



## Determining The Best Work Behaviour Of The Laboratory Head Using The Technique For Order Of Preference By Similarity To The Ideal Solution

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### How to Cite :

Rustina, E., Nakuloadi, H., Widodo, T., Wening, N., Rianto, R. (2024). Determining the Best Work Behaviour of the Laboratory Head Using The Technique For Order Of Preference By Similarity To The Ideal Solution . EKOMBIS REVIEW: Jurnal Ilmiah Ekonomi Dan Bisnis, 12(3). doi: <https://doi.org/10.37676/ekombis.v12i3>

### ARTICLE HISTORY

Received [14 Mei 2024]

Revised [12 July 2024]

Accepted [26 July 2024]

### KEYWORDS

Work Behaviour,  
Laboratory Head,  
Commitment

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### ABSTRACT

Vocational education is in high demand because it prepares students to be job-ready. In learning, it is more about work practices, internships, and in the laboratory than theory in class. Therefore, the existence of laboratories is essential in vocational schools. The research was conducted at the maritime school of SMK Putera Samodra, Yogyakarta, Indonesia, using the quantitative approach of the TOPSIS method to determine the best work behaviour performance from the head of the laboratory. Work behaviour assessment criteria include service orientation, integrity, commitment, discipline, and cooperation. According to the assessment results by the principal and 31 colleagues, the best work behaviour is that of the head of the merchant ship engineering laboratory. Overall, the best work behaviour analysis results can have a positive impact, such as recognition, improved leadership practices, and enhanced performance in all laboratories in vocational schools. Other potential implications of work behaviour research results for schools can be developing leadership with the best strategies, identifying areas for improvement, allocating more resources to laboratories, and the positive effects of leadership qualities on vocational schools.

### INTRODUCTION

The quality of education is an essential factor in shaping trained human resources that support the notion of productivity, competitiveness, and economic growth of the nation (Wu et

al., 2018). The existence of Vocational High Schools is increasingly in demand because graduates are expected to work immediately. Vocational schools practice more in their learning. The quality of education is not only determined by the educational process but can also be influenced by teacher's performance as educators (Sudibjo & Prameswari, 2021). In addition, the quality of vocational education can be improved through adequate laboratory facilities and practical learning experiences to meet the demands of the world of work, which are constantly evolving from time to time (Purwaningrum et al., 2022).

This is in line with research (Wahjusaputri & Bunyamin, 2022). Vocational high school quality teachers are called when they have met the demands of Vocational Schools and industry, such as mastering hard skills and employability skills. Hadromi et al. 2019 J. Phys.: Conf. Ser. 1273 012001), but the gap in teacher quality still exists (Wu et al., 2018). Not all vocational schools have adequate laboratories, and management is not maximized. In order to assess the competence of employees, it is essential to evaluate the performance of team members (Nurmaesah et al., 2023). But in general, selecting the best employees is still manually using many criteria and alternatives, making it difficult for top managers to assign them periodically because it requires a long and complicated process (Rahim et al., 2018). Assessment of performance and work behaviour by principals sometimes only stops at filling in routine paper forms and is not optimally utilized in school management leadership.

Given the gap, it is necessary to research the human resources of vocational school laboratories. This research was conducted at SMK Putera Samodra, a maritime vocational school that has 4 (four) laboratories, namely commercial ship nautical, commercial ship engineering, language, and computer laboratories, which are closely related to logistics and digital supply chain activities. Implementing the digital supply chain has been proven to have a significant positive relationship with logistics leadership (Rustina, Teguh, et al., 2023).

Leadership is also important in digital governance to connect administrative work easily and correctly (Mohammed et al., 2022). While research on performance in vocational schools is still limited with the SAW method, performance assessment includes commitment, integrity, service orientation, discipline, cooperation, and leadership. This study uses the TOPSIS method to assess the work behaviour of laboratory heads in vocational schools.

