Combination of Matrix Simple Additive Weighting Algorithm (SAW) on the Reference URICA-Scale to Measure Readiness for Change in Narcotic Rehabilitation Patients

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ARTICLE INFO

A B S T R A C T

This study aims to design a matrix combination in the URICA-Scale calculation and the simple additive weighting (SAW) method that can be used as a measuring tool to evaluate the readiness of drug rehabilitation patients using the University of Rhode Change Assessment Scale (URICA-Scale) as a desire combined with simple additive weighting (SAW) method in order to facilitate the design of electronic information systems regarding assessment tests with reference to URICA-Scale. In software development, the design modeling step in the system is one part of the (System Development Life Cycle) contained in the Waterfall model. The results of this study are able to provide an arrangement of calculation matrices where the combination of these matrices contributes to programmers in implementing them into certain programming languages.

A B S T R A K

Penelitian ini bertujuan untuk merancang desain kombinasi matriks pada perhitungan URICA-Scale dan metode simple additive weighting (SAW) yang dapat digunakan sebagai alat ukur guna mengevauasi tentang kesiapan pasien rehabilitasi narkotika dengan menggunakan University of Rhode Change Assesment Scale (URICA-Scale) sebagai acuan yang dikombinasikan dengan metode simple additive weighting (SAW)agar dapat mempermudah dalam merancang sistem informasi elektronik mengenai tes asesmen dengan acuan URICA-Scale. Dalam pengembangan perangkat lunak langkah pemodelan desain pada sistem merupakan salah satu bagian dari (System Development Life Cycle) yang terdapat pada model Waterfall. Hasil penelitian ini mampu memberikan susunan matrix perhitungan dimana dengan adanya gabungan dari matriks tersebut memberikan kontribusi bagi programmer dalam melakukan implementasi kedalam Bahasa pemrograman tertentu.

INTRODUCTION

The drug problem in Indonesia is still a serious problem and needs to be dealt with immediately. The use of illegal goods has increasingly received government attention until the President of the Republic of Indonesia declared a drug emergency five years ago (Munte, 2020). In the international realm, ONODC (Crime., 2018) as a world-scale agency that focuses on the scope of narcotics problems, in 2019 there were at least 271 million people (5.5% of the global population) in the age range of 15 to 64 years old was declared to have consumed the illicit goods, this evaluation was obtained in 2017 ago. Narcotics abuse cases, both internationally and nationally, have become a serious concern for state leaders, including in Indonesia, which declared a narcotics emergency status to be precisely defined 5 years ago by the President of the Republic of Indonesia (Ramadani, 2021). Head of the National Narcotics Agency (BNN) Komjen Pol Petrus Reinhard Golose said referring to Presidential Instruction number 20 of 2020 concerning the National Action Plan for the Prevention and Eradication of Abuse and Illicit Trafficking of Narcotics and Narcotics Precursors in 2020-2024 requiring BNN to immediately adapt and improve itself in anticipating the development of crime. Narcotics. Indonesia currently abuses narcotics in 2021 has increased by 0.15%. The condition of the Indonesian population exposed to narcotics was stated as such, first 4,534,744 in 2019, then the number rose to 4,827,619 in 2021. The two groups of users, namely 3,419,188 in 2019 experienced an increase to 3,662,646 in 2021.

In line with the PERMENKES RI Number 4 of 2020, in CHAPTER III Article 7 regarding the implementation of services at the recipient institution, reporting must include:

1. Assessment
2. Medical Rehabilitation Plan; and/or
3. Medical Rehabilitation

One way to measure the readiness of an addict in carrying out the rehabilitation process is by conducting an assessment test using the URICA-Scale as a reference in determining a user (Aguiar A. C., 2020) (Polaschek, 2010). In an effort to manage drug rehabilitation patients, measure and assess their willingness to abuse these items, and find the patient's motivation. Point "1" above, in the process there are several familiar instruments used in organizations or agencies that are oriented in dealing with narcotics problems, these instruments include the so-called (URICA-Scale), the University of Rhode Change Assessment Scale is still often used to assist monitoring For patients, the organization appointed to treat patients is usually a psychologist, counselor, or coach using the URICA-Scale instrument to be implemented to determine the seriousness of the patient during the rehabilitation process which is directly addressed to the rehabilitation patient.

