil perhitungan yang telah dilakukan terdapat 3 siswa yang dinyatakan lulus seleksi, sementara 1 siswa dinyatakan tidak lulus seleksi. Dengan metode ini perhitungan seleksi PPDB akan lebih objektif karena perhitungan berdasarkan bobot dan kriteria-kriteria penilaian yang telah ditentukan. Sehingga terciptanya sebuah sistem optimal yang akan mempermudah proses seleksi PPDB.

Kata Kunci : Metode Weight Product, Penerimaan Peserta Didik Baru, Sistem Pendukung Keputusan.

INTRODUCTION

The development of information technology is something that cannot be separated from life today. With the information, it is possible to make the right decision to do a plan and can make it easier to manage company activities effectively and efficiently (Prasetyo et al., 2018) . The development of information technology, especially the internet, is certainly welcomed by all circles, and has even penetrated the world of education since the last few years (Witanto & Solihin, 2016) . This of course creates competitive competition in every educational institution.

Currently, there are not many schools in Indonesia that hold new student admissions (PPDB) by utilizing the *online system* . According to (Budiarti et al., 2018) , "the existence of a computerized system can help convey information and facilitate the implementation of processing and managing new student admission data." With these benefits and conveniences, this system should be developed by each school. This is in line with advances in information and communication technology that is able to support input and output processes quickly and accurately, especially in the implementation of PPDB (Budiarti et al., 2018) .

One of the academic activities in the school is the New Student Admission (PPDB) process which is carried out every time before the new school year. In the process of accepting new students, some schools still use the manual method which is divided into several parts. Each student who registers must fill out a registration form first, then the PPDB committee will select each form that is filled out by the candidate or the student's guardian. Of course, this will take a very long time, because after selecting the prospective students, the committee must recap the names and grades of the students accepted.

This manual system also certainly results in the administration process of new student admissions tending to be slow, because the data of new students who have registered have not been integrated and managed properly. So that the need for a concept and mechanism for accepting new students by utilizing information technology is one thing that really needs to be considered.

Research that discusses the *online new student admission system* has been done before. Research by (Ruhul Amin, 2017) with the title Design and Build a New Student Admission System at SMK Budhi Warman 1 Jakarta, in his research revealed that an *online -based registration system* can make it easier for prospective new students to register by saving time and costs compared to coming directly to the school. school, and can help and facilitate the management of new students at the school. In this study the author will apply the *Weight Product* method as a method in making decisions because based on research conducted by (Syafitri et al., 2019) , this method can provide a solution to the selection of laptops. Decision Support System (DSS) is an information system that uses decision models, databases, and managers' own thinking, interactive *modeling processes* with computers to achieve decision making by certain managers. With the DSS, it can provide interactive tools that allow *decision makers* to carry out various analyzes of the model in question". (Utomo, 2015) .

Research conducted by (Noer, 2019) resulted in a computerized sub-system of new student admissions that can facilitate the process of accepting new students. The research by (Niza, 2019) resulted in a decision support system for the selection of new admissions with a *weight product method* based on *Visual Basic Net* 2010 which can select computerized students quickly, accurately and efficiently. Research by (Fauzan et al., 2017) resulted in a computerized system that can help the process of majoring and accepting new students quickly, accurately and efficiently with the *Weight Product method.*

Based on this, it is necessary to have a system that can manage the process of accepting new students so that the process of implementing new student admissions can run effectively and efficiently. It is hoped that the existence of this system can simplify and speed up the process of accepting new students, so as to facilitate employee performance.