Meanwhile, research (Pangestu, 2019) on laboratory assessment is more on physical criteria, namely practice areas, atmosphere, temperature, lighting, maintenance, and workstations. According to (Gustalika et al., 2021), the criteria for practicum assistants include academic criteria, microteaching, personality, and interview results. In contrast, this study uses criteria for assessing the work behaviour of school laboratory heads, namely service orientation, integrity, commitment, discipline, and cooperation, to determine the best work behaviour of laboratory heads.

This study's findings reflect the best work behaviour at SMK Pelayaran Putera Samodra laboratory heads. Knowing the best work behaviour is expected to motivate other employees and give awards for their achievements. The contribution to the institution is that it allows the identification of areas that require improvement and ultimately leads to improving the quality of vocational education to improve quality and professionalism to assist schools in producing competent and work-ready graduates.

## **LITERATURE REVIEW**

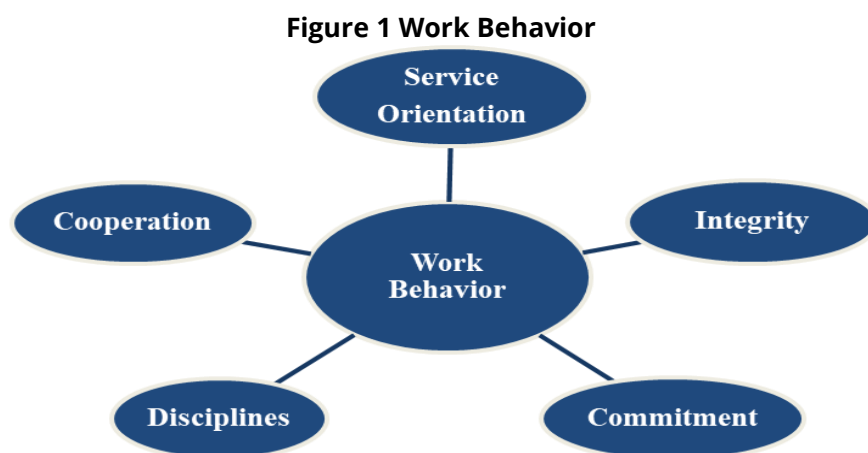
### **Work Behavior**

In understanding how work behaviour affects employee performance, it is important to consider the various factors that influence employee behaviour and performance. Several studies have investigated the relationship between multiple aspects of work behaviour and employee performance. The research results of Andriyanty et al. highlight the significant effect of work behaviour on employee performance, mediated by motivation and performance (Novita

Sari., Achmad Hizazi., 2021). The role of self-initiated organizational member behaviour mediates the relationship between organizational support, psychological capital, and job performance (Suhayat et al., 2023). Work engagement partially mediates the relationship between learning organizations and innovative work behaviour, which has a relationship with learning organizations (Hosseini et al., 2021). With the emotional support of leaders, it can motivate members to develop ideas, take risks, and behave innovatively at work (Green, 1997).

### Service Orientation

Considering that education is a service sector, service is vital for users. The quality of academic services teachers provide is influenced by service-oriented leadership or support services (Díaz-García et al., 2023), emphasizing the importance of innovating technology in line with needs by building channels and communicating while becoming a digital culture. Service activities are needed by teachers, especially laboratory heads and laboratory assistants, to improve competence (MS, 2022). Practical activities in the laboratory aim to prove the theoretical concepts obtained in the lesson (Sari et al., 2023).



### Integrity

Integrity is one of the criteria in performance assessment because performance assessment includes several sub-criteria, namely service orientation, commitment, integrity, discipline, cooperation, and leadership (Wati, 2020). Integrity is required in training and education, including leadership and management practices and strategies (Antes et al., 2019). Empirical findings from youth development research on character development require mentoring and developing integrity and preferred leadership styles among young people (Arshad et al., 2021).

Besides, integrity is also one of the values that must be created in character development in formal education (Suherman et al., 2019). The higher a person's integrity, the more obedient that person is to the rules (Triyono & Tjahjono, 2023). This is very appropriate for SMK because it is a collection of young people.

