DOI: http://dx.doi.org/10.26483/ijarcs.v10i5.6477

Volume 10, No. 5, September-October 2019



International Journal of Advanced Research in Computer Science

RESEARCH PAPER

Available Online at www.ijarcs.info

IMPLEMENTATION OF WEIGHTED PRODUCTS IN THE MAKING OF A HEALTHY HUMAN RESOURCE ASSESSMENT SYSTEM FOR PUBLIC HEALTH CENTERS

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ISSN No. 0976-5697

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Abstract: The performance evaluation of medical personnel at the Public Health Center is a form of government efforts to improve health service providers for the community. To realize these goals, the government, through the Minister of Health's Decree number 857/MENKES/SK/IX/2009 concerning performance evaluation of Health Human Resources. The implementation of human resource performance appraisal has been carried out so far, only by recording personal data individually, so that the data gap has an opportunity to be engineered by someone. Determining the performance of health human resource performance with excellent performance, the Decision Support System is using by the Weighted Product (WP) method, where this method is very suitable for the selection of various alternatives that depart from the determination of the weight of each assessment criteria. With the decision of the optimal weight by the Head of the Community Health Center, this method began to formulate a weight matrix to used as an exponential factor for each medical staff's compatibility rating. The program output obtained, it turns out not much different compared to manual calculations — testing by examining the program outputs with manual counts. Although there are slight differences between the two results, the difference is tiny, ranging from 0.001 to 0.002. But because the main goal of the decision support system is to get the best ranking of alternatives.

Keywords: Performance Evaluation, Assessment, Health Human, Resources, Puskesmas

I. INTRODUCTION

Puskesmas are the spearhead for improving the welfare of the community in the health sector. To enhance the quality of service and coverage of a work area, optimal medical and paramedical performance is required by their main duties and functions as health workers.

1.1. Background

Based on the ^[1] article 1 paragraph 1 Health workers are every person who devotes himself in the field of health and has an understanding or skills through health education which for certain types requires the authority to conduct health efforts.

One complaint that is often heard from the public relating to the government apparatus is in addition to the convoluted due to rigid bureaucracy, unscrupulous behavior of people who are sometimes unfriendly, as well as employee performance in providing services related to timeliness in providing services, quantity, and quality of service which is still very low. The low service performance will build a bad image at the Puskesmas, where dissatisfied patients will tell their colleagues. Vice versa, the higher the performance of services provided, will be a plus for the health center, in this case, the services provided by the health center^[2].

Service performance concerns the results of work, work

speed, work done by customer expectations, and timeliness in completing work. A person's performance is a combination of ability, effort, and opportunity to assess his work.

Puskesmas Kampung Bali is one of the Community Health Centers serving the community in a particular environment, where the density of service work to the community is quite

high. Therefore it requires skilled and dedicated health care workers in carrying out their work so that the skills and performance of health care workers (medical personnel) become an issue that requires special attention from the health center. Control over the performance of competent medical personnel will undoubtedly produce good results as well. Therefore it is necessary to have a tool/method that can help the management of the Puskesmas in evaluating the performance of existing medical personnel.

1.2. Problem

The problems that arise when making a program as described above are how to design an application program that can be used to assess the performance of Medical Workers.

II. LITERATURE REVIEW

Multi-Attribute Decision Making (MADM) is an analytical method that reduces the use of mathematics used for alternative selection with several criteria. MADM is also used to solve problems in discrete spaces with a limited number of choices ^[3]

In general, the Multi-Attribute Decision-Making model considered as follows:

For example A = {ai | i = 1, ... n} is the set of decision alternatives and C = {Cj | j = 1, ... m} is the set of expected goals, then Xo alternatives will be determined, which have the highest degree of expectation of the relevant objectives Cj.

Most MADM approaches are carried out through 2 steps, namely: first, to aggregate decisions that are responsive to all objectives on each alternative; second, ranking the alternative choices based on the results of the decision aggregation.