MATERIALS AND METHODS

The stages of the research include the steps taken from beginning to end, as follows:
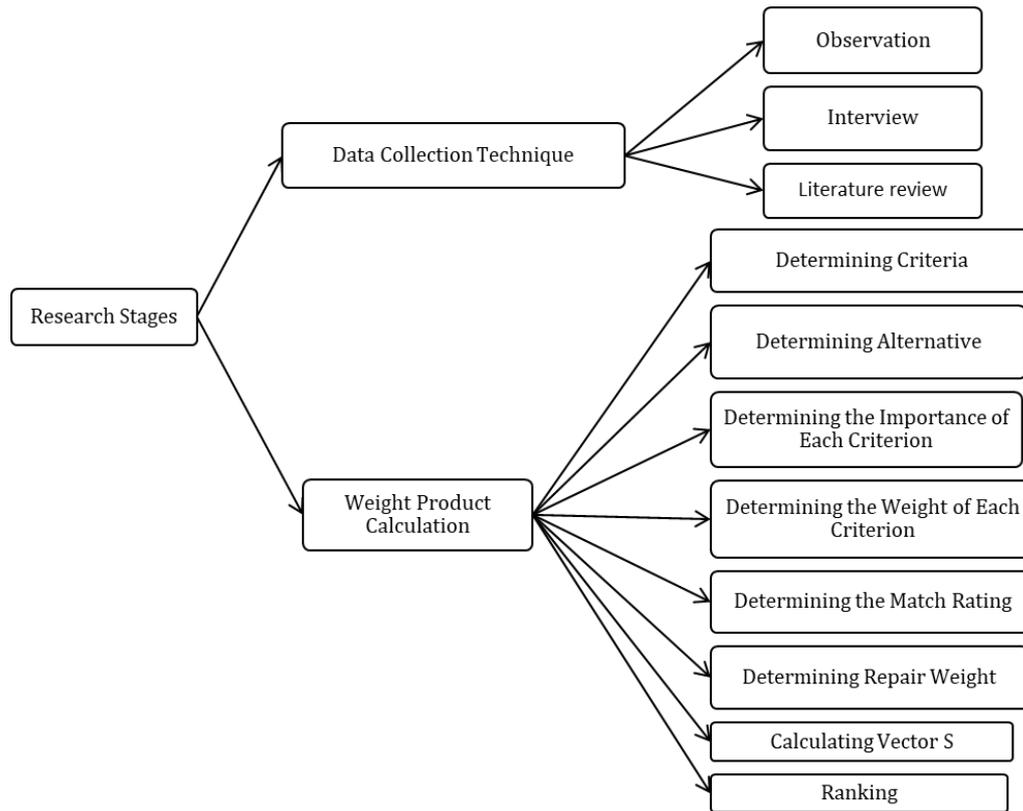
Figure 1. Research Stages

The explanation of the stages of the research carried out is as follows:

A. Data Collection Techniques

 1. Observation
    The author collects data and information by observing directly how the PPDB system is implemented in one of the schools, namely SMK Singaparna.

 2. Interview
    Here, the author conducts direct interviews with Mrs. Yuli Sumartini, ST as the Administration in the Administration section at SMK Singaparna and as one of the PPDB committees.

 3. Literature Study
    In this way, the authors collect supporting data for this study by taking several references from books, journals, proceedings and from the internet to obtain materials related to the research made.

B. Weight Product Method

According to (Niswatin, 2017) , the *product weight method* uses multiplication to connect attribute ratings, where the rating of each attribute must first be raised to the weight of the attribute in question. This process is the same as the normalization process. The preference for alternative Ai is given as follows:

$$ Si = \prod_{j}^{n} = 1 Xij^{wj} \quad \dots \dots \dots \dots \dots \dots . $$

Where i = 1, 2, 3, ..., n. Where wj = 1, wj is a positive rank for the profit attribute, and a negative value for the cost attribute. The relative preferences of each alternative are given as follows:

$$ Vi = \frac{\prod_{j}^{n} = 1 Xij^{wj}}{\prod_{j}^{n} = 1 (Xi)^{wj}} \dots \dots \dots \dots \dots $$

With i = 1, 2, 3, ..., n.
Where :
V = Alternative preferences analogous to a vector V
x = Criteria value
w = Weight of criteria/subcriteria
i = Alternative
j = Criteria
n = Number of criteria
*= The number of criteria that have been assessed on Vector S.

RESULTS AND DISCUSSION

A. **System Procedure**

Prospective students come directly to Singaparna Vocational School to register. Then prospective students will make a selection according to the specified schedule. The selections

P-ISSN: 1978-2136 | E-ISSN: 2527-676X
Techno Nusa Mandiri : Journal of Computing and Information Technology
As an Accredited Journal Rank 4 based on **Surat Keputusan Dirjen Risbang SK Nomor 85/M/KPT/2020**

included tests of general knowledge, Mathematics, English, and Tahfidz Al-Qur'an.

After the selection process is complete, the committee that acts as the system admin will input the results of the selection into the system. Then the system will process the calculation of the selection results in accordance with what was input by the admin. The system will display the results of the calculations used as the result of the selection process.

