Assessment of Employee Using Simple Multi-Attribute Technique Exploiting Rank (SMARTER) and Behaviorally Anchor Rating Scale (BARS) Method

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Abstract – Lecturers' active role as the spearhead of higher education has an essential role in improving higher education quality and sustainability. Therefore, assessing work behaviour is needed to measure how lecturers participate in achieving the vision and mission, quality improvement, and service guarantee to students and complementary documentation. This condition became the basis of research. They are implementing decision support systems with Simple Multi-Attribute Rating Technique Exploiting Ranges (SMARTER) and Graphic Rating Scale (GRS) to measure a lecturer's behaviour by using multiple criteria. With the SMARTER method and Behaviorally Anchor Rating Scale (BARS). By applying the impermeable BARS method, the work behaviour assessment process results in ease and accuracy that is more in line with the employees' behaviour being assessed. With the SMARTER approach, an assessment of employee work behaviour is produced, with 90% of alternatives used. The results are Good.

Keywords - Lecturer, BARS method, Method of SMARTER, Behavioral Assessment Work.

I. INTRODUCTION

Human resources have an essential role in the sustainability of an agency. Higher education is one of the educational institutions that have lecturers as human resources where lecturers' presence is one of the factors that is considered absolute. Lecturers are prominent supporters who interact directly with students. A lecturer is deemed qualified if he meets the qualifications and work behaviour and is competent in line with its vision and mission. Success is usually measured by the lecturer's level of success in teaching, the level of discipline in education, the ability to interact with students, and many other supporting factors [17].

In any organization, Behavior Assessment or the performance of each employee is an everyday activity. As stated by [7] which states that employee Behavior Assessment can be said to be effective if it includes the following two things, namely (1) the existence of a set of standards and (2) information communication (feedback). Dessler [10] "Effective appraisal also requires that the supervisor set performance standards. And it requires that the employee receives the training, feedback, and incentives required to eliminate performance deficiencies". Gary Dessler's opinion is increasingly confirmed that Conduct's assessment effectively requires a standard that has been preset and feedback to prevent a decline. Likewise, in higher education institutions, whether in the form of universities, institutes, or colleges. In general, Job Performance Appraisal is a process by which organizations evaluate performance to improve performance [7].

Assessment of lecturer achievement aims to achieve the vision and mission of higher education institutions and accreditation needs [12].

Decision-making methods are used to be applied for job performance assessment. One of them is the Simple Multi-Attribute Rating Technique Exploiting Ranges (SMARTER) method, which supports multi-criteria by giving weight to each criterion and sub-criterion that illustrates how critical the requirements are [2][10][13][18]. Each standard and sub-criteria, which are characteristics or several properties of items or items, will be presented by applying the Behaviorally Anchor Rating Scale (BARS) method [11][15].

This article proposes the combination of Simple Multi-Attribute Rating Technique Exploiting Ranges (SMARTER) method and Behaviorally Anchor Rating Scale (BARS) to analyze the lecturer's performance in Siliwangi University.

A. Job Performance Assessment

Job Performance Appraisal is a formal system for assessing and evaluating the performance of an individual or team assignments used by industry, agencies, and organizations to generate feedback on performance following the standard set used [1][5]. Correct Job Performance Assessment will help relevant stakeholders and the employees or Human Resource Development division being assessed. The Job Performance Appraisal process consists of three stages: (1) defining the job, evaluating performance, and providing feedback [1].
B. Decision Support System

Decision support systems were first put forward in the early 1970s by Michael S. Scott Morton. It was term Management Decision Systems to assist managers in making decisions on semi-structured problems, providing support for managers, increasing managers’ decisions, speed computing, and productivity enhancement [10][14]. Decision support systems are considered capable of solving problems and solving semi-structured issues [13]. A semi-structured problem is a problem that includes several elements recognized by problem solvers. Decision-making correlates with the uncertainty of the results of the decisions taken to reduce risk factors.