The implementation of this assessment test is generally carried out conventionally, and to carry out the calculations, corrections are made one by one from each or all of the individuals who take the test. Launching from Drug and Alcohol Dependence, it also uses the Urica-Scale reference as the basis for obtaining assessment results for its patients, but in using the URICA-Scale reference it can be applied not only to narcotic rehabilitation patients. (Polaschek, 2010) (Yunitasari, 2018)

METHOD

URICA-Scale (University of Rode Island Assessment Scale)

This URICA-Scale can be applied in various interests to measure the readiness of individuals or users in undergoing several processes to measure the readiness of the user in undergoing the treatment process, previous research in previous studies as for the use of the URICA-Scale reference to measure the readiness of a patient in undergoing treatment (Aguiar, 2020). (Aguiar A. C., 2021) Then this reference can also be applied to different objects according to the needs that can be tested regarding the readiness of an individual to undergo a treatment period in dysphonic patients. In the application to these patients, using voice to measure the readiness dimension of readiness to change and evaluate the readiness stage at the stage of an individual's change cycle (Aguiar A. C., 2020). In the list of questions that will be shown to the individual a number of 32 question points and in each question there is a range in filling 1-5 answer choices, details on questions and answer options are as table 1 and table 2 (Aguiar A. C., 2021) ((Aguiar A. C., 2020).

The validity of the use of the URICA-Scale was confirmed separately in a large sample of drug and alcoholic patients, but evidence from predictive validation tests for composite scores is very limited. So an increase in a patient's internal motivation to change seems to have a significant impact on the day off from treatment (Field, 2009). The URICA-Scale assessment has a slice of the total existing QP (Question Points), in per-dimensional calculations of the four models as follows:

1. Pre-Contemplation (PC) for QP =1,5,11,13,23,26,29
2. Contemplation (C) for QP = 2,8,12,15,19,21,243.
3. Action (A) for QP = 3,7,10,14,17,25,30
4. Maintenance (M) for QP = 6,16,18,22,27,28,32

The whole of each QP above will later be calculated on the average of each existing model, then to generate the value in the above calculation so that the "Readiness for Change" in the URICA-Scale can be measured using the following formula:

Readiness for Change = (AverageC + AverageA +Average M) – Average PC

The above formula can be obtained in accordance with previous research when carrying out this assessment, it is still conventional in its implementation in patients (Aeni, 2021). Then a similar study was conducted by (Field, 2009) the role of the URICA-Scale provides about how to measure motivation to change and is associated with behavior change in patients with narcotic dependence. The four dimensions have a range of values that have been classified into the table 3.

Table 1
Tabel *value Readiness for Change* (Value pada tiap QP)

Strongly disagree	Don't agree	Uncertain	Agree	Strongly agree
1	2	3	4	5

Table2
Questions Point on Urica-Scale

No	Question Point (QP)
1	As far as I'm concerned, I have no substance abuse problems that require change
2	I think I might be ready to improve myself
	Continued Question point on URICA-Scale
3	I'm doing something about a substance abuse problem that's been bothering me for a long time
4	Maybe it will be meaning ful to fix my substance abuse problem
5	I have no substance abuse problems. I shouldn't be in this rehab tempat
6	I'm worried I'll be back on substances after Ichanged. So I'm in this rehab to seek help
7	Finally I'm currently doing something about my substance abuse problem
8	I've been thinking for a long time that I might want a change over myself
9	I've managed to get over my substance abuse problem but I'm not sure I can keep it upthe effort alone
10	There were times when my substance abuse problem was difficult, but I'm currently working on it
11	Being in this rehab is quite a waste of my time because my abuse problem doesn't existrelationship with me
12	I hope this rehab can make me understand myself better
13	I guess I have an error but there isn't anything I really need to change
14	I really worked hard to change
15	I have a substance abuse problem and I think I should address it
16	I don't follow through on what I've changed and expect, I'm here to prevent a relapse of substance abuse problems
17	Even though I don't always succeed in changing myself, at least I'm trying to overcome my substance abuse problem
18	I thought once I got over my substance abuse I would be completely free, but it turns out that sometimes I still have to struggleto address the problem of substance abuse
19	I wish I had more ideas (ways) to solve my substance abuse problem
20	I've started working on my substance abuse problem but I'd like some help
21	Maybe this rehab will be able to help me
22	I might need something to encourage me to stick with the changes I'm currently making.
23	I may have a problem with substance abuse but I really think I have no problem with itthat
24	I hope someone in this rehab has some useful advice for me
25	Anyone can talk about change; but right now I'm really going through that change
26	All this psychological talk is boring.Why can't people just forget about their substance abuse problems?
27	I'm here to prevent myself from relapse of my substance abuse problem
28	It's frustrating, but I think I willre-abusing the substance I thought I had finished
29	I have worries and so do the people around me. So why should I waste timethink of them?
30	I'm currently actively working on my substance abuse problem
31	I'd rather adjust to my mistakes than try to change them
32	After everything I've done to change from my substance abuse problem, it often comes back and haunts me

Table 3
Table Score Readiness for Change (URICA-Scale)

Stage	Group Avg
Pre-Contemplation	<9,3
Contemplation	9,4–11.0
Action	11,1–12,6
Maintenance	>12,7

Simple Additive Weighting Algorithm (SAW)

In obtaining a prediction of a certain value, the simple additive weighting (SAW) algorithm is familiarly used and as a decision supporter in order to obtain certain goals, so that the expected results will be validated by manual calculations so that errors do not occur and in its application a very good accuracy is obtained at the algorithm (Hidayat, 2020). A similar study uses a simple additive weighting (SAW) algorithm to predict water level and rainfall, but in its application the results are less competitive in providing outputs for flood problems, besides that the simple additive weighting (SAW) algorithm can be combined with certain algorithms to can collaborate so as to produce the expected goals (Hannats Hanafi Ichsan, 2021).