### Commitment

Commitment is crucial in organizations to maintain organizational integrity and change (Triyono & Tjahjono, 2023). A strong belief and acceptance of the values and goals of the organization and high team member commitment indicate a high team. Behavioural commitment is how employees are connected to the organization (Affandi et al., 2023). Research in educational organizations confirms a significant influence on performance between affective commitment and job satisfaction on performance (Maslan et al., 2023).

Research by (Supriyanto, 2022) found that affective commitment has no significant impact on performance but contributes to service quality significantly. Affective commitment is a form of employee and organizational attachment based on vision, values, and emotions, where this positive behaviour is highly preferred by the organization (Tjahjono, 2015). Other research results state that servant leadership and positive organizational support affect the commitment and behaviour of organizational members.

However, commitment does not significantly mediate perceived organizational support and organizational member behaviour (Gunawan et al., 2023). At the organizational level, organizational commitment also influences governance and teacher performance. (Affandi et al., 2023). When linked with transformational leadership, teacher commitment and performance are positive effects of leadership. Furthermore, teacher commitment positively affects teaching performance (Alzoraiki et al., 2023), knowledge sharing, organizational learning, and organizational commitment (Vu & Yazdani, 2021). Teacher commitment mediates the relationship between transformational leadership and sustainable teaching performance (Alzoraiki et al., 2023).

### **Discipline**

Various references show the impact of discipline on multiple aspects of vocational high school education, including academic performance, teacher employability, and students. Work discipline is the awareness and willingness of employees to comply with company instructions and decisions (Alzoraiki et al., 2023). Research results from (Tentama et al., 2019) emphasize the importance of discipline in vocational schools to prepare students for a workforce in industry. In line with this, teacher assessment results according to gender and work experience show that discipline significantly correlates with work motivation (Afandi et al., 2021).

Work discipline partially also has a significant effect on the performance of high school civil servant teachers, and simultaneously, work motivation significantly affects the performance of high school teachers (Yuliastanty, Stepanina, 2023). Therefore, fostering a culture of discipline in vocational high schools is very important to shaping positive behaviour and performance of students and educators.

### **Cooperation**

Research results (Das Neves et al., 2021) confirm that the essential competency for active learning is teacher cooperation (teamwork). Teamwork competence supports work efficiency and effectiveness, resulting from group member coordination, communication, and cooperation of group members (Mallillin & Mallillin, 2020). Improve performance instruments by facilitating cooperation through collective components (Kuvaas, 2006).

Cooperation is also one of the characteristics developed to strengthen character education in formal education. According to PP No. 87/2017 on Strengthening Character Education, followed by the Decree of the Minister of Education and Culture of the Republic of Indonesia No. 20/2018, are religion, nationalism, independence, and integrity.

So, employees and teachers must have these characteristics as national values that schools need to develop (Suherman et al., 2019). Cooperation and trust are built by school management leadership (Shie & Chang, 2022). In the maritime field, collaboration and coordination of various parties are essential to build cooperation and enable the exchange of important information, handling risky, suspicious, and emergency events more effectively (Rustina, Wening, et al., 2023).

### **Technique For Order Of Preference By Similarity To Ideal Solution**

The Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) was first used by Hwang dan Yoon (Hwang & Yoon, 1981). This method is one method for solving multi-attribute decision-making (MADM) problems where the best-selected alternatives have the