The decision-making process consists of three phases, namely (1) the Intelligent step or the operation of tracking and detecting problems and identifying problems; (2) the design phase or the phase to understand the problem, reduce the risk and test the feasibility of the risk by conducting a process of finding, developing and analyzing alternative actions that can be taken; (3) Choice or a decision-making process based on the implemented alternative [3].

C. Simple Multi-Attribute Rating Technique Exploiting Ranges (SMARTER)

SMART is a multi-criteria decision-making method. The multi-criteria decision-making technique is based on the theory that each alternative consists of several criteria that have value - value. Each standard has a weight that describer how important criteria are compared with other criteria [4]. The SMARTER method is developing the Simple Multi-Attribute Rating Technique (SMART) method introduced by Edward in 1977 [10]. In the SMARTER method, the Rank Order Centroid (ROC) weighting formula is used [6].

The equation for the SMARTER method can be seen in the following equation (1), where $U_n = \text{Final Score}$, $W_k = \text{Weighting from criteria } k$, $U_n(X_{nk}) = \text{The utility value for the } k \text{ criterion for the } k \text{ alternative}$.

$$U_n = \sum_{k=1}^{k} W_k U_n (X_{nk})$$  

(1)

Calculation of utility value can use the following equation (2), where $U_i(a_i)$ is utility value for (i) criteria, $C_i$ is the value of the (i) criteria, $C_{\text{min}}$ is the minimum value of criteria, $C_{\text{max}}$ is the maximum value of criteria.

$$U_i(a_i) = 100\% \times \frac{(C_i - C_{\text{min}})}{(C_{\text{max}} - C_{\text{min}})}$$  

(2)

D. Weighting Rank Order Centroid (ROC)

The ROC technique's weighting works by giving weight to the criteria according to the ranking based on the priority level. The weighting of the ROC is generally formulated in equation (3), where $W$ is the weight value of criteria and i is alternative value.

$$W_k = \frac{1}{k} \sum_{i=1}^{i} \left( \frac{1}{i} \right)$$  

(3)

E. Behavioural Anchor Rating Scale (BARS)

The Behavioural Anchor Rating Scale (BARS) method is a performance appraisal method that combines work behaviour approaches with personal traits. Scaling is done between 5 to 10 vertical actions (Anchor) for each work indicator. Anchors are arranged from the highest value to the lowest cost. Anchors can be in the form of critical incidents obtained through job analysis, usually compiled by a team of Human Resources specialists, managers, and employees [8]. The stages in the Behavioral Anchor Rating Scale (BARS) method can be seen as follows:

a) Making a Critical Incident
b) Developing performance dimensions
c) Reallocating events
d) Making the scale of the incident
e) Developing the final tools

The BARS method has several positive values that are more accurate because the experts have developed the BARS in the HRD devising. HRD has more precise standards, can generate feedback, systematically critical group events (Anchors) into five to ten independent dimensions, and has consistent properties [8][11][15].

F. Related Research

Several studies on the SMARTER and BARS methods have been carried out to optimize of decision-maker. Alfa Saleh et al. in 2018 determine the selection of laboratory assistants by applying the Simple Multi-Attribute Rating Technique Exploiting Ranges (SMARTER) method by applying six criteria and weighting accordingly [10]. With assessment priorities and produce research results that the technique used can provide useful recommendations. Other related research involves the Simple Multi-Attribute Rating Technique Exploiting Ranges (SMARTER) method to determine life insurance product recommendations to customers. Research results show that the SMARTER method is optimal and feasible as alternative decision support by Haryanti et.al. in 2016 [6]. This research is also strengthened by other research that applies the SMARTER method in selecting and evaluating suppliers of Brazil's construction industry. The SMARTER method is considered efficient in selecting suppliers, providing supplier recommendations in the form of ranking by prioritizing the quality and price offered by each supplier by Schram and Danielle in 2012 [9].

