

## Assessing the Validity of Transformational Leadership, Motivation, and Job Satisfaction Instruments: A CVI and CCA Approach in Merangin District

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### Article Info

#### Article history:

Received 15, 02, 2026  
Revised 20, 03, 2026  
Accepted 05, 05, 2026

#### Keywords:

Transformational leadership;  
motivation; job satisfaction;  
CVI; CCA; instrument  
validation.

### ABSTRACT

This study aims to assess the validity and reliability of instruments measuring transformational leadership, motivation, job satisfaction, and teacher performance in senior high schools in Merangin District. A quantitative approach was employed using a two-stage validation process, namely Content Validity Index (CVI) and Confirmatory Composite Analysis (CCA). The study involved three expert validators and 75 teacher respondents. The CVI results indicated that most items achieved a high level of agreement among experts ( $I-CVI = 1.00$ ), although several items ( $I-CVI = 0.67$ ) required revision to improve clarity and relevance. Furthermore, the CCA results showed that all constructs met reliability criteria, with Composite Reliability (CR) values exceeding 0.70. Most indicators demonstrated adequate factor loadings ( $>0.70$ ), indicating acceptable construct validity; however, several indicators fell below the recommended threshold, including one item with a very low loading that should be eliminated. Overall, the findings suggest that the instrument is generally valid and reliable, although refinement of several items is necessary to enhance measurement accuracy. This study contributes to the development of more robust and contextually appropriate measurement instruments in educational research.



### INTRODUCTION

Education plays a crucial role in developing high-quality and competitive human resources. In the school context, the quality of education is greatly influenced by the performance of teachers as the primary implementers of the learning process (Alwi & Mumtahana, 2023; Ximenes, 2024). Teachers play a role not only in delivering material but also in effectively designing, managing, and evaluating learning activities (Nguyen et al., 2022; Fawait et al., 2024). Therefore, improving teacher performance is a crucial aspect in efforts to improve the quality of education, particularly in regions that still face various challenges in educational attainment, such as Merangin Regency.

Teacher performance is influenced by various factors, one of which is the principal's leadership. In an educational setting, leadership is not only related to administrative functions but also encompasses the ability to direct, motivate, and create a supportive work environment (Sariaki et al, 2025). Transformational leadership is a relevant approach because it emphasizes the leader's ability to inspire and empower organizational members through a clear vision and attention to individual needs (Bashori et al., 2022; Khan et al., 2025). This approach is believed to be able to encourage increased commitment and positive work behavior among teachers.

In addition to leadership, psychological factors such as motivation and job satisfaction also play a significant role in determining teacher performance (Sahid et al., 2023). Work motivation relates to internal and external drives that influence enthusiasm and persistence in work, while job satisfaction reflects an individual's assessment of their working conditions (Pincus, 2023; Taris, 2023). These two variables are interrelated and can strengthen the influence of leadership on performance. Several studies have shown that transformational leadership can increase motivation and job satisfaction, ultimately impacting teacher performance (Alzoraiki et al., 2023; Sebulen & Jimenez, 2024).

Although the relationship between transformational leadership, motivation, job satisfaction, and teacher performance has been extensively researched, there is still a need to strengthen the measurement validity of these constructs, especially in the local context. The educational conditions in Merangin Regency, which still face various limitations, demonstrate the importance of using valid and reliable instruments to assess the factors influencing teacher performance. Therefore, this study aims to evaluate the validity of the instruments used in measuring transformational leadership, motivation, and job satisfaction using the Content Validity Index (CVI) and Confirmatory Composite Analysis (CCA) approaches, so that accurate measuring instruments can be obtained and can be used in further educational research.

## **LITERATUR REVIEW**

### **1. Transformational Leadership**

Transformational leadership is a leadership style that focuses on the leader's ability to inspire, motivate, and develop individual potential to optimally achieve organizational goals (Eduzor, 2024; Ridic et al., 2025). In the educational context, a principal's transformational leadership includes conveying a clear vision, supporting teacher professional development, and creating a work environment conducive to improving the quality of learning (Sariaki et al, 2025).

Transformational leadership consists of four main dimensions: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. These four dimensions play a role in creating a positive work climate, increasing trust, and encouraging teachers to innovate and develop professionally (Hilto et al., 2023; Hui & Long, 2024; Pitichat & Riggio, 2025). Empirical research shows that transformational leadership has a significant influence on teacher performance, both directly and through psychological variables such as motivation and job satisfaction (Adriantoni et al., 2023; Usman & Haryadi, 2023). Effective leadership can create a supportive organizational culture, increase work commitment, and encourage better performance.