The application of this algorithm is intended to obtain the best selection in the search for health facilities by combining the TOPSIS algorithm in a system that is integrated into Google Maps, but the results of this study have drawbacks, namely problems at distance only produce 70% of the accuracy obtained (Rohman, 2020). The steps that can be applied to the simple additive weighting (SAW) algorithm are as follows:

1. Ci is used as a reference in decision making
2. Each criterion is determined, the suitability rating for each alternative is determined
3. Ci as a criterion matrix can act as a decision maker.
4. Perform normalization to obtain a matrix based on the equation

The process of obtaining the results of a matrix ranking that has been normalized by R using a certain weight so that the best alternative (Ai) is obtained as a way out (Rohman, 2020).

$$V_i = \sum n\ w_j r_{ij}$$ (Jumaryadi, 2021) (Rohman, 2020)

With:
V_i= Weighted value for each QP
w_j= weighting (in each QP)
r_{ij}= Normalization Matrix

$$\mathbf{r}_{ij} = \left\{ \frac{x_{ij}}{Max(x_{ij})} \right.$$

(Jumaryadi, 2021) (Rohman, 2020)

With:
r_{ij} = Question Point normalized from alternative Ai on Attribute Cj
r_{ij} = Question Point normalizes from alternative Ai on Attribute Cj
i= alternative
j= criteria
MAX (x_{ij}) = maximum value of i on criterion.j
MIN (x_{ij}) = minimum value on criterion j

In previous research, this method was also applied as processing in selecting new employees in an organization, in this study it was stated that the SAW algorithm was compared with the WP algorithm to obtain a more optimal suitability of the output results (Hidayat, 2020) (Setyawan A, 2017).

System and Software

In previous research, it was explained that the system is an interaction in which it leads and achieves the results of the goals in a group that continuously reflects either directly or indirectly. With each other in an organization and aims to achieve a certain mission vision (Safei, 2017) (Sahambangung, 2018).

RESULTS AND DISCUSSION

In accordance with existing literature sources, the simple additive weighting (SAW) and URICA-scale algorithms have their own calculations and mechanisms to obtain certain results or goals, in this study both will be combined to obtain the same output as URICA-Scale as a reference to be able to meet the value that can be classified according to the patient's score when doing the assessment and classified into one of the four classifications above, the following is a simulation of the incorporation of the matrix:
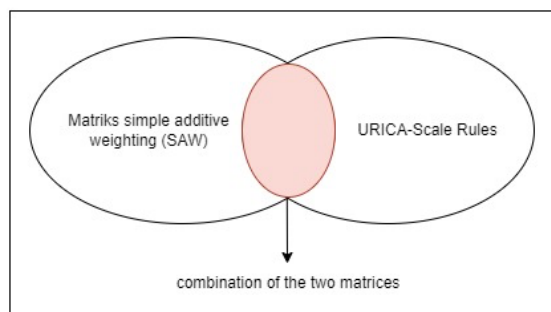

Figure 1. Combination matrix of SAW and URICA-Scale

Figure 1 shows that the simple additive weighting (SAW) and URICA-Scale algorithms are simulated in the form of intersecting images, the results of combining these slices can be implemented into a mathematical matrix calculation with the following sequence of steps:

1. Specifies an alternative, namely R_i.
2. Determine the criteria that will be used as a reference in making decisions, namely Cj.
3. Provide the value of the suitability rating of each alternative on each criterion.
4. Determine the preference weight or level of importance (W) of each criterion.
5. Create a match rating table for each alternative on each criterion.
6. Make a decision matrix that is formed from the suitability rating table for each alternative on each

criterion. The value of each alternative (Ai) on each criterion (Cj) that has been determined, where, i=1,2,...m and j=1,2,...n.
7. Normalize the decision matrix by calculating the value of the normalized performance rating (rij) from the alternative Ai on the Cj criteria.
8. The results of the normalized performance rating value (rij) form a normalized matrix (R)
9. The final result of the preference value (Vi) is obtained from the sum of the normalized matrix row elements (R) with the preference weights (W) corresponding to the matrix column elements (W).