B.   System Requirements Analysis

Functionality requirements are descriptions of activities or services that must be provided by the application to be made. In the design of the new student admissions information system there are two users, namely admin and user. The admin and user have the following characteristics and needs:
1. Admin Needs
   a. Admin can login.
   b. Admin can input, delete, and edit prospective student data.
   c. Admin can input criteria data for assessment.
   d. Admin can input value in *Weight Product calculation* .
   e. Admin can make reports as needed.
   f. Admin can log out of the system by logging out.
2. User Needs
   a. Users can login.
   b. Users can see announcements of new student admissions.
   c. Users can exit the system by logging out.
3. System Requirements
   a. The system can manage the data of prospective students.
   b. The system can manage criteria data.
   c. The system can manage *weight product calculations* for new student admissions.
   d. The system can manage reports.
   e. Admin and user must log out after using the application.
4. Calculation of *Weight Product Method*

The process of calculating new student admissions using the WP method can be implemented as follows:
   A.   Determining the Assessment Criteria
      C1 : MATHEMATICS
      C2 : ENGLISH
      C3 : INDONESIAN LANGUAGE
      C4 : TADARUS
   B.   Determining Alternative
      A1 : Doni
      A2 : Aji
      A3 : Anisa
      A4 : Widya
   C.   Determining the Level of Importance of Each Criterion

Table 1. The Level of Importance of Each Criterion

LEVEL OF INTEREST	SCORE
Not too important	1
Quite important	2
Very important	3

   D.   Determining the Preference Weight of Each Criterion

Table 2. Weight of Preference for Each Criterion

CRITERIA	DESCRIPTION	WEIGHT
C1	MATHEMATICS	2
C2	ENGLISH	3
C3	INDONESIAN	2
C4	TADARUS	3

   E.   Determining the Suitability Rating of Each Alternative On Each Criterion

Table 3. Rating of the suitability of each alternative on each criterion

ALTERNATIVE	CRITERIA			
	C1	C2	C3	C4
A1	70	80	77	80
A2	80	88	78	82
A3	83	78	89	90
A4	78	92	85	80

   F.   Determining Repair Weight

$$W1 = \frac{2}{(2+3+2+3)} = 0{,}2$$
$$W2 = \frac{3}{(2+3+2+3)} = 0{,}3$$
$$W3 = \frac{2}{(2+3+2+3)} = 0{,}2$$
$$W1 = \frac{3}{(2+3+2+3)} = 0{,}3$$

Table 4. Improvement of the Weight of Each Criterion

CRITERIA	SCALE OF INTEREST	WEIGHT REPAIR
C1	2	0.2
C2	3	0.3
C3	2	0.2
C4	3	0.3

   G.   Calculating Vector S

S1 $= (70^{0.2})(80^{0.3})(77^{0.2})(80^{0.3}) = 77.30$
S2 $= (80^{0.2})(88^{0.3})(78^{0.2})(82^{0.3}) = 82.51$
S3 $= (83^{0.2})(78^{0.3})(89^{0.2})(90^{0.3}) = 84.64$
S4 $= (78^{0.2})(92^{0.3})(85^{0.2})(80^{0.3}) = 84.02$

P-ISSN: 1978-2136 | E-ISSN: 2527-676X
Techno Nusa Mandiri : Journal of Computing and Information Technology
As an Accredited Journal Rank 4 based on **Surat Keputusan Dirjen Risbang SK Nomor 85/M/KPT/2020**

H. Determining Rank

$$V1 = \frac{77,30}{(77,30+82,51+84,64+84,02)} = 0,235$$

$$V2 = \frac{82,51}{(77,30+82,51+84,64+84,02)} = 0,251$$

$$V3 = \frac{84,64}{(77,30+82,51+84,64+84,02)} = 0,258$$

$$V4 = \frac{84,02}{(77,30+82,51+84,64+84,02)} = 0,256$$

Table 5. Ranking Results

Alternative	Results	Rank	Information
V3	0.258	1	Graduated
V4	0.256	2	Graduated
V2	0.251	3	Graduated
V1	0.235	4	Not pass

Based on the provisions of SMK Singaparna that students who are considered to have passed the selection are students who have a preference value of more than 0.250. And from the calculations that have been done above, it can be seen that there are three students who have a preference value of more than 0.250. This means that the three students passed the selection and were entitled to proceed to the next stage, while 1 student was declared not to have passed the selection.