Thus it can be said that, the problem of Multi-Attribute Decision Making (MADM) is evaluating m alternative Ai (i = 1,2, ..., m) to a set of attributes or criteria Cj (j = 1,2, ..., n), where each interdependent characteristics of one another. The decision matrix for each alternative to each attribute, X, is given as:

$$X = \begin{pmatrix} X_{11} & X_{12} & \dots & X_{1n} \\ X_{21} & X_{22} & \dots & X_{2n} \\ X_{31} & X_{32} & \dots & X_{3n} \\ \dots & \dots & \dots & \dots \\ X_{m1} & X_{m2} & \dots & X_{mn} \end{pmatrix}$$
(1)

Where :

Xij: is the performance rating of alternative I to the jth attribute, and the value of w weights shows the relative importance.

And w is given as $w = \{w_1, w_2, w_3, \dots, w_n\}$ is the preference weights of each alternative.

Performance rating (X), and weight value (W) are the central values that represent the absolute preference of the decision-maker. MADM problems end with the ranking process to get the best alternative obtained based on the overall profits of the given a choice.

Another phrase conveyed by ^[4], namely: Various MADM methods have been proposed to solve various applications of decision problems. One way of MADM is Weighted Product (WP). This method is more efficient than other methods for solving MADM problems. The reason is because of the time needed in the calculation^{[5][7]}.

$$P_i = (\prod_{j=1}^m M_{ij} \text{ normal})^{w_j}$$
(2)

Where :

M_{ij} is the rating of each attribute

 W_{j} weights for each quality A similar formula was also conveyed by $^{\left[5\right] }$

$$P_i = (\prod_{j=1}^{m} y_{ij}) \wedge W_j$$
(3)

Where :

 y_{ij} is the rating of each attribute

W_i weights each attribute

Similar expressions are conveyed by ^[4] as follows:

 $A = \{ai \mid i = 1, 2, 3, \dots, n\}$

Where A is an alternative set, then C is known as the set of criteria written in the following notation:

 $C = \{c_j \mid j = 1, 2, 3, \dots, m\}$

Furthermore, weights W for each alternative are arranged with the following notation:

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$$W = \{wj \mid j = 1, 2, 3, \dots, n\}$$

Based on the three equations above, the match rating matrix becomes:

where d_{11} , d_{12} d_{nn} is the compatibility rating of each alternative.

The next step is to arrange the normalization matrix for the beneficial attributes using the following formula:

$$r_{ij} = \frac{a_{ij}}{d_{ij}^{max}}$$
(5)

Meanwhile, if the attribute for an attribute that is not profitable, the formula is:

$$r_{ij} = \frac{d_{ij}}{d_{ii}}$$
(6)

The next step is to construct a weighted normalized matrix with the following formula:

$$V_{ij} = r_{ij}^{W_{ij}} \tag{7}$$

Then, calculate the scores of each alternative with the following formula:

$$M_i = \prod_{j=1}^m V_{ij} \tag{8}$$

Then in the final stage proceed with ranking to get the best alternative, with the formula:

$$BA_{WP} = Max \begin{array}{c} n\\ M_i\\ i=1 \end{array}$$
(9)

III. METHODOLOGY

The research methods used are:

1. Literature search relating to policies regarding the assessment of the performance of medical personnel at the Puskesmas

2. Interviews with the performance appraisal officer,

3. System (software) development

Existing System

The implementation of determining the performance of medical personnel that applies to technical service units and public health centers in Bengkulu City has so far followed the provisions stipulated by Decree of the Minister of Health of the Republic of Indonesia Number 857 / Menkes / SK / IX / 2009 concerning Assessment Guidelines Health Human Resources Performance at the Health Center. There are seven types of criteria used as guidelines for performance evaluation,

according to the Minister of Health's Decree No. 857/Menkes /SK/IX/2009, 7 criteria, namely:

- 1. HR group
- 2. Education
- 3. Working Period
- 4. Presence
- 5. Deduction component
- 6. Enhancing Components
- 7. Productivity

The weighting of each of these criteria explained as follows:

1. HR group

Table 1. Positions and Job Descriptions and Functions

No	Position	Main Tasks and Functions	Weight
1	Head of	Coordinating the	4
	Puskesmas	implementation of Health Office	(Very
		affairs, by compiling technical	Good)
		policies, providing guidance, controlling and facilitating the	
		eradication of diseases, health	
		services, family health and	
		promotion, and environmental	
		health; take responsibility and	
		report the results of official	
		performance to the Head of the	
		Health Service	
2.	Administration:	Helps coordinate the imple-	3
	- Head of admin- istration	mentation of Health Service affairs, in accordance with the	(Good)
	- Administration	main tasks and functions of	
	of Puskesmas	health centers, by synergizing	
	or r usicesinus	the planning and execution of	
		activity programs in each	
		puskesmas program, which	
		includes eradication of diseases,	
		health services, family health	
		and promotion and	
		environmental health; fostering and controlling the	
		implementation of office	
		administration services,	
		equipment, staffing, finance,	
		performance appraisal and	
		reporting; and to account for and	
		report the results of the	
		performance of Puskesmas	
		administration to the Puskesmas head in accordance with the	
		established guidelines and	
		instructions	
3	Functional	Carrying out Puskesmas affairs	2
	Officer with a	by providing public health	(Norma
	Credit Score:	services, emergency measures,	1)
	General	mental health, adolescent health,	
	Practitioner,	child health, health	
	Dentist, Midwife, Nurse, Dental	consultations, providing referrals, health testing, autopsy,	
	Nurse, Hospital	post mortem, public health	
1	Staff, Sanitarian,	counseling, accountability and	
	Nutritionist,	reporting of performance results	
	Pharmacist,	to the Head of Service Bengkulu	
1	Assistant	City Health through the Head of	
	Pharmacist	Puskesmas to create a healthy,	
1		active and prosperous community.	
4	Functional	Carry out tasks providing	1
-	Officer with no	services, incoming and outgoing	(Low)
1	credit frame:	mail agenda, typing and sending	()
1	Administration	letters, inventory of goods,	
	staff. General,	doing data rejuvenation at the	
	Counter Officers,	Puskesmas	

Treasurer, Treasurer, goods

2. Education

Table 2. Educational Criteria

No.	Education	Weight
1.	Doctor, Dentist, Bachelor	4
2.	Baccalaureate	3
3.	Bachelor degree	2
4	Senior High School	1

3. Years of service

	Table 3. Criteria for Years of Se	ervice
No.	Years of Service	Weight
1.	More than ten years	4
2.	5-10 years	3
3.	1 – 5 years	2

4. Attendance Criteria

Less than one year

4

	Table 4. Attendance Criteria	a
No.	Number of Attendance	Weight
1.	Full according to the number of working days per month	4
2.	Average absentees one time per month	3
3.	Alpha averages two times per month	2
4.	The average of absent is more than three times per month	1

5. Reduction Criteria

	Table 5. Reduction Criteria	
No.	Number of reprimand letters received	Weight
1.	Never received a letter of reprimand	4
2.	Have received a letter of reprimand	3
3.	Have received a warning letter and a warning	2
	letter	
4.	Often receive letters of reprimand and warning	1
	letters.	

6. Enhancement Criteria

Table 6. Enhancement Criteria

No.	The number of awards received	Weight
1.	Has been awarded at the national level	4
2.	Has been awarded at the provincial level	3
3.	Has been awarded at the regional level	2
4.	Never got an award	1

D 1 ...

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7. Productivity Criteria

	Table 7. Productivity Criteria	
No.	Productivity at work	Weight
1.	Very productive in carrying out the main tasks and functions	4
2.	Productive in carrying out the main tasks and functions	3
3.	Productive enough in carrying out the main tasks and functions	2
4.	Less productive in carrying out the main tasks and functions	1

IV. RESULTS AND DISCUSSION

1. Results

The results of the research on the implementation of the weighted product method for evaluating the performance of medical personnel are computer programs that can be explained based on the display of the following images:



Figure 1. Main Menu Display

The Main Menu functions as a controller of all forms provided, namely: forms for managing medical personnel data, criteria for determining weighting forms, assessment forms, preference weighting forms and other forms related to medical personnel assessment systems. Following are some examples of each form as described above, which are:



Figure 2. Criteria Weighting Form

In the Criteria Weighting Form above, if done via the 'Tambah' button and proceed by selecting the criteria code and proceed by filling in the criteria described. Then the program will request the level of each type of rules accordingly, as shown in Figure 3 below:

lode Bob	ot B1				
lode Krite	eria KØ	5 • Un	aian Kriterin Penambah		
Bobot	Penambe	h <<			
C Per	mah men	dapat pengharg	aan di tingkat nasional		
@ Per	noh men	depat pengharg	nan di tingkat provinsi		
C Per	mah men	dapat pengharg	aan di tingkat Kota		
		dapat pengharg h mendapatkan			
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Figure 3. Criteria Weighting Form (continued)