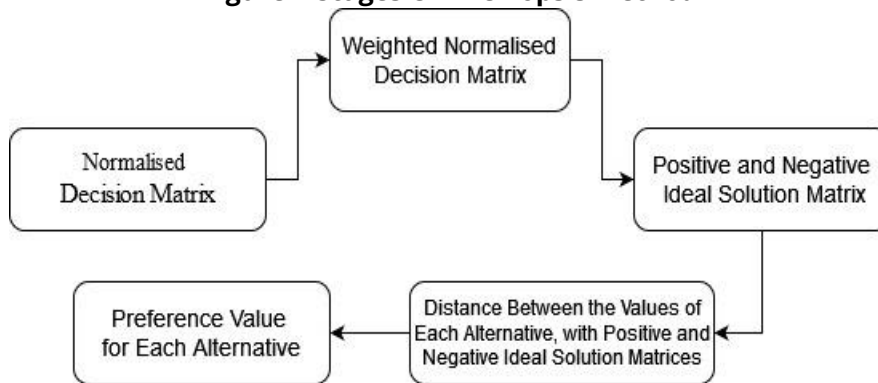
shortest distance to the positive ideal solution but have the longest distance to the negative ideal solution. This method has several benefits, including simplicity, logical reasoning, clarity, efficient computation, and the capability to assess the comparative effectiveness of each option in a straightforward mathematical manner (Parida, 2019).

Advantages of the TOPSIS method include offering a straightforward and intuitive approach to evaluating alternatives across multiple criteria, taking into account both the best and worst options, incorporating quantitative and qualitative factors into decision-making, and facilitating the ranking of alternatives based on their overall performance compared to the ideal solution.

On the other hand, the TOPSIS method has drawbacks such as being sensitive to the method used for normalization, involving subjectivity in determining criteria weights, necessitating precise and reliable data for meaningful outcomes, and potentially overlooking uncertainty and risk factors in decision-making. Understanding these strengths and weaknesses can enhance the practical application of the TOPSIS method in decision-making contexts (Roszkowska, 2024).

**Stages Of The Topsis Method**

**Figure 2 Stages Of The Topsis Method**



Normalized Decision Matrix (R), the formula is  $r_{ij} = x_{ij} / \sqrt{\sum_{i=1}^m x_{ij}^2}$  with  $i=1,2, \dots,m$ ; where the value of  $m$  = the number of alternatives evaluated, and the value of  $X_{ij}$  = the rating value of the suitability of the  $i$  - th alternative against the  $j$ th criterion. Weighted Normalized Decision Matrix (Y). The normalized data value (R) is multiplied by the weight (W) to get a weighted normalized decision matrix (Y).  $y_{ij}=w_j.r_{ij}$ , where  $w_j$  = positive rank for the profit attribute and negative value for the cost attribute. Value  $w_j$  = weight value of the  $j$ th criterion C.

Positive (A+) and Negative (A-) Ideal Solution Matrix can be calculated based on the normalized weight ranking. The Positive Ideal Solution formula  $A^+ = (y_{1+}, y_{2+}, y_{3+}, \dots, y_{n+})$ . while the Negative Ideal Solution is formulated simply  $A^- = (y_{1-}, y_{2-}, y_{3-}, \dots, y_{n-})$ . Where:

$J$  = benefit criteria,  $J'$  = cost criteria, and  $j = 1, 2, 3, \dots, n$

$y_{ij}$  = weighted normalized decision matrix element Y

$y_{j+} = \max_i\{y_{ij}\}$ ; if  $j$  is a benefit/advantage attribute

$y_{j+} = \min_i\{y_{ij}\}$ ; if  $j$  is a cost attribute.

$y_{j-} = \min_i\{y_{ij}\}$ ; if  $j$  is a benefit attribute

$y_{j-} = \max_i\{y_{ij}\}$  ; if  $j$  is a cost attribute

**Positive/Negative Ideal Solution Distance (D)**

Distance of Alternative  $A_i$  Positive Ideal Solution  $D^+_i = \sqrt{\sum_{j=1}^n (y_{j+} - y_{ij})^2}$ . Distance of Alternative  $A_i$  Negative Ideal Solution  $D^-_i = \sqrt{\sum_{j=1}^n (y_{ij} - y_{j-})^2}$ . Where:

$y_j$  =  $j$ th attribute positive ideal solution

$y_{-j}$  = negative ideal solution of the  $j$ th attribute

$y_{ij}$  = element of the weighted normalized decision matrix  $Y$

Preference Value ( $V$ ) of each alternative ( $V_i$ ):  $V_i = D_i^- - D_i^+ + D_i^+$ . The preference value chosen is the most significant  $V_i$  value.