C. **Use Case Diagarams**

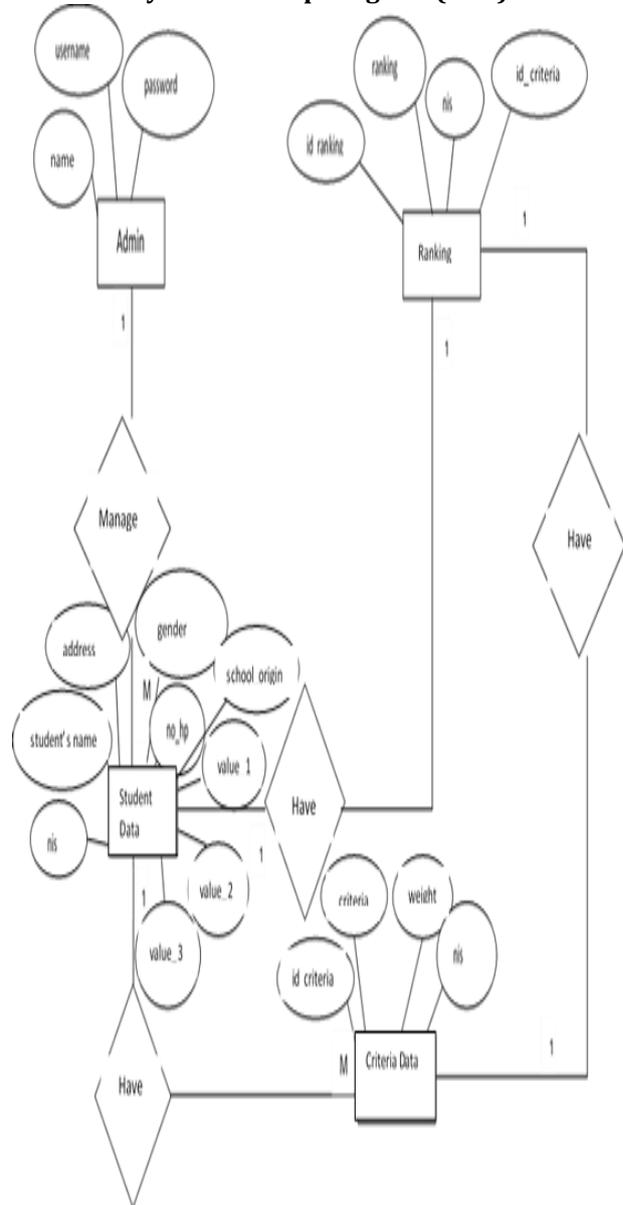Figure 2. Use Case Diagram Admin
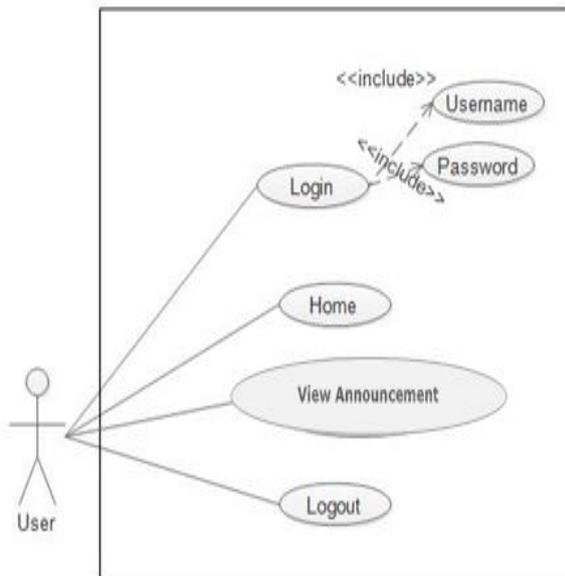
Figure 3. Use Case Diagram User

D. **Entity Relationship Diagram (ERD)**

Figure 4. Entity Relationship Diagram (ERD)

P-ISSN: 1978-2136 | E-ISSN: 2527-676X
Techno Nusa Mandiri : Journal of Computing and Information Technology
As an Accredited Journal Rank 4 based on **Surat Keputusan Dirjen Risbang SK Nomor 85/M/KPT/2020**
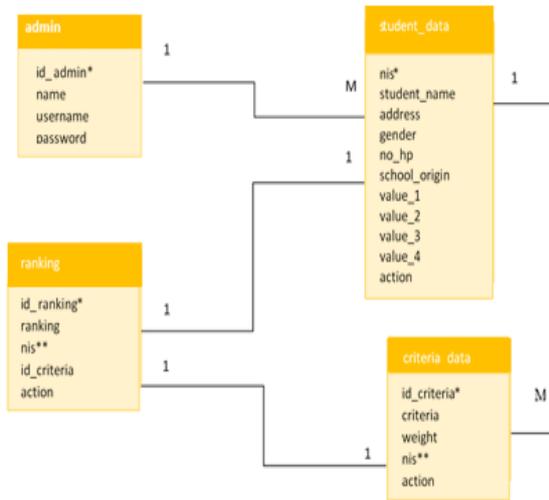
E. Logical Record Structure (LRS)