Related research regarding the BARS method includes a study conducted by Michelle Martin-Raugh, et al. 2016 [8] regarding the application to evaluate teaching practice with the results of her research stating that the BARS method is preferred the assessment process than the FFT method. Other research related to BARS, such as that conducted by Donald P Schwab et al. in 2006 [11], measured BARS with the following three characteristics: Leniency Effect, Independent Dimension, and Reliability results showing that the BARS method still needs further research.

II. RESEARCH METHODOLOGY

The stages in the research are carried out as in the following figure:
This research is divided into three main stages, namely (1) Pre research, (2) process SMARTER, (3) behaviour Assessment System. 

A. Pre Research

The pre-research begins with direct and indirect observations of the lecturer job performance assessment in one of the tertiary institutions to find an overview of the Lecturer Job Performance Assessment process. The resulting observations' results are continued by identifying the problem to produce a problem formulation and limitation. A literature study is conducted to provide research guidance in finding solutions to solve the problems formulated.

B. Process SMARTER

SMARTER method that is carried out consists of the following stages:

a) Determining the Number of Criteria

The Lecturer Work Behavior Assessment Process that is carried out refers to Law No. 5 of 2014, Articles 75-78 of ASN, and Government Regulation No.46 of 2011 concerning Assessment of Civil Servant Work Performance. The criteria used are as follows:

| No. | Criteria          | The Type of Criteria |
|-----|-------------------|----------------------|
| 1   | Service Orientation | Categorical          |
| 2   | Integrity         | Categorical          |
| 3   | Commitment        | Categorical          |
| 4   | Discipline        | Categorical          |
| 5   | Cooperation       | Categorical          |
| 6   | Leadership        | Categorical          |

b) Determine the Weight Value of Each Criterion

Each criterion's weight and priority levels are determined based on the priority level using equation 3, namely Rank Order Centroid (ROC) weighting.

Based on table 3 above, the weight values for each sub-criterion are categorized based on the achievement number 91 ≤ score ≤ 100 for the title Good, 76 ≤ score ≤ 90 for the title Enough, 51 ≤ score ≤ 60 for Less, and Under 50 for Bad designations.

