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Research Article

INCREASING INNOVATIVENESS THROUGH KNOWLEDGE MANAGEMENT, TRANSFORMATIONAL LEADERSHIP. AND PERSONALITY REINFORCEMENT

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Abstract: Era 4.0 requires teachers to innovate in developing learning. This study aims to increase teacher innovativeness by looking for relationships with knowledge management, transformational leadership and personality. The method used is a combination of the correlation approach and Sitorem's analysis. A sample of 271 from a population of 1684 certified SD PNS teachers using multystage proportional sampling. Data analysis consisted of normality, homogeneity, linearity, and multiple regression tests. The results of the study prove that there is a strong or significant relationship between knowledge management, transformational leadership, and personality with teacher innovativeness with a correlation coefficient of ry123 = 0.652. SITOREM analysis shows that based on the order of priority improvements that need to be improved into recommendations for improvement, namely: 1) Knowledge Dissemination, 2) Awareness, 3) Openness to Experience, 4) Individual Consideration, 5) Business Innovation, and 6) Organizational Innovation. While the maintained order can be proposed to develop an action plan, namely: 1) Idealized Influence, 2) Product Innovation, 3) Emotional Stability, 4) Process Innovation, 5) Inspirational Motivation, 6) Knowledge Application, 7) Knowledge Storage, 8) Agreeableness, 9) Service Innovation, 10) Knowledge Acquisition, 11) Intellectual Stimulation, 12) Extraversion, and 13) Knowledge Evaluating.

Keywords: Innovation, Knowledge Management, Transformational Leadership, Personality.

I. INTRODUCTION

The world of education is currently experiencing significant changes, especially in terms of technology (Haug & Mork, 2021). These developments have an impact on the role of teachers as educators in the learning process (Sahin, 2009). In this case the teacher must be able to create a pleasant learning atmosphere and produce graduate students in accordance with educational goals (Valtonen et al., 2021). The learning outcomes of students will certainly also increase along with the innovations made by the teacher. Therefore, teachers must have high innovation power and be able to create tools that are able to achieve learning objectives. In other words, teachers must be able to innovate in learning, teachers must be innovative. Teacher innovativeness is indispensable in the fast technological era (Ninlawan, 2015; Şen & Eren, 2012; Nugultham, 2012; Chua & Jamil, 2012; Turculeț, 2015; Tosida et al. 2020a). The presence of platform 4.0 has an impact on innovation that teachers need to carry out. The presence of platform 4.0 which is based on the cyber-cyber system, supported by rapid technological advances, information base, knowledge, innovation, and networking, marks the emergence of the creative age (Yilmaz & Bayraktar, 2014; Lourmpas & Dakopoulou, 2014; Mooi, 2010; Tosida et al. 2020a; Tosida et al. 2020b; Tosida et al. 2020c).

Teacher awareness in implementing innovativeness in various fields is a necessity, with the hope of producing harmony in a learning process so that learning objectives can be achieved as expected. However, to do all this requires toughness, persistence, seriousness in carrying it out because the duties and responsibilities of teachers are very complex and varied. Because it is very interesting to research so that information is obtained about the innovativeness of SDN teachers in Bogor City and several related factors including knowledge management, transformational leadership, and personality.

Innovation can be defined as actions taken by teachers to create learning tools or products to make them better. (Jumagalieva et al., 2014), (Dong et al., 2018). Innovation in a concept put forward by J. Greenberg and R.A. Baron (2008) is defined as the action (process) of making changes from something that has been formed into something new. Then according to the opinion of Schermerhorn, Jr. (2005) innovation is the act of processing a new idea to be transformed into something that has practical uses, with the dimensions of product innovation, namely new goods, products or services and process innovation, namely procedures or methods. new work. Furthermore, Mary Uhl-Biel et al. (2014), argues that innovation is the process of creating new ideas and putting them into practice. This innovation is a means of creative ideas that can be applied by a person into daily practice, namely practices that contribute to improving customer service or organizational productivity.(Grogan et al., 2021; Sahin, 2009; Haug & Mork, 2021).

Innovation in the view of Kinicki & William (2013; Ebersberger et al., 2021; Fayomi et al., 2019; Olokundun et al., 2018; Suleimanova, 2013; Luck et al., 2012) is defined as the activity of creating new ideas and turning them into useful applications, especially new goods and services. Ancok (2012) innovation is a process of thinking about and implementing that thought, resulting in new things in the form of products, services, business

processes, new methods, policies and so on. Mota & Scott (2014) also suggest that the term innovation is more often associated with novelty, which arises from human creativity. Innovation is at the heart of understanding the change process. With dimensions 1) novelty in the form of an idea or product; 2) creativity: creating products; and 3) the change process: a change in understanding of the organization. Innovation also close to advance creativity particularly in informatic and communication technology (ICT or telematics) era (Tosida et al. 2018).