## 2. Motivation

Teacher work motivation is a crucial factor influencing their level of engagement, enthusiasm, and persistence in carrying out learning tasks. Motivation can stem from both intrinsic and extrinsic factors, such as satisfaction with teaching, recognition, and career development opportunities (Baroudi et al., 2022; Abdullah et al., 2023). In the educational context, principals play a crucial role in creating these conditions through a supportive and empowering leadership style.

Various studies have shown that work motivation has a strong relationship with teacher performance. Teachers with high motivation tend to be more active, creative, and responsible in carrying out their duties (Shermukhammadov, 2022; Gusrianto et al., 2025). Furthermore, motivation also acts as a mediator in the relationship between transformational leadership and teacher performance.

## 3. Job Satisfaction

Job satisfaction is an emotional and cognitive state that reflects the extent to which an individual feels satisfied with their job (Judge et al., 2020; Sudibjo & Sutarji, 2020). In the context of teachers, job satisfaction is influenced by various factors, such as the work environment, relationships with coworkers, recognition, and support from leaders (Ker et al., 2022). Research shows that principal leadership plays a crucial role in increasing teacher job satisfaction by creating a positive and supportive work climate (Guo et al., 2025; Sariakin et al., 2025).

High job satisfaction will motivate teachers to work optimally and contribute to achieving organizational goals. Furthermore, job satisfaction also plays a role as a variable related to teacher motivation and performance. Although some studies have shown that job satisfaction does not always directly impact performance, this variable remains an important indicator in assessing the quality of teachers' work experiences and the effectiveness of leadership in educational organizations.

## **METHODS**

### **Research Design**

This study uses a quantitative approach with a descriptive-evaluative design that aims to assess the validity of the instrument in measuring the constructs of transformational leadership, motivation, and job satisfaction. This study focuses on evaluating the quality of the measurement model, not on testing the causal relationships between variables. To ensure comprehensive instrument validity, this study integrates the Content Validity Index (CVI) approach for content validity and Confirmatory Composite Analysis (CCA) within a Partial Least Squares Structural Equation Modeling (PLS-SEM) framework for construct validity.

### **Research Subject**

This study involved three expert validators and 75 respondents who participated in different stages of the instrument validation process. The three validators were engaged in the initial stage to assess the content validity of the instrument using the Content

Validity Index (CVI), focusing on the relevance, clarity, and representativeness of each item. Meanwhile, the 75 respondents were involved in the subsequent stage, where data were collected to evaluate the construct validity and reliability of the instrument through Confirmatory Composite Analysis (CCA). Thus, all participants contributed systematically according to their respective roles in ensuring the overall quality and robustness of the measurement instrument.

### **Research Procedure**

This research was conducted in several stages. The first stage was the development of a research instrument based on theoretical studies relevant to the variables of transformational leadership, motivation, and job satisfaction. The second stage was the content validity test of the instrument through expert assessment using the CVI approach. The third stage was the revision of the instrument based on expert input to improve item clarity and appropriateness. The fourth stage was data collection by distributing questionnaires to respondents. The final stage was data analysis using the CCA approach to evaluate construct validity and reliability.

### **Instruments and Data Collection Techniques**

The instrument used in this study was a structured questionnaire based on theoretical indicators for each variable: transformational leadership, motivation, and job satisfaction. Each variable was measured using several items representing the dimensions of the construct being studied. The measurement scale used was a Likert scale to quantitatively capture respondents' perceptions. Data collection was conducted through a survey method, distributing questionnaires to teachers as research respondents. Prior to use, the instrument was tested for content validity through expert judgment using the CVI method, considering the relevance, clarity, and representativeness of each item to the construct being measured.

### **Data analysis technique**

Data analysis in this study was conducted in two main stages. The first stage was content validity testing using the Content Validity Index (CVI), which included calculating Item-Level CVI (I-CVI) and Scale-Level CVI (S-CVI). The CVI value was used to determine the suitability of each instrument item based on the level of expert agreement. The second stage was construct validity and reliability testing using the Confirmatory Composite Analysis (CCA) approach within the PLS-SEM framework with the assistance of SmartPLS software. Evaluation of the measurement model was conducted based on several criteria: indicator validity (outer loading), construct reliability (Composite Reliability and Cronbach's Alpha), convergent validity (Average Variance Extracted/AVE), and discriminant validity, tested using the Fornell-Larcker criteria and the Heterotrait-Monotrait Ratio (HTMT).

