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DETERMINING BEST GRADUATES OBJECTIVELY USING THE WEIGHTED PRODUCT METHOD

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Abstract: The purpose of education and teaching activities in higher education is to produce quality and effective graduates. Among the graduates there are of the best graduates for each study program each year. This study aims to find the best graduates who are able to compete in the world of work in accordance with stakeholder needs. The data processed in this study were sourced from the 2018 Royal Computer Information Management College graduates. The method used in this study is the Weighted Product method. The results of this study can determine the best graduates quickly and accurately. research can help in terms of decision makers for determining the best graduates in each college.

Keywords: Best Graduate; Student; Weighted Product

Abstrak: Tujuan kegiatan pendidikan dan pengajaran di perguruan tinggi adalah untuk menghasilkan lulusan yang berkualitas dan efektif. Di antara lulusan ada beberapa lulusan terbaik untuk setiap program studi tiap tahun. Penelitian ini bertujuan mencari lulusan terbaik yang mampu bersaing di dunia kerja sesuai dengan kebutuhan *stakeholder*. Data yang diolah dalam penelitian ini bersumber dari data lulusan Sekolah Tinggi Manajemen Informatika Komputer Royal tahun 2018 sebanyak 100 lulusan. Metode yang dipakai dipenelitian ini, metode *Weighted Product.* Hasil dari penelitian ini dapat menentukan lulusan terbaik secara cepat dan tepat. Penelitian dapat membantu dalam hal pengambil keputusan untuk penentuan lulusan terbaik disetiap perguruan tinggi.

Kata kunci: Lulusan Terbaik*;* mahasiswa*;Weighted Product*

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INTRODUCTION

One of the goals of education and educational activities at public and private universities is to produce quality graduates [1]. Graduates in a university are an important and valuable asset and become a source of pride for the university. Graduates who work in leading companies or become entrepreneurs will bring the good name of the college [2].

In determining the best graduates, it is not only seen from the Cumulative GPA but must pass according to their field of expertise according to the study program. The best graduates are expected to be able to compete in the professional world according to the needs of stakeholders [3]. Graduation standards are seen from the Grade Point Average, thesis grades, superior course grades, attendance, and achievements both on-campus and off-campus.

In determining the best graduates, valid data is needed from each student who meets the standards to be processed to produce a decision value that can assist decision-makers in determining the best graduates. Manually processing data by evaluating student data one by one will certainly affect the assessment process in terms of time and data accuracy so that it can affect the desired decision results quickly and precisely.

So we need a capable Decision Support System (DSS) to present problem-solving solutions in semi-structured and unstructured events [4]-[5]. DSS can help someone in making efficient and effective decisions so that the problems they face can be solved [6]. The method used is the Weighted Product. The weighted product is a multi-criteria problem-solving method that can add weight to the data [7]. Multiplication is used to correlate attribute ratings, and the rank of each attribute must be raised to the first rank along with the attribute weight [8].

Research using the Weighted Product method has been widely applied in various fields, such as research in the field of education, and the system created with this method can assist students in determining the location of prayer in [9]. Research in the field of business, that the system created can help in determining one of the suitable food business opportunities [5]. Research in the field of government, that applications made with this method can produce optimal decisions in determining promotions for Civil Servants and make it easier to make reports on the promotion process [10]. Furthermore, research in the banking sector, namely the system created using this method, can be the best choice and can be recommended for receiving credit [11].

The purpose of this study is to use the Weighted Product method to determine the best graduates at the Royal Kisaran College of Computer Information Management.

METHOD

Methodology This research consists of several steps. The stages of the graduate data research methodology include determining criteria, weighting, processing data using the Weighted Product method, and implementation. The framework will appear in Figure 1.

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Figure 1. Stages of the Research Process

The graduate data used is from the Royal Kisaran College of Computer Informatics Management. The data used in 2018 were 100 graduates. For testing, the data used is data taken from 2 graduates.

The criteria used in this study are the Grade Point Average, the value of excellent courses, thesis scores, attendance, and achievements both on-campus and off-campus.

From the existing criteria, each criterion is given a weight. Grade Point Average is 30%, thesis score is 25%, excellent subject value is 20%, attendance is 15% and achievements both on campus and off-campus are 10%.