The above steps can be implemented and combined with adjustments to the needs of the URICA-Scale reference can be carried out into the following flow:
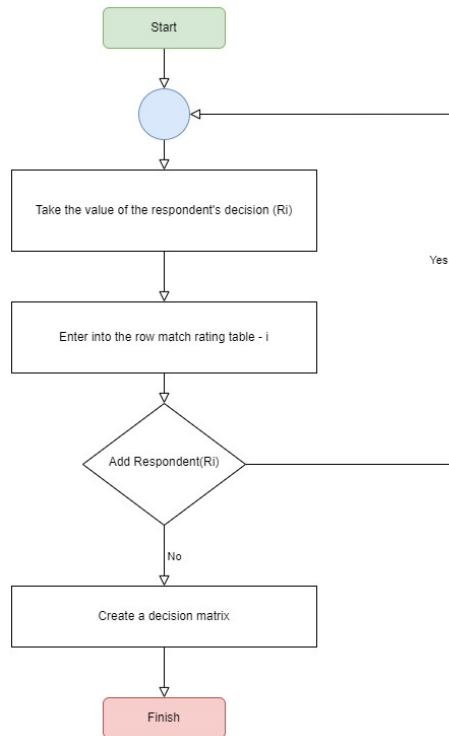
Figure 2. Flow processing combining matrix

Figure 2 above has visualized the process of merging the two matrices by focusing on the URICA-Scale reference, after knowing the steps and process flow above, we get a mathematical equation that can be implemented into the formula below:

$$R_i, x_{PC(i)}, x_{C(i)}, x_{A(i)}, x_{M(i)}$$

$$x_{PC(i)} = Pre - Contemplation$$

$x_{C(i)} = Contemplation$

$x_{A(i)} = Action$

$x_{M(i)} = Maintenance$

The URICA-Scale reference can be entered into the simple additive weighting (SAW) algorithm matrix as follows:

$$\begin{bmatrix} R_1 x_{PC(1)} x_{C(1)} x_{A(1)} x_{M(1)} \\ R_2 x_{PC(2)} x_{C(2)} x_{A(2)} x_{M(2)} \\ R_3 x_{PC(3)} x_{C(3)} x_{A(3)} x_{M(3)} \\ \vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots \\ R_n x_{PC(n)} x_{C(n)} x_{A(n)} x_{M(n)} \end{bmatrix} \begin{bmatrix} x_{PC(i)}/7 \; x_{C(i)}/7 \; x_{A(i)}/7 \; x_{M(i)}/7 \\ \vdots \quad \vdots \quad \vdots \quad \vdots \\ \vdots \quad \vdots \quad \vdots \quad \vdots \\ \vdots \quad \vdots \quad \vdots \quad \vdots \\ x_{PC(n)}/7 \; x_{C(n)}/7 \; x_{A(n)}/7 \; x_{M(n)}/7 \end{bmatrix}$$

In the equation matrix above, a matrix for decision making will be generated as follows:

$$\begin{array}{c c c c c} criteria & C_1 & C_2 & C_3 & C_4 \\ Type & PC & C & A & M \\ R_1 & x_{1,1} & x_{1,2} & x_{1,3} & x_{1,4} \\ R_2 & x_{2,1} & x_{2,2} & x_{2,3} & x_{2,4} \\ R_3 & x_{3,1} & x_{3,2} & x_{3,3} & x_{3,4} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ R_n & x_{n,1} & x_{n,2} & x_{n,3} & x_{n,4} \end{array}$$

A well-structured matrix, to determine the amount of value in all respondents' answers can be classified into four equations, for each dimension has a different score range, then to determine the classification can be calculated using the following equation:

$$x_{PC(i) \, PreContemplation} = \sum_{j=1}^{7} q_{PC(i,j)}$$

$$x_{C(i) \, Contemplation} = \sum_{j=1}^{7} q_{C(i,j)}$$

$$x_{A(i)Action} = \sum_{j=1}^{7} q_{A(i,j)}$$

$$x_{M(i)Maintenance} = \sum_{j=1}^{7} q_{M(i,j)}$$

CONCLUSIONS AND SUGGESTIONS

The results of this study can make it easier for a programmer to obtain a matrix scheme of combining the simple additive weighting (SAW) algorithm into the URICA-Scale reference, in implementing it into the form of software engineering there are various programming languages that can be applied to realize the e-assessment system model. .So the development of this matrix in the future can be realized in the form of software to make it easier for counselors, psychologists, and health workers who want to do initial screening for patients who need testing regarding the individual's readiness to undergo treatment in various agencies. Besides that, it would be better if the development on the multi-platform side would make it easier for users to do calculations and access in the initial screening of hospitalized patients.

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