## FINDINGS AND DISCUSSION

### *Findings*

Each item in the instrument was assessed by experts. The standard refers to a CVI  $\geq 0.80$  as the instrument's content validity quality standard. The CVI assessment results are presented in Table 1.

**Table 1. Result of Content Validity Index**

No.	Statement Items	Validator			Total	I-CVI	UA	Category
		1	2	3				
1	I demonstrate accurate knowledge of my subject matter	1	1	1	3	1,00	1	Relevant
2	I connect content with past and future learning experiences	1	1	1	3	1,00	1	Relevant
3	I demonstrate a wide range of skills in my subject area ( <i>I demonstrate mastery of core concepts, procedures, and practical applications in the field of study I teach.</i> )	1	1	0	2	0,67	0	Revision Needed
4	I communicate content in a way that students can understand	1	1	1	3	1,00	1	Relevant
5	I use school and community resources to help students ( <i>I leverage school resources and community partnerships (e.g., libraries, local resource persons, or study visits) to support student learning</i> )	1	0	1	2	0,67	0	Revision Needed
6	I use strategies to improve students' understanding	1	1	1	3	1,00	1	Relevant
7	I changed the teaching methodology to make the topic relevant	1	1	1	3	1,00	1	Relevant
8	I understand the individual differences of students and teach accordingly	1	1	1	3	1,00	1	Relevant
9	I use the appropriate materials, technology, and resources	1	1	1	3	1,00	1	Relevant
10	I do classroom tests to monitor student performance	1	1	1	3	1,00	1	Relevant
11	I evaluate student performance and provide feedback	1	1	1	3	1,00	1	Relevant
12	I maintain student outcomes and use future improvements	1	1	1	3	1,00	1	Relevant
13	I revise content to improve student achievement	1	1	1	3	1,00	1	Relevant
14	I keep official records of students' learning progress	1	1	1	3	1,00	1	Relevant
15	I create a climate of mutual trust and respect in the classroom	1	1	1	3	1,00	1	Relevant
16	I maintain a classroom setting that minimizes distractions	1	1	1	3	1,00	1	Relevant
17	I create a welcoming and supportive classroom environment	1	1	1	3	1,00	1	Relevant
18	I believe in my Principal based on his words	1	1	1	3	1,00	1	Relevant
19	School leaders set a good and consistent example	1	1	1	3	1,00	1	Relevant
20	The principal shows integrity in every decision ( <i>The principal shows integrity in decision-making by being consistent, transparent, and fair to all school residents</i> )	1	0	1	2	0,67	0	Revision Needed

No.	Statement Items	Validator			Total	I-CVI	UA	Category
		1	2	3				
21	I feel proud to have a Principal like him	1	1	1	3	1,00	1	Relevant
22	The principal is a role model for teachers and staff ( <i>The principal becomes a role model through time discipline, work ethics, and adherence to school policies.</i> )	1	0	1	2	0,67	0	Revision Needed
23	School leaders communicate a clear vision	1	1	1	3	1,00	1	Relevant
24	I am motivated by the Principal's vision and goals	1	1	1	3	1,00	1	Relevant
25	Principals arouse the morale of teachers and staff	1	1	1	3	1,00	1	Relevant
26	Principal gives positive hope for the future of the school	1	1	1	3	1,00	1	Relevant
27	The principal inspired me to achieve a common goal	1	1	1	3	1,00	1	Relevant
28	Open communication about important school issues	1	1	1	3	1,00	1	Relevant
29	Teachers are invited to be involved in setting important goals/decisions	1	1	1	3	1,00	1	Relevant
30	Supported creative thinking in solving problems	1	1	1	3	1,00	1	Relevant
31	Be open to new ideas from teachers and staff	1	1	1	3	1,00	1	Relevant
32	Supporting the professional development of teachers	1	1	1	3	1,00	1	Relevant
33	Provide regular and helpful feedback	1	1	1	3	1,00	1	Relevant
34	Paying attention to the development needs of each teacher	1	1	1	3	1,00	1	Relevant
35	Provide support when teaching difficulties	1	1	1	3	1,00	1	Relevant
36	Appreciate the difference in character and potential of teachers	1	1	1	3	1,00	1	Relevant
37	Taking time to listen to teachers' problems	1	1	1	3	1,00	1	Relevant
38	I love working at this school	1	1	1	3	1,00	1	Relevant
39	Overall, I am satisfied with my work	1	1	1	3	1,00	1	Relevant
40	I would recommend my school as a good place to work	1	1	1	3	1,00	1	Relevant
41	If I could decide again, I would still choose to work as a teacher ( <i>I am committed to continuing my career as a teacher in the future.</i> )	1	0	1	2	0,67	0	Revision Needed
42	I don't want to transfer to another school if possible	1	1	1	3	1,00	1	Relevant
43	The advantages of being a teacher clearly outweigh the disadvantages	1	1	1	3	1,00	1	Relevant
44	I don't regret deciding to become a teacher ( <i>I feel that the decision to become a teacher is in line with my values and career goals</i> )	1	1	0	2	0,67	0	Revision Needed
45	I wonder if it would be better to choose another profession	1	1	1	3	1,00	1	Relevant
46	I work because it's fun to do this task.	1	1	1	3	1,00	1	Relevant
47	I work because I think this task is interesting to do.	1	1	1	3	1,00	1	Relevant
48	I work because I love doing this task.	1	1	1	3	1,00	1	Relevant
49	Ability to identify problems ( <i>I identify learning problems proactively because</i>	1	0	1	2	0,67	0	Revision Needed