The data is processed using the Weighted Product method. The Weighted Product method consists of several stages, namely. Determine the criteria to be used as assessment parameters. Determine the preference value of decision-making. Perform the calculation of the relative value of the initial weight (wj). The initial weight value (w0) is used to indicate the relative importance of each criterion.

$$w_j = \frac{w_0}{\sum w_0} \quad (1)$$

Explanation:

w_j = repair weight
w_0 = initial weight
$\sum w_0$ = total weight

Perform calculation of preference value for each alternative vector S with the formula:

$$S_i = \prod_{j=1}^{n} (Xij)wj \quad (2)$$

Explanation:

S = vector alternative preference s
X = criterion value
W = criterion weight
I = alternative
J = criteria
N = many criteria

The implementation of the system is carried out using PHP applications and MySQL databases by processing predetermined criteria and then knowing the best graduates.

RESULTS AND DISCUSSION

By applying the WP method to the developed SPK, it functions to assist decision-makers in determining the best graduates with objectives that match the criteria of the Information Systems and Computer Systems study program.

Determining the criteria used in this study can be seen in table 1.

Tabel 1. Criteria

No	Criteria	Criteria Code
1	Grade-Point Average	C1
2	Thesis Grade	C2
3	Featured Course Values	C3
4	Attendance	C4
5	Academic And Non-Academic Achievements	C5

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If seen from Table 1, the column for the writing criteria code with letters and numbers is C1. Where the letter C character indicates the criteria abbreviation and the number 1 from the serial number for each criterion. Each criterion is given a preference weight as shown in table 2.

Table 2. Criteria Weight

No	Criteria	Weight
1	C1	5
2	C2	4
3	C3	3
4	C4	2
5	C5	1
Total		15

Determining the Preference Value of Each Criterion is given a preference value. For the criteria for the GPA, the preference value can be seen in table 3.

Table 3. Grade Point Average

No	Grade Point Average	Value
1	3,65 - 4,00	3
2	3,25 - 3,64	2
3	< 3,25	1

Furthermore, the criteria for graduate thesis scores can be seen in table 4.

Table 4. Thesis Value

No	Thesis Grade	Ket	Value
1	>79 - 100	A	3
2	>69 - <=79	B	2
3	<=65 - 69	C	1

Furthermore, the criteria for the graduate's Leading Course Values can be seen in table 5.

Table 5. Value of Featured Courses

No	Featured Course Values	Value
1	87,00 - 100,00	3
2	80,00 - 86,99	2
3	< 80,00	1

Furthermore, the criteria for the presence of graduates can be seen in table 6.

Table 6. Attendance

No	Attendance	Value
1	85% – 100%	3
2	80% - 84%	2
3	< 80%	1

Furthermore, the achievement criteria for both on-campus and off-campus graduates can be seen in table 7.

Table 7. Achievements

No	Achievements	Value
1	<=4	3
2	1 - 3	2
3	0	1

Alternative Value of Each criterion, manual calculation of the decision support system will be carried out using the Weighted Product method. Data were taken from 2 graduates from the Information Systems and Computer Systems Study Program as samples from each criterion in the calculation of the ranking of the best graduates.

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Table 8. Alternative Value of Each criterion After Weighting for Information Systems Study Program

Alternative	Criteria				
	CI	C2	C3	C4	C5
Adfrima Jaya	3	3	3	3	3
Lusi Mayasari	3	3	2	3	3

The Computer Systems Study Program is shown in table 9.

Table 9. Alternative Value of Each Criteria After Weighting for Computer Systems Study Program

Alternative	Criteria				
	CI	C2	C3	C4	C5
Muhammad Nuriswansyah	3	3	3	3	3
Zulfan Afandi	3	3	3	2	3

Specify the weight of the reference set. Weight is the value or relative importance of each criterion given by the decision-maker. The decision-maker in question is the leader.

W = 5 + 4 + 3+ 2 + 1 = 15
then ∑W = 15.

Calculation of the value of the preference weights on each of the existing criteria:

$K_1 = \frac{5}{5+4+3+2+1} = 0.33$

$K_2 = \frac{4}{5+4+3+2+1} = 0.27$

$K_3 = \frac{3}{5+4+3+2+1} = 0.20$

$K_4 = \frac{2}{5+4+3+2+1} = 0.13$

$K_5 = \frac{1}{5+4+3+2+1} = 0.07$

For the value of the criterion preference weights, it can be seen in table 10.