## METHODS

This research uses a quantitative approach, where data analysis determines the best work behaviour with the TOPSIS method decision support system. The data processed are the results of the principal's assessment of the work behaviour of 4 (four) laboratory heads at SMK Pelayaran Putera Samodra, namely the laboratories of Commercial Ship Nautics, Commercial Ship Engineering, Language, and Computer.

Peers use descriptive analysis to assess the work behaviour of laboratory heads. Furthermore, peers - teachers and education personnel with at least a Bachelor's degree and a minimum of 5 years of service - compared the results with the principal's assessment. The questionnaire includes criteria for service orientation, integrity, commitment, discipline, and cooperation with Likert scale answer options.

**Table 1 Methods**

Criteria	Indicators
Service Orientation	Being polite and friendly, neat and polite in appearance, providing opportunities to participate, being fair, sharing experiences, and providing laboratory information services.
Integrity	Behave well by the code of ethics, make a positive contribution, have a sense of pride in their profession, be consistent between words and deeds, be earnest in carrying out the duties and functions of the position, be willing to bear all work risks, set an example in attitude, behaviour, and speech, apply the principle of honesty, be open.
Commitment	Implementing the basic principles of Pancasila ideology, upholding the Unitary Republic of Indonesia, appreciating diversity, prioritizing the interests of duty over personal / group interests, working hard, carrying out duties and responsibilities, following up on suggestions and input, feeling ownership, and maintaining facilities and infrastructure.
Discipline	Planning, implementing, assessing, making reports on time, carrying out management according to workload, requesting permission with valid reasons and evidence, and completing other tasks outside laboratory duties on time.
Cooperation	Develop cooperation, respect peers, discuss progress, difficulties, and potential, establish communication with stakeholders, and implement agreed decisions.

## RESULT AND DISCUSSION

Alternative data (A), Criteria (C), and suitability rating evaluation data from each alternative on each criterion (X) entered previously are as follows in;

**Table 1: A1 (Commercial Nautical Lab), A2 (Ship Engineering Lab), A3 (Language Lab), A4 (Computer Lab)**

No	Criteria	Weight	Attribute
C1	Service Orientation	15	Benefit
C2	Integrity	30	Benefit
C3	Commitment	20	Benefit
C4	Discipline	20	Benefit
C5	Cooperation	15	Benefit

**Table 2: Rating The Suitability Of Each Alternative On Each Criterion (X)**

Alternative	Criteria				
	C1	C2	C3	C4	C5
A1	3	4	4	3	4
A2	5	5	5	4	5
A3	3	3	3	3	2
A4	3	4	4	3	3

**Weight Normalization**

The weight values entered are W=(15,30,20,20,15). Since the total sum of weight values is not equal to 1, it is necessary to normalize the weight W as follows:

$$W7 = 15 / (15+30+20+20+15) = 15 / 100 = 0.15$$

$$W8 = 30 / (0.15+30+20+20+15) = 30 / 100 = 0.3$$

$$W9 = 20 / (0.15+0.3+20+20+15) = 20 / 100 = 0.2$$

$$W10 = 20 / (0.15+0.3+0.2+20+15) = 20 / 100 = 0.2$$

$$W11 = 15 / (0.15+0.3+0.2+0.2+15) = 15 / 100 = 0.15$$

Therefore, the normalized weight values obtained are: W = (0.15, 0.3, 0.2, 0.2, 0.15)