No.	Statement Items	Validator			Total	I-CVI	UA	Category
		1	2	3				
	<i>I think they are important to achieve teaching goals)</i>							
50	Using effective and efficient methods, media, and resources	1	1	1	3	1,00	1	Relevant
51	Ability to evaluate problems and find solutions	1	1	1	3	1,00	1	Relevant
52	I work because if I don't carry out this task, I will feel bad.	1	1	1	3	1,00	1	Relevant
53	I work because I would feel guilty not doing it.	1	1	1	3	1,00	1	Relevant
54	I work not to feel bad if I don't.	1	1	1	3	1,00	1	Relevant
55	I feel that this job has no relevance to what I expected. ( <i>I carry out tasks mainly to meet external demands and requirements (e.g. rules or formal assessments)</i> )	1	1	0	2	0,67	0	Revision Needed
56	I used to know why I was doing this task, but I don't see the reason anymore.	1	1	1	3	1,00	1	Relevant
57	I feel that sometimes the purpose of this task is not what I want.	1	1	1	3	1,00	1	Relevant

Confirmatory Composite Analysis (CCA) was conducted through a pilot study. 75 respondents were used to provide an objective assessment of the instrument.

Table 2. Result of Confirmatory Composite Analysis (CCA)

No.	Variable	Indicator	Item No. (Statement)	CR Value	Loading Factor	Categories
1	Teacher Performance	Subject Matter Knowledge	I demonstrate accurate knowledge of my subject matter	0,895	0,714	Valid/relayible
2			I connect content with past and future learning experiences	0,895	0,671	Not Valid/relayible
3			I demonstrate mastery of core concepts, procedures, and practical applications in the field of study I teach	0,895	0,715	Valid/relayible
4			I communicate content in a way that students can understand	0,895	0,700	Valid/relayible
5			I leverage school resources and community partnerships—e.g., libraries, local resource persons, study visits—to support student learning	0,895	0,759	Valid/relayible
6	Instructional Planning & Strategy	Assessment	I use strategies to improve students' understanding	0,895	0,801	Valid/relayible
7			I changed the teaching methodology to make the topic relevant	0,895	0,794	Valid/relayible
8			I understand the individual differences of students and teach accordingly	0,895	0,747	Valid/relayible
9			I use the appropriate materials, technology, and resources	0,895	0,772	Valid/relayible
10			I do classroom tests to monitor student performance	0,895	0,730	Valid/relayible
11			I evaluate student performance and provide	0,895	0,802	Valid/relayible