Table 10. Criteria Preference Weight Value

Kode	Kriteria	Bobot	N. Bobot Preferensi
C1	grade-point average	5	0.33
C2	Thesis Grade	4	0.27
C3	Featured Course Values	3	0.20
C4	attendance	2	0.13
C5	Achievement	1	0.07

Calculates the Preference Vector (S) Value. Next, To calculate the vector S, the data are multiplied, but first by the equation:

$S_i = \prod_{j=1}^{n} x_{ij}^{wj}$;dengan $i = 1,2,\ldots\ldots, m.$ (3)

Calculations for graduates of the Information Systems Study Program:

S1 (Adfrima Jaya)
$= (3^{0.33})*(3^{0.27})*(3^{0.20})*(3^{0,13})*(3^{0.07})$
= 1,44 x 1,35 x 1,25 x 1,15 x 1,08
= 3,02

S2 (Lusi Mayasari)
$= (3^{0.33})*(3^{0.27})*(2^{0.20})*(3^{0,13})*(3^{0.07})$
= 1,44 x 1,35 x 1,15 x 1,15 x 1,08
= 2,78

Vector S value of each Information Systems Study Program graduate can be seen in table 11.

Table 11. Vector S Value of Each Graduate of the Information Systems Study Program

Alternative	Criteria				
	CI	C2	C3	C4	C5
Adfrima Jaya	3	3	3	3	2
Lusi Mayasari	3	3	2	3	3

Calculations for graduates of the Computer Systems Study Program:

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S1 (Muhammad Nuriswansyah)
= $(3^{0.33})*(3^{0.27})*(3^{0.20})*(3^{0,13})*(3^{0.07})$
= 1,44 x 1,35 x 1,25 x 1,15 x 1,08
= 3,02

S2 (Zulfan Afandi)
= $(3^{0.33})*(3^{0.27})*(3^{0.20})*(2^{0,13})*(3^{0.07})$
= 1,44 x 1,35 x 1,15 x 1,09 x 1,08
= 2,63

Vector S value of each Information Systems Study Program graduate can be seen in table 12.

Table 12. Vector S Value of Each Graduate of the Computer Systems Study Program

Alternative	Criteria					Vector S
	CI	C2	C3	C4	C5	
Muhammad Nuriswansyah	3	3	3	3	3	3,02
Zulfan Afandi	3	3	3	2	3	2,63

Next calculate the value of Vector (V), where the next step is to add up all the values of S together to calculate the value of V. The calculation uses the equation:

$$V_i = \frac{\prod_{j=1}^{n} x_{ij}^{wj}}{\prod_{j=1}^{n} \left(x_j^w\right)^{wj}}; \quad (3)$$

dengan $i = 1,2,\ldots, m$.

Calculations for graduates of the Information Systems Study Program:
V1 (Adfrima Jaya)

$$\frac{3,02}{3,02+2,78}$$

$$\frac{3,02}{5,8} = 0,52$$

V2 (Lusi Mayasari)

$$\frac{2,78}{3,02+2,78}$$

$$\frac{2,78}{5,8} = 0,48$$

Table 13. Vector V Value of Each Graduate of the Information Systems Study Program

Alternative	Criteria					Vector S	Vektor V
	CI	C2	C3	C4	C5		
Adfrima Jaya	3	3	3	3	2	3,02	0,52
Lusi Mayasari	3	3	2	3	3	2,78	0,46

Calculations for graduates of the Computer Systems Study Program:

V1 (Muhammad Nuriswansyah)

$$\frac{3,02}{3,02+2,63}$$

$$\frac{3,02}{5,65} = 0,53$$

V2 (Zulfan Afandi)

$$\frac{2,63}{3,02+2,63}$$

$$\frac{2,63}{5,65} = 0,4$$

Table 14. Vector V Value of Each Graduate of the Computer Systems Study Program

Alternative	Criteria					Vector S	Vektor V
	CI	C2	C3	C4	C5		
Muhammad Nuriswansyah	3	3	3	3	3	3,02	0,53
Zulfan Afandi	3	3	3	2	3	2,63	0,47

From the calculation, the highest score was obtained in V1 (Adfrima Jaya) for the Information Systems Study Program and V1 (Muhammad Nuriswansyah) for the Computer Systems Study Program. The results of the calculation of the Weighted Product method for each study program can be seen in table 15.Tabel 15. Calculation Results of the Weight Product Method

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for the Information Systems Study Program

Alternative	Student name	WP Method Value	Rating
V1	Adfrima Jaya	0,52	Rating 1
V2	Lusi Mayasari	0,48	Rating 2

Table 16. Calculation Results of the Weight Product Method for the Computer System Study Program

Alternative	Student name	WP Method Value	Rating
V1	Muhammad Nuriswansyah	0,53	Peringkat 1
V2	Zulfan Afandi	0,47	Peringkat 2

CONCLUSION

The Weight Product method has been able to be applied to determine the best graduates in private universities. The results of this research are in the form of SPK by applying the Weighted Product method to determine the best graduates in private universities quickly and accurately.

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