Figure 5. Logical Record Structure (LRS)

F. User Interface

Login Page

Figure 6. Login page

On this page the admin will login to the system.
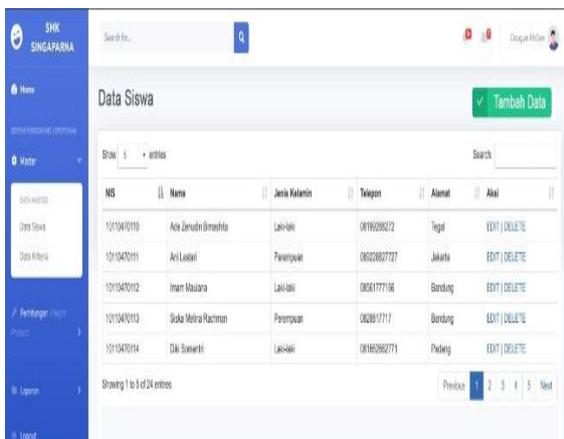
Prospective Student Data Page

Figure 7. Prospective Student Data Page

This page serves to display the data of prospective students who have registered which will be used as an alternative in the calculation. On this

page the admin can also edit, delete and add prospective student data.
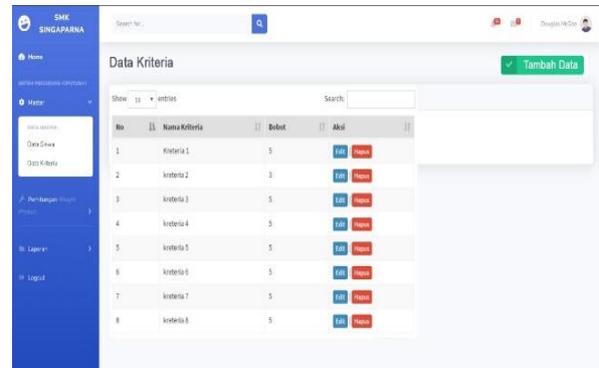
Criteria Data Page

Figure 8. Criteria Data Page

This page serves to display the criteria data used in the calculation process. On this page the admin can also edit, delete and add criteria data.
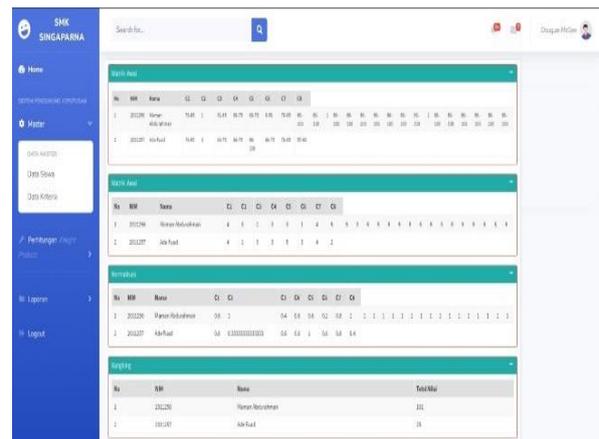
Product Weight Calculation Page

Figure 9. Weight Product Ranking Page

On this page the admin will perform the calculation process.
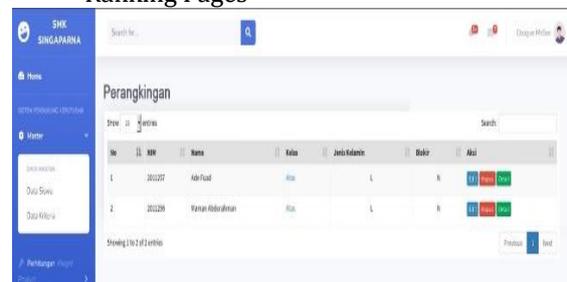
Ranking Pages

Figure 10. Weight Product Ranking Page

On this page will display the results of the calculation process that will be used as rankings and from the results of this ranking it can be seen who passed the selection and advanced to the next stage.