No.	Variable	Indicator	Item No. (Statement)	CR Value	Loading Factor	Categories
12			feedback I maintain student outcomes and use future improvements	0,895	0,767	Valid/ reliable
13			I revise content to improve student achievement	0,895	0,784	Valid/ reliable
14			I keep official records of students' learning progress	0,895	0,761	Valid/ reliable
15		Learning Environment	I create a climate of mutual trust and respect in the classroom	0,895	0,814	Valid/ reliable
16			I maintain a classroom setting that minimizes distractions	0,895	0,779	Valid/ reliable
17			I create a welcoming and supportive classroom environment	0,895	0,814	Valid/ reliable
18	Transformational Leadership	Idealized Influence	I believe in my Principal based on his words	0,955	0,769	Valid/ reliable
19			School leaders set a good and consistent example	0,955	0,882	Valid/ reliable
20			The principal shows integrity in decision-making by being consistent, transparent, and fair to all school residents	0,955	0,890	Valid/ reliable
21			I feel proud to have a Principal like him	0,955	0,850	Valid/ reliable
22			The principal becomes a role model through time discipline, work ethics, and compliance with school policies	0,955	0,902	Valid/ reliable
23		Inspirational Motivation	School leaders communicate a clear vision	0,955	0,862	Valid/ reliable
24			I am motivated by the Principal's vision and goals	0,955	0,900	Valid/ reliable
25	Principals arouse the morale of teachers and staff		0,955	0,881	Valid/ reliable	
26	Principal gives positive hope for the future of the school		0,955	0,910	Valid/ reliable	
27		The principal inspired me to achieve a common goal	0,955	0,889	Valid/ reliable	
28		Intellectual Stimulation	Open communication about important school issues	0,955	0,885	Valid/ reliable
29	Teachers are invited to be involved in setting important goals/decisions		0,955	0,911	Valid/ reliable	
30			Supported creative thinking in solving problems	0,955	0,890	Valid/ reliable
31			Be open to new ideas from teachers and staff	0,955	0,914	Valid/ reliable
32		Individualized Consideration	Supporting the professional development of teachers	0,955	0,882	Valid/ reliable
33	Provide regular and helpful feedback		0,955	0,860	Valid/ reliable	
34	Paying attention to the development needs of each teacher		0,955	0,843	Valid/ reliable	
35	Provide support when teaching difficulties		0,955	0,827	Valid/ reliable	
36			Appreciate the difference in character and potential of teachers	0,955	0,791	Valid/ reliable
37			Taking time to listen to teachers' problems	0,955	0,867	Valid/ reliable
38	Teacher Satisfaction	Job Satisfaction &	I love working at this school	0,833	0,898	Valid/ reliable

No.	Variable	Indicator	Item No. (Statement)	CR Value	Loading Factor	Categories
39		Pride	Overall, I am satisfied with my work	0,833	0,830	Valid/relayible
40			I would recommend my school as a good place to work	0,833	0,848	Valid/relayible
41			I am committed to continuing my career as a teacher in the future	0,833	0,850	Valid/relayible
42		Desire & Certainty to Remain a Teacher	I don't want to transfer to another school if possible	0,833	0,619	T.Valid/ relay
43			The advantages of being a teacher clearly outweigh the disadvantages	0,833	0,807	Valid/relayible
44			I don't regret deciding to become a teacher (I feel that the decision to become a teacher is in line with my values and career goals)	0,833	0,731	Valid/relayible
45			I wonder if it would be better to choose another profession	0,833	0,757	Valid/relayible
46		Intrinsic Motivation	I work because it's fun to do this task.	0,984	0,844	Valid/relayible
47			I work because I think this task is interesting to do.	0,984	0,811	Valid/relayible
48			I work because I love doing this task.	0,984	0,847	Valid/relayible
49		Identified Regulation	I proactively identify learning problems because I think they are important to achieve teaching goals	0,984	0,783	Valid/relayible
50	Teacher Motivation		Using effective and efficient methods, media, and resources	0,984	0,817	Valid/relayible
51			Ability to evaluate problems and find solutions	0,984	0,829	Valid/relayible
52			I work because if I don't carry out this task, I will feel bad.	0,984	0,704	Valid/relayible
53			I work because I would feel guilty not doing it.	0,984	0,789	Valid/relayible
54			I work not to feel bad if I don't.	0,984	0,742	Valid/relayible
55		External Regulation	I feel like this job has no relevance to what I expect. (I perform tasks primarily to meet external demands and requirements—e.g. formal rules or assessments)	0,984	0,766	Valid/relayible
56			I used to know why I was doing this task, but I don't see the reason anymore.	0,984	0,119	Not Valid/relay
57			I feel that sometimes the purpose of this task is not what I want.	0,984	0,762	Valid/relayible

### **Discussion**

The Content Validity Index (CVI) indicates that the developed instrument generally has a very good level of suitability. This is demonstrated by the dominant I-CVI score of 1.00 for most items, indicating that all experts assessed the item as relevant to the construct being measured. This high level of agreement indicates that the instrument was designed based on a strong theoretical foundation and accurately represents the variables of transformational leadership, motivation, job satisfaction, and teacher performance.