**Calculating Vector S Values**

$$S1 = (3^{0.15})(4^{0.3})(4^{0.2})(3^{0.2})(4^{0.15}) = 3.6169$$

$$S2 = (5^{0.15})(5^{0.3})(5^{0.2})(5^{0.2})(5^{0.15}) = 4.7818$$

$$S3 = (3^{0.15})(3^{0.3})(3^{0.2})(3^{0.2})(2^{0.15}) = 2.823$$

$$S4 = (3^{0.15})(4^{0.3})(4^{0.2})(3^{0.2})(3^{0.15}) = 3.4641$$

**Calculating Vector V Values**

$$V1 = 3.6169 / (3.6169 + 4.7818 + 2.823 + 3.4641) = 0.2463$$

$$V2 = 4.7818 / (3.6169 + 4.7818 + 2.823 + 3.4641) = 0.3256$$

$$V3 = 2.823 / (3.6169 + 4.7818 + 2.823 + 3.4641) = 0.1922$$

$$V4 = 3.4641 / (3.6169 + 4.7818 + 2.823 + 3.4641) = 0.2359$$

**Ranking of Vector V Values**

Based on the calculation results of vector V values, they can be ranked in descending order (from the most considerable value to the smallest value) as follows:

No	Alternative	Result
1	A <sub>2</sub>	0.32560449542757
2	A <sub>1</sub>	0.24628265347843
3	A <sub>4</sub>	0.23588102896252
4	A <sub>3</sub>	0.19222503844331

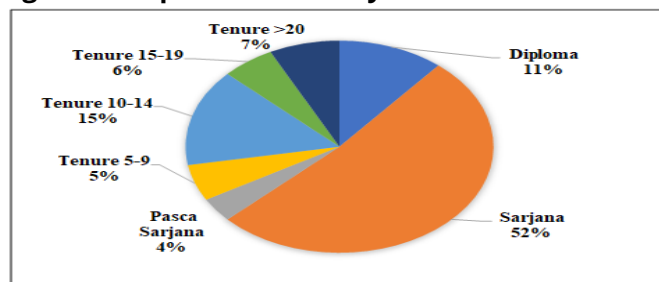
The ranking results show that the most considerable value is V2 = 0.32560449542757, and A2 is the best alternative. In other words, the head of the commercial ship engineering laboratory is the selected alternative that is expected to produce more competent graduates in the field of engineering. A2 work behaviour gets the best achievement, followed by A1, A4, and A3. Furthermore, applying the TOPSIS method in this study will help schools objectively identify the strengths and weaknesses of laboratory work behaviour of laboratory heads.

Furthermore, the results are compared between the assessment by the principal and the assessment of peers. Higher Education (Bachelor = 52% and Postgraduate = 4%) has advanced knowledge and skills that can positively influence work behaviour, engage in continuous

learning, and apply critical thinking skills to the work environment, thus leading to innovative problem-solving and decision-making to be more effective. The Diploma = 11% focuses more on practical skills and technical knowledge, which are essential for specific roles. Work behaviour is more task-oriented, with a strong emphasis on applying learned techniques directly to job responsibilities.

Employees with longer tenure >20 years =7% and 15-19 years = 6% tend to deeply understand company culture and operational processes. Work behaviours, which include mentoring younger employees and leading by example, contribute to stable and experienced employees. Medium to Short Tenure (Tenure 10-14 = 15% and 5-9 = 5%) are still in the career growth phase, actively seeking opportunities for advancement and eager to demonstrate capabilities. Work behaviours at these tenures also include high energy, enthusiasm, and a willingness to take on new challenges.

**Figure 3 Respondent Data By Education And Tenure**

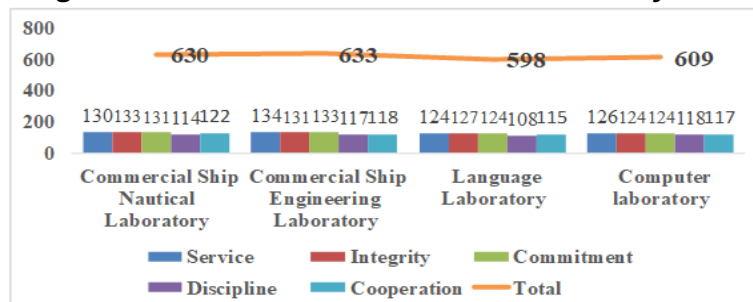


Respondents' varied educational backgrounds and length of tenure indicate a diverse workforce, which can enrich perspectives and exchange ideas. This diversity can enhance creativity and innovation within the organization.