P-ISSN: 1978-2136 | E-ISSN: 2527-676X
Techno Nusa Mandiri : Journal of Computing and Information Technology
As an Accredited Journal Rank 4 based on **Surat Keputusan Dirjen Risbang SK Nomor 85/M/KPT/2020**

CONCLUSION

From the results of calculations with 4 criteria, namely C1 Mathematics, C2 English, C3 Indonesian and C4 Tadarus which were applied to 4 alternative students from SMK Singaparna as a sample and based on the provisions of SMK Singaparna that students who were considered to have passed the selection were students who had more preference scores from 0.250. It can be seen that from the results of calculations that have been carried out there are 3 students who have passed the selection, while 1 student is declared not to have passed the selection.

With this system, it is hoped that the selection procedure for new student admissions can be more computerized and produce more precise and accurate information. The selection procedure for new admissions can be more structured with the criteria used for ranking. The existence of a desktop-based application makes it easier for admins in the ranking process for the selection of new student admissions.

For further system development, it is necessary to add criteria that will be used for ranking, in addition to adding other methods for comparison.

REFERENCE

Budiarti, Y., Sriyadi, & Panji, A. (2018). Sistem Informasi Penerimaan Peserta Didik Baru (PPDB) Online Pada Madrasah Aliyah Negeri 17 Jakarta. *Techno Nusa Mandiri*, *Vol 15*(1), No. 1. http://ejournal.nusamandiri.ac.id/ejupdfrnal/index.php/techno/article/view/744/

Fauzan, R., Fitri, R., & Fadliansyah, M. (2017). Sistem Informasi Penjurusan Dan Penerimaan Peserta Didik Baru Menggunakan Metode Weighted Product. *Jurnal ELTIKOM*, *1*(1), 11–22. https://doi.org/10.31961/eltikom.v1i1.15

Niswatin, R. K. (2017). Sistem Seleksi Penerimaan Siswa Baru Menggunakan Metode Weighted Product. *ITEJ (Information Technology Engineering Journals)*, *2*(2), 25–32. https://doi.org/10.24235/itej.v2i2.19

Niza, R. P. (2019). Sistem Pendukung Keputusan Penerimaan Siswa Baru Pada Sma Pgri 4 Padang Menggunakan Metode Weighted Product(Wp). *Jurnal Teknologi Dan Open Source*, *2*(2), 96–107. https://doi.org/10.36378/jtos.v2i2.364

Noer, Z. M. (2019). Sub Sistem Penerimaan Peserta Didik Baru (Ppdb) Di Smk Mjps 3 Kota Tasikmalaya. *Jurnal Teknik Informatika*, *7*(1), 1–6. http://jurnal.stmik-dci.ac.id/index.php/jutekin/article/view/397/453

Prasetyo, K. D., Sukma, D., & Khasanah, F. N. (2018). Sistem Informasi Produksi Pakaian Berbasis Desktop. *Jurnal Penelitian Ilmu Komputer, System Embedded & Logic*, *6*(September), 139–148.

Ruhul Amin, M. K. (2017). *Rancang Bangun Penerimaan Siswa Baru Pada Smk Budhi Warman 1 Jakarta*. *2*(2), 113–121. http://ejournal.nusamandiri.ac.id/index.php/jitk/article/view/391/347

Syafitri, N. A., Sutradi, & Dewi, A. P. (2019). Penerapan Metode Weighted Product Dalam Sistem Pendukung Keputusan Pemilihan Laptop Berbasis Web. *SemanTIK*, *2*(1), 169–176. http://ojs.uho.ac.id/index.php/semantik/article/view/762/528

Utomo. (2015). *Pengertian Sistem Pendukung Keputusan*. http://e-journal.uajy.ac.id/10958/4/3TF06824.pdf

Witanto, R., & Solihin, H. H. (2016). PERANCANGAN SISTEM INFORMASI PENERIMAAN SISWA BARU BERBASIS WEB (STUDI KASUS : SMP PLUS BABUSSALAM BANDUNG). *Jurnal Infotronik*, *1*(1), 87–98. https://doi.org/10.33050/cices.v2i1.215

P-ISSN: 1978-2136 | E-ISSN: 2527-676X
Techno Nusa Mandiri : Journal of Computing and Information Technology
As an Accredited Journal Rank 4 based on **Surat Keputusan Dirjen Risbang SK Nomor 85/M/KPT/2020**