While in Table 4 shows the formulation of assessment using the bars method, where the evaluation has sub-criteria.
| Commitments | Good | Less trying in earnestly to uphold the ideology of the state Pancasila, 1945 Constitution Of The Republic Of Indonesia, Unitary State of the Republic of Indonesia, this singular diversity and government plans with the aim to be able to carry out its duties and prioritize the interests of the government rather than personal interests and / or groups in accordance with duties, functions and his responsibilities as a state apparatus to workplace organizations | Bad | Never tried earnestly to uphold the ideology of the state Pancasila, 1945 Constitution Of The Republic Of Indonesia, Unitary State of the Republic of Indonesia, this singular diversity and government plans with the aim to be able to carry out its duties and prioritize the interests of the government rather than personal interests and / or groups in accordance with duties, functions and his responsibilities as a state apparatus to workplace organizations |
| Discipline | Very good | Always comply with laws and regulations and / or official service regulations with a sense of responsibility and still comply with the provisions of working hours and be able to properly store and / or maintain state property entrusted to them | Good | In general, he obeys the prevailing laws and / or official regulations with a sense of responsibility, adheres to the provisions of working hours and is able to properly store and / or maintain state property entrusted to him |
| | | | leadership | Very good | Always act firmly and impartially, provide a good example, the ability to move work teams to achieve high performance, capable of uplifting and moving subordinates in carrying out the task and able to make decisions quickly and accurately | Good | In general, act decisively and impartially, provide good role models, the ability to mobilize the work team to achieve high performance, be able to inspire and move |
| Leadership | Good | None of the respondents have ever been able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and do not respect and accept other people's opinions, less willing to accept decisions made legally which have become joint decisions. | Bad | Have never been able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and do not respect and accept other people's opinions, less willing to accept decisions made legally which have become joint decisions. |
| Cooperation | Enough | Less trying in earnestly to uphold the ideology of the state Pancasila, 1945 Constitution Of The Republic Of Indonesia, Unitary State of the Republic of Indonesia, this singular diversity and government plans with the aim to be able to carry out its duties and prioritize the interests of the government rather than personal interests and / or groups in accordance with duties, functions and his responsibilities as a state apparatus to workplace organizations | Bad | Never tried earnestly to uphold the ideology of the state Pancasila, 1945 Constitution Of The Republic Of Indonesia, Unitary State of the Republic of Indonesia, this singular diversity and government plans with the aim to be able to carry out its duties and prioritize the interests of the government rather than personal interests and / or groups in accordance with duties, functions and his responsibilities as a state apparatus to workplace organizations |
| | | | | Always able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and respect and accept other people's opinions, willing to accept decisions made legally which have become joint decisions. | Good | In general, they are able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and respect and accept other people's opinions, are willing to accept decisions made legally which have become joint decisions. |
| | Good | Generally tried earnestly to uphold the ideology of the state Pancasila, 1945 Constitution Of The Republic Of Indonesia, Unitary State of the Republic of Indonesia, this singular diversity and government plans with the aim to be able to carry out its duties and prioritize the interests of the government rather than personal interests and / or groups in accordance with duties, functions and his responsibilities as a state apparatus to workplace organizations | Bad | Never tried earnestly to uphold the ideology of the state Pancasila, 1945 Constitution Of The Republic Of Indonesia, Unitary State of the Republic of Indonesia, this singular diversity and government plans with the aim to be able to carry out its duties and prioritize the interests of the government rather than personal interests and / or groups in accordance with duties, functions and his responsibilities as a state apparatus to workplace organizations |
| | Enough | Sometime trying earnestly to uphold the ideology of the state Pancasila, 1945 Constitution Of The Republic Of Indonesia, Unitary State of the Republic of Indonesia, this singular diversity and government plans with the aim to be able to carry out its duties and prioritize the interests of the government rather than personal interests and / or groups in accordance with duties, functions and his responsibilities as a state apparatus to workplace organizations | Good | In general, they are able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and respect and accept other people's opinions, are willing to accept decisions made legally which have become joint decisions. |
| | | | | Sometimes trying earnestly to uphold the ideology of the state Pancasila, 1945 Constitution Of The Republic Of Indonesia, Unitary State of the Republic of Indonesia, this singular diversity and government plans with the aim to be able to carry out its duties and prioritize the interests of the government rather than personal interests and / or groups in accordance with duties, functions and his responsibilities as a state apparatus to workplace organizations | Good | In general, they are able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and respect and accept other people's opinions, are willing to accept decisions made legally which have become joint decisions. |
| | | | | Always able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and respect and accept other people's opinions, willing to accept decisions made legally which have become joint decisions. | Good | In general, they are able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and respect and accept other people's opinions, are willing to accept decisions made legally which have become joint decisions. |
| | | | | Sometimes trying earnestly to uphold the ideology of the state Pancasila, 1945 Constitution Of The Republic Of Indonesia, Unitary State of the Republic of Indonesia, this singular diversity and government plans with the aim to be able to carry out its duties and prioritize the interests of the government rather than personal interests and / or groups in accordance with duties, functions and his responsibilities as a state apparatus to workplace organizations | Good | In general, they are able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and respect and accept other people's opinions, are willing to accept decisions made legally which have become joint decisions. |
| | | | | Always able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and respect and accept other people's opinions, willing to accept decisions made legally which have become joint decisions. | Good | In general, they are able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and respect and accept other people's opinions, are willing to accept decisions made legally which have become joint decisions. |
| | | | | Sometimes trying earnestly to uphold the ideology of the state Pancasila, 1945 Constitution Of The Republic Of Indonesia, Unitary State of the Republic of Indonesia, this singular diversity and government plans with the aim to be able to carry out its duties and prioritize the interests of the government rather than personal interests and / or groups in accordance with duties, functions and his responsibilities as a state apparatus to workplace organizations | Good | In general, they are able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and respect and accept other people's opinions, are willing to accept decisions made legally which have become joint decisions. |
| | | | | Always able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and respect and accept other people's opinions, willing to accept decisions made legally which have become joint decisions. | Good | In general, they are able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and respect and accept other people's opinions, are willing to accept decisions made legally which have become joint decisions. |
| | | | | Sometimes trying earnestly to uphold the ideology of the state Pancasila, 1945 Constitution Of The Republic Of Indonesia, Unitary State of the Republic of Indonesia, this singular diversity and government plans with the aim to be able to carry out its duties and prioritize the interests of the government rather than personal interests and / or groups in accordance with duties, functions and his responsibilities as a state apparatus to workplace organizations | Good | In general, they are able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and respect and accept other people's opinions, are willing to accept decisions made legally which have become joint decisions. |
| | | | | Always able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and respect and accept other people's opinions, willing to accept decisions made legally which have become joint decisions. | Good | In general, they are able to cooperate with colleagues, superiors, subordinates both inside and outside the organization and respect and accept other people's opinions, are willing to accept decisions made legally which have become joint decisions. |
The values in table 6 above are obtained from the results of the initial value transformation of the criteria with the weight value of each sub-criteria calculated using ROC weighting. Then the normalized result value will be converted into a utility value using equation 2. The following utility values for each criterion and alternative are shown in table 7.