Based on the explanation of previous theories, it can be synthesized that innovation is the act or activity of creating new ideas and implementing them into new products / services that have practical uses, with dimensions and indicators: 1) product innovation, namely Product Innovation Dimensions with indicators : creating new products, and repairing / updating existing / existing products. 2) Service Innovation Dimensions with indicators: improving the quality of service facilities and the use of information technology. 3) Dimensions of Process Innovation with indicators: work plan renewal and development of work methods / methods. 4) Dimensions of Business Innovation with indicators: increasing competence and developing professionalism. 5) Dimensions of Organizational Innovation with indicators: improvement of work governance and certification of educator competencies. (Suleimanova, 2013).

The opinion of Chan & Lee (2013) states that Knowledge Management is a way for companies to identify, create, represent, distribute, and allow the adaptation of insights and experiences. These insights and experiences consist of knowledge, both owned by individuals and knowledge that is inherent in a process or standard procedure. The dimensions are as follows: 1) Knowledge Identification; 2) Reflection of Knowledge; 3) Knowledge Sharing; 4) Use of Knowledge. Then Aulawi, Govindaraju, Suryadi, & Sudirman (2009) provide an understanding of knowledge management as a management function that can create knowledge, manage knowledge flow and ensure that knowledge is effectively and efficiently used for the long-term benefit of the organization.
Transformational leadership is put forward by Colquitt, Lepine, and Wesson (2015) as leadership that involves inspiring all members to commit to a common vision that gives meaning to developing their own potential and several problems from a new perspective. Robbins and Judge (2013) transformational leadership is defined as a leader who pays attention to the problems faced by his followers and the development needs of each of his followers by providing enthusiasm and encouragement to achieve his goals.

In supporting innovativeness, other factors are needed, including knowledge management, transformational leadership and personality. The opinion of Chan & Lee (2013) states that Knowledge Management is a way for companies to identify, create, represent, distribute, and allow the adaptation of insights and experiences. These insights and experiences consist of knowledge, both owned by individuals and knowledge that is inherent in a process or standard procedure. The dimensions are as follows: 1) Knowledge Identification; 2) Reflection of Knowledge; 3) Knowledge Sharing; 4) Use of Knowledge. Robbins and Judge (2013) define personality as the total number of ways in which individuals react to and interact with others. The dimensions of personality according to Robbins and Judge include: 1) Extraversion. Tends to be gregarious, assertive, and sociable; 2) Agreeableness. Tendency to submit to others, very pleasant, warm and trustworthy; 3) Conscientiousness. Be very careful, responsible, organized, reliable and persistent; 4) Emotional stability. Can withstand stress, have positive emotional stability, tend to be calm, confident, and safe; 5) Openness to experience. Very open, creative, curious, and artistically sensitive.

Personality has a relationship with innovation behavior. This statement is in line with research (Cohen, 2015) which found a relationship between personality and individual innovation behavior in the workplace. Previous research indicates the results obtained by proving the hypothesis. This research conducted refers to previous research but has differences in terms of the subject studied and the location of the study. The novelty of the research, among others, was the discovery of a relationship between variables which was then analyzed using the SITOREM method. With the SITOREM method, indicators that are still weak will be improved and indicators that are already strong will be maintained and developed.

Based on this background, further research is required so that a strong relationship can be found between variables. Then follow up in the form of an action plan to improve and maintain the indicators for each variable.

II. METHODOLOGY

This study uses a combination research method between correlational research and SITOREM analysis. The flow of this combined research methodology uses a correlational research flow which is analyzed using SITOREM analysis. Through SITOREM Analysis, the results of correlational research are analyzed in more detail on the indicators of research variables, so as to find indicators that need to be corrected and maintained or developed immediately. This research will begin with the stage of making the instrument, followed by the stage of testing the instrument with statistical calculations. The next stage is to obtain instrument validation and instrument

reliability, after which the distribution of instruments is aimed at the samples that have been determined. Research constellation The research constellation of the relationship between variables can be described as follows.

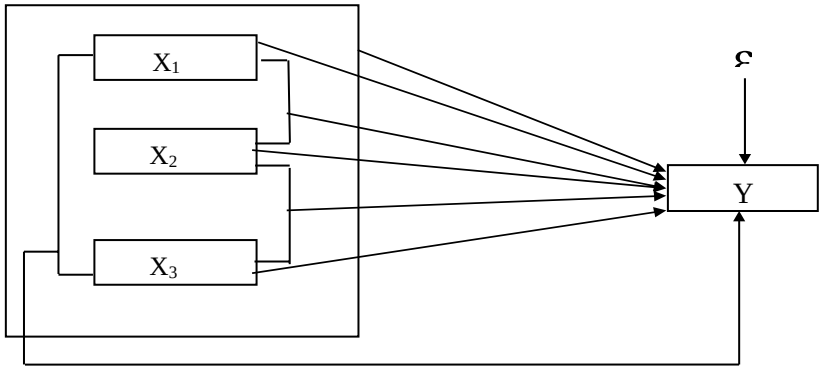

Figure 1. Constellation of Research Problems

Information :
X1 = Knowledge Management
X2 = Transformational Leadership
X3 = Personality
Y = Teacher Innovation
ε = Epsilon (Other variables)