Whereas the medical personnel form as the main subject of the assessment is in the form of medical personnel, as in Figure 4 below:

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Figure 4. Medical Personnel Form

The next step is filling in the performance data of each medical person, following all the criteria set by the Chair of the Puskesmas. The appearance of the form for filling the performance data is shown in Figure 5 below:

Tahun Penilaian Jumlah Kehadiran selama tahun penilaian Pengmunag Produktifitas Tambah Kareksi Hapus Simpan Selesai DATA <u>PCHI AUAN</u> Kd Näsi KdTenaga NHTenaga NH N2 N3 N4 N5 N6 N7 Total	Data 1	enaga Medi	is rang L	Jinnai									
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Figure 5. Medical Personnel Data Form

Before starting the assessment process, the operator must fill in the preference weight, because preference weight is the main element in determining the degree of performance of medical personnel identified by the Head of the Puskesmas. The display of charging the preference weights is shown in Figure 6 below:

Pengaturan Bobot Preferensi	
Kniterin	Nilai Bobot (1 - 4)
Samber Days Monusia	(SDM)
Pendidikan	
Masa Kerja	E I
Kehadiran	È.
Pesanbah	E
Pengurang	E.
Produktelins	

Figure 6. Preference Weight Form

Furthermore, after all the required data has been filled out through each of the appropriate forms, the next operator will evaluate the performance of the medical personnel. The appearance of the medical personnel assessment process as following pictures:

#1	#2 4	MAIN 50	K PREFERENCIAL	16	17	-		
W1 1 DED	Ma	NAT ITSU	NK BOBOL PHI WK CLUA	Marces 1000	Ma	Mu	Lanjur	Katu

Figure 7. Early Stage Performance Assessment Process

And after clicking the Next button, then the form appears like the following figure 8:

		MATTIK BATI	NG. A.E.COC	DEALSET	HAR, ALTER	NATE					
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0002	10002	Ontra Crant. 5.57	-14-	- 5-	- 12			- 12			
1000	10000	Seven Halls	- 12	- 10-	-6		1				
104	TOTA	Salidary2, 537	-15-	- 1	-6-	-1-	- 11	-12-	4		
2008	10005	Earnah, A.M.d. Kudi.	-6-	- 5-	- 6	1	10	1			
3156	FORM.	Filture 18.M	12	4	4	4	- 1	4	4		
1007	10007	Emanat Seabarg	- 11	- 1	- 12 -	10	1	- 14	1		
0000	10000	NS. Dod traver, S.Kep	2	4	13	4	11	19.	4		
0009	10003	Munite, SKM	- 12 -	4	1	4	12	4	4		
0010	10010	Herey Dittatha S.Kep/	12	4	1	4	14	4	1 . II		
1500	cal hits! an and	a [3] [5		19 <u>16 5</u>	194	-	15	156	157	Matrik S	Kolaar

Figure 8. WP Process Step 2

In brief, step by step, the WP process that occurs finally reaches the ranking results like Figure 9 below:

ingeneration of	MATER S	EX105 y			
And Decem Medi	Mana Lengu Medit.	-	A DAMAGE AND	-	
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THEM	do Arris Mailer		1807288-42		
1925	Tale States AMOU		110072-0		
19862	DireDut 5.57		414058-02		
Talci	Sever-Yalk		110708-02		
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		23 \$5275	3al		
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		14148.42	34		
		10758-02	34		
	lary Puscellere 585-4		14		
	de Fardiyan Silap A		14		
	ann Si Agust Difan A Nachart S. 17 - A	HENE CO.	14		1.12
	Dudteen Stap		14		- 18
N	G Duditeren: Sfazili	AC165	14		

Figure 9. WP Process Final Step

In this study, the desired outcome is, as shown in Figure 10 below:

Q		USK	DINAS KESEBATAN KOTA BENGKULU ISKE SMAS K AMPUNG BALI asirvas Zainsel Ne. 1 Kanpang Bali Keta Bengkulu									
Tahun	RANKING HASIL PENILAIAN KINERJA TENAGA MEDIS Tahas Pushina : 2015											
Na.	Nama Tenaga Medik	SDM	700	мяк	NDR	TAM	KUR	FRO	Nihi	Keterangan		
1	Wita Widami, A. Md Keb.	1	3	3	4	1	4	3	0,0460	Sangat Baik		
2	Mulyati, \$35M	2	4	4	4	1	4	3	0,0437	Buik		
3	Siti Rohani Z., S.ST	2	4	3	4	1	4	4	0,0431	Beik		
4	Henry Oldarina, S.Kep/	2	4	3	4	1	4	4	0,0431	Buk		
s	Decie Im, SST	2	4	3	4	- 1	4	4	0,0431	Buik		
6	Finiari, SKM	2	4	4	4	1	4	4	0,0415	Buk		
7	Rinny Punga Drwi, SKM	2	4	4	4	1	4	4	0,0415	Baik		
8	Lidis Handayani, S.Kep.	2	4	4	4	1	4	4	0,0415	Buik		
9	Yurina Tri Agusti, S. Kep.	2	4	4	4	1	4	4	0,0415	Buik		
10	Oshs Diani, SST	2	4	4	4	1	4	4	0,0415	Buik		
11	NS. Dedi Jawan, S.Kep	2	4	3	4	1	3	4	0,0409	Baik		
12	Apriyoni, A.ME. 7	2	3	3	4	1	4	4	0,0409	Bulk		
13	Suai Ela Firi, A Mil Kep.	2	3	3	4	1	4	4	0,0409	Baik		
14	Riya Endhi Yani, A.Md Kep	2	3	3	4	1	4	4	0,0409	Buik		
15	Nurlises MS	2	3	3	4	1	4	4	0,0409	Buik		
16	Meirin, SCM	2	4	3	4	2	4	4	0,0405	Baik		
17	Ein Lenni SCM	2	4	3	4	2	4	4	0,0405	Buik		
18	Remisti AMI Kds.	3	4	4	4	1	4	4	0,0400	Baik		
19	Sacrah, A. Md. Keb.	2	3	4	4	1	4	4	0,0394	Buk		
20	Nurdaneli Nurli, A.Md.Ken.	2	3	4	4	1	4	4	0.0394	Baik		
21	drg, Annian Mardhish	2	4	1	1	1	3	4	0,0394	Buik		
22	Jina Oktagia, A.Md Keh.	2	3	2	1	1	3	4	0,0340	Sedang		
23	Ermawati Sinabang	1	1	2	1	1	4	3	0,0329	Sedang		
24	Yulis Oustins, AMd KL	2	2	2	1	1	3	4	0,0316	Sedang		
25	Simon Harls	3	1	2	2	1	4	4	0,0311	Sedang		
Entranspon Bengluk, 11 September 2016 Stabl viel, Sande den Mannie a.n. Kogala Präsemen Kangang Ball 2001 : Prediction KA Solding Tan Under 2013 : Man Korja KA Solding Tan Under 2014 : Man Korja KA Solding Tan Under 2015 : Schulden Statut 2016 : Statut Statut 2017 : Schulden Statut 2020 : Statut Statut 2020 : Statut Statut												

Figure 10. WP Process Final Step

In Figure 10 above, that program outcomes in the form of Recommendation Letter of award recipients to medical personnel with the highest value.

V. CONCLUSION

Based on the results of the program output, as shown in Figure 10 above and compared with the manual calculation that has been used by the Performance Evaluation Section of the Medical Staff of Kampung Bali Health Center can be called the same because it has a small difference. Meanwhile, using manual calculation or conventional calculation, the result is the highest value achieved by WITA WIDIANTI, A.Md. Keb. Namely: 0.0458, while the program output is 0.0460. That means there is a difference of 0,0002, which can be called the result is not much different.

VI. ACKNOWLEDGMENT

Special thanks to the Director of Research and Community Service, Directorate General of Research and Development -Ministry of Research, Technology and Higher Education of the Republic of Indonesia in 2019 funding through the Beginner Lecturer Research scheme

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