Understanding the distribution of education levels and tenure can help tailor leadership development programs and succession planning. Organizations can leverage the strengths of highly educated and tenured employees for leadership roles while providing career development opportunities for those with lesser tenure.

The distribution of educational qualifications and tenure among respondents, as depicted in the pie chart, offers valuable insights into work behaviour. It demonstrates the potential for a dynamic and diverse workplace where different levels of education and experience contribute uniquely to organizational culture and effectiveness. The results of colleagues' assessments of the work behaviour of the head of the laboratory are presented in Figure 3.

**Figure 4 Total Work Behavior Of The Laboratory Head**



The Head of Laboratory Commercial Ship Technique has the highest total score, which is 633, making it the laboratory with the best performance in work behaviour. According to the criteria of work behaviour, the highest consecutive scores of the commercial ship technique laboratory are service orientation 134, commitment 133, integrity 131, cooperation 118, and



discipline 117. The impact of this analysis can be significant for vocational schools and the Head of the Commercial Ship Technique Lab.

Here are some potential impacts. Schools should acknowledge and reward the heads of the commercial ship technique laboratory for their outstanding performance and motivate them to carry out effective leadership. Leadership development can consider the successful strategies and practices of the head of the commercial ship technique laboratory, serving as a model for leadership development in schools.

Additionally, identifying areas for improvement and enhancing work behaviour comprehensively by comparing the best performance with other laboratory heads can be beneficial. Schools can allocate more resources to the commercial ship technique laboratory to maintain and further improve performance. Leadership quality in this Commercial Ship Technique Laboratory positively impacts student learning experiences, engagement, and outcomes in the laboratory.

## **CONCLUSION**

Based on assessments by the School Principal and colleagues, the best work behaviour is exhibited by the head of the commercial ship technique laboratory. However, it is crucial to cultivate a culture of continuous improvement and encourage laboratory heads to innovate, experiment, and adjust work practices based on feedback and results.

Overall, analyzing the best work behaviour of laboratory heads can lead to positive outcomes such as recognition, improved leadership practices, and enhanced performance in all laboratories at vocational schools. The potential impact of research results on school work behaviour includes developing leadership by considering successful strategies, identifying areas for improvement, allocating more resources to laboratories, and the positive effects of leadership quality on the teaching and learning experience in vocational schools

## **SUGGESTION**

Based on research conducted at Putera Samodra Seafaring Vocational School, Yogyakarta, the following are several suggestions that can be implemented to improve the effectiveness and efficiency of laboratory management and the quality of vocational education:

### **1. Leadership Training Program Development**

Provide ongoing leadership training programs for laboratory heads to strengthen their abilities in managing teams and resources. This training must cover aspects such as service orientation, integrity, commitment, discipline, and cooperation.

### **2. Periodic Evaluation**

Conduct regular evaluations of the work behavior of laboratory heads and other employees using structured methods such as TOPSIS. This evaluation should involve assessments from the principal and colleagues to get a comprehensive picture of performance.

### **3. Awards and Recognition**

Giving awards to laboratory heads with the best performance as a form of motivation and recognition for their dedication. These awards may take the form of financial incentives, certificates, or further career development opportunities.

### **4. Greater Resource Allocation**

Allocate more resources, both in the form of funds, equipment and experts, to laboratories that demonstrate the best performance. This will help improve the overall quality of the laboratory and support a more effective practical learning process.

### **5. Best Practice Adjustments**

Identify and adopt best practices from top performing laboratories for implementation in other laboratories. These include management methods, learning approaches, and employee motivation techniques.

#### 6. Feedback and Innovation

Encourage a culture of constructive feedback and continuous innovation. The laboratory head must be open to input from various parties and dare to try new approaches that can increase the operational effectiveness of the laboratory.

The implementation of these suggestions is expected to improve laboratory performance at the Putera Samodra Seafaring Vocational School, Yogyakarta, so that it can support the goals of vocational education which produces graduates who are work ready and competent in their fields.

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7399

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