However, several items received an I-CVI score of 0.67, indicating that only two of the three experts considered them relevant. These items include items 3, 5, 20, 22, 41, 44, 49, and 55. This score falls below the recommended threshold of three experts, and therefore requires revision. These findings indicate that several indicators still do not fully meet the criteria for clarity, appropriateness, or representativeness of the constructs being measured (Almanasreh et al., 2022; Rusticus, 2024).

Upon closer inspection, items requiring revision tended to have complex sentence structures, contain more than one meaning (double-barreled), or lack specificity in describing the construct indicators. This can lead to differences in interpretation among experts, thus reducing the level of agreement. Furthermore, some items contained terms that were not fully operationalized, making them difficult to assess consistently by experts.

The distribution of items requiring revision also indicated that the issues were not focused on a single variable, but rather spread across several constructs such as teacher performance, transformational leadership, job satisfaction, and motivation. This suggests that although the instrument was generally sound, further refinement was still needed to ensure that each construct was optimally represented by clear and measurable indicators.

Overall, the Universal Agreement (UA) score, which was predominantly 1, reinforced the finding that the instrument had good content quality. However, items with a UA value of 0 indicate differences in perception among experts that require further revision. Thus, content validation using CVI provides a strong basis for the instrument's suitability for use, with the caveat that some items be revised to enhance measurement quality before proceeding to construct validation.

Meanwhile, Confirmatory Composite Analysis (CCA) showed that the instrument used had an excellent level of reliability (Hair Jr et al. 2020; Schamberger et al., 2023). This is demonstrated by Composite Reliability (CR) values for all variables, which were above 0.70: 0.895 for teacher performance, 0.955 for transformational leadership, 0.833 for job satisfaction, and 0.984 for motivation. These values indicate that each construct has high internal consistency and is able to measure the variable stably.

In terms of indicator validity, most items had factor loadings above 0.70, indicating that the indicators make a strong contribution to representing their constructs. For the teacher performance variable, the loading values were within a fairly good range, although one indicator with a value of 0.671 fell slightly below the ideal limit. This indicates that the indicator still contributes, but needs to be revised to optimize its effectiveness.

For the transformational leadership variable, all indicators showed high loading values, ranging from 0.769 to 0.914. This indicates that the transformational leadership construct is well-measured according to its theoretical dimensions. The absence of indicators with low loading values for this variable indicates that the instrument is able to capture the concept of transformational leadership comprehensively and consistently.

For the job satisfaction variable, most indicators also met validity criteria, although one indicator had a low loading value of 0.619. This value indicates that the indicator is not able to optimally represent the construct. Meanwhile, for the motivation variable, almost all indicators demonstrated good validity, except for one indicator with a very low loading value of 0.119, indicating that the item was invalid and not worth retaining in the model.

Overall, the CCA results indicate that the instrument met most of the construct validity and reliability criteria. However, several indicators with low loading values require attention through revision or elimination. Thus, this construct validation process strengthens the results of the previous content validation, while ensuring that the instrument used is truly capable of measuring the constructs of transformational

leadership, motivation, job satisfaction, and teacher performance accurately and empirically.

## CONCLUSION

The results of this study indicate that the instrument used to measure transformational leadership, motivation, job satisfaction, and teacher performance generally met the criteria for good validity and reliability. Content validation using the Content Validity Index (CVI) showed that most items had a high level of agreement among experts (I-CVI = 1.00), although several items with an I-CVI value of 0.67 required revision to improve clarity and appropriateness. Furthermore, the results of construct validation using Confirmatory Composite Analysis (CCA) showed that all variables had Composite Reliability (CR) values above 0.70, indicating high internal consistency. Most indicators also had factor loadings above 0.70, although there were several indicators with values below the standard, including one indicator with a very low value that needed to be eliminated. Overall, the developed instrument can be declared suitable for use, with the note that improvements to several items are made to improve the accuracy and quality of measurement in future research.

## AUTHOR CONTRIBUTIONS

Dian Andriadi conceptualized the study and research approach, developed the research instruments, managed data curation, conducted formal analysis, and drafted as well as revised the manuscript. Urip Sulistiyo contributed to conceptualization, provided supervision, performed validation, and critically reviewed and edited the manuscript. Sofyan was responsible for organizing data collection, contributed to the investigation process and resources, and assisted in reviewing and editing the manuscript. Akhmad Habibi contributed to formal analysis, data interpretation, visualization, and supported manuscript review and editing.

## CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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