Based on the utility value generated, the next step is to determine the final value. Equation 1 is used to calculate the final amount (NA) in the Smarter method, as can be seen in table 8 to table 10 below.

Table 8. Final scores using the SMARTER method

Table 9. Assessment of Job Performance with the SMARTER Method
Table 10. Assessment of Job Performance with the SMARTER Method

| A | C1 | C2 | C3 | C4 | C5 | C6 | Aktual | SMARTER |
|---|----|----|----|----|----|----|--------|---------|
| 1 | Good | Very good | Very good | Good | Good | Very good | Good | Enough |
| 2 | Very good | Good | Good | Good | Good | Good | Even | Enough |
| 3 | Good | Good | Good | Very good | Good | Good | Medium | Even |
| 4 | Good | Good | Good | Very good | Good | Good | Medium | Even |
| 5 | Good | Very good | Good | Good | Good | Even | Enough |
| 6 | Good | Good | Very good | Good | Good | Even | Enough |
| 7 | Very good | Good | Good | Good | Good | Even | Enough |
| 8 | Very good | Good | Good | Good | Very good | Even | Enough |
| 9 | Very good | Good | Good | Good | Good | Even | Enough |
| 0 | Good | Very good | Good | Very good | Good | Good | Even | Enough |

Based on table 8, which shows the final value of the calculation using the SMARTER method, a ranking (R) of the highest alternative final value to the lowest alternative value can be formed as in table 9.

The results of the ranking in table 9 can be used as a test by comparing the results of the decision holders’ actual decisions with the results of applying the SMARTER method in table 10.

Based on the results of the comparison table 10 with the application of the method to the actual assessment SMARTER able to provide alternative recommendations for the decision if the decision-making process based on the weighted criteria or the level of interest among different criteria.

IV. CONCLUSION

Work Behavior Assessment carried out by applying the Simple Multi-Attribute Rating Technique Exploiting Ranges (SMARTER) and Behaviorally Anchor Rating Scale (BARS) methods. The result shows that the work behaviour appraisal process requires measurable and transparent standards, is objective and produces feedback on employee work behaviour achievements.

By applying these two methods, a more objective assessment of work behaviour is produced by applying a behavioural assessment with several anchors used, as well as producing behavioural assessment feedback in the form of a final value that becomes a reference in decision making for management [17].

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