The population of this research is all teachers of Civil Servant Civil Servants (PNS) certified 1683 teachers with the number of SD Negeri 211. The sample used multystage proportional random sampling and obtained 271 teachers. The calculation of the population that will be sampled uses multystage proportional random sampling. The use of the multystage proportional random sampling technique was chosen because the population was quite large, spread over 6 (six) sub-districts in Bogor City.
The stages of determining the number of samples carried out in this study are: a) Determination of the number of SD. The state accounts for 50% of the total SD. The state in Bogor City, namely 211 schools to 106 schools (rounding off). Furthermore, 50% SD were randomly drawn from each district. Country. b) Determination of the proportion of the research population, namely Certified PNS teachers in Public SDs by 50%, from 1683 teachers to 843 teachers, the proportion in each sub-district is the same as the initial distribution, c) Determination of the number of samples in this study using the Slovin formula (Bungin, 2010: 105)
Then the number of research samples obtained based on the Slovin formula is:

$$n = \frac{843}{(843 \times (0{,}05)^2) + 1}$$

$$n = \frac{843}{3{,}1073} = 271$$

The research trial took 30 certified civil servant teachers who were part of the population outside the study sample.
The data analysis technique consisted of 1) statistical analysis prerequisite tests including normality, homogeneity, and linearity tests. 2) Looking for the regression equation covering the innovativeness variable (Y) on knowledge management (X1), transformational leadership (X2), personality (X3). 3) test the significance and linearity of simple regression equations. 4) Looking for multiple regression equations. 5) Looking for the correlation between variables. 6) Looking for multiple correlation. 7) Determine the contribution of each variable. Furthermore, SITOREM analysis is carried out with the aim of correcting the weak indicators and maintaining the already strong indicators. This stage of the analysis begins with the analysis of the contribution of the innovativeness variables using the calculation formula for the coefficient of determination. The next stage is analyzing the research variable indicators, then analyzing the weight of each variable indicator, analyzing the classification of indicators, and finally the results of the SITOREM analysis. (Hardhienata, 2019). The final results of the SITOREM analysis are depicted in the form of a recapitulation image of the final SITOREM analysis results.

Table 1 SITOREM Analysis

INNOVATIVITY		
Indicator In Initial State	**Indicators After Weighting by Experts**	**Indicator Value**
1. Product	1. Product (25%)	4,09
2. Service	2. Service (23%)	4,29
3. Process	3. Process (21%)	4,07
4. Effort	4. Effort (17%)	3,77
5. Organization	5. Organization (15%)	3,98
KNOWLEDGE MANAGEMENT		
Indicator In Initial State	**Indicators After Weighting by Experts**	**Indicator Value**
1. *Acquisition*	1. *Application* (22%)	4,30
2. *Storing*	2. *Storing* (22%)	4,07
3. *Evaluating*	3. *Acquisition* (21%)	4,01
4. *Dissemination*	4. *Evaluating* (17%)	4,37
5. *Application*	5. *Dissemination* (17%)	3,67
TRANSFORMATIONAL LEADERSHIP		
Indicator In Initial State	**Indicators After Weighting by Experts**	**Indicator Value**
1. *Idealized Influenced*	1. *Idealized Influenced* (30%)	4,51
2. *Inspirational Motivation*	2. *Individualized Consideration* (28%)	3,98
3. *Intellectual Stimulation*	3. *Inspirational Motivation* (22%)	4,50
4. *Individualized Consideration*	4. *Intellectual Stimulation* (20%)	4,08
PERSONALITY		
Indicator In Initial State	**Indicators After Weighting by Experts**	**Indicator Value**
1. *Emotional Stability*	1. *Emotional Stability* (24%)	4,46
2. *Extraversion*	2. *Agreeableness* (21%)	4,20
3. *Openness to Experience*	3. *Conscientiousness* (21%)	3,74
4. *Agreeableness*	4. *Extraversion* (18%)	4,00
5. *Conscientiousness*	5. *Openness to Experience* (16%)	3,77

Table 1 above explains the results of the SITOREM analysis showing that based on the priority order of improvements that need to be improved to serve as recommendations for improvement, namely: 1) Knowledge Dissemination, 2) Conscientiousness, 3) Openness to

Experience, 4) Individualized Consideration, 5) Business Innovation, and 6) Organizational Innovation.

While the maintained order can be proposed to compile an action plan, namely: 1) Idealized Influenced, 2) Product Innovation, 3) Emotional Stability, 4) Process Innovation, 5) Inspirational Motivation, 6) Knowledge Application, 7) Knowledge Storing, 8) Agreeableness, 9) Service Innovation, 10) Knowledge Acquisition, 11) Intellectual Stimulation, 12) Extraversion, and 13) Knowledge Evaluating.

Based on this analysis, an action plan is needed which can be in the form of a seminar or training. The action plan program in order to increase teacher innovativeness based on the conclusions, implications and suggestions of the research results is the implementation of training with the development of knowledge management to increase teacher innovativeness.

Table 2 General Action Plan for Increasing Research Variables in Efforts to Increase Teacher Innovation

No.	Variable	Kontribusi	Increase Priority Scale Implementation Year 1	2	3
1.	*Knowledge management, transformational leadership, and personality*.	42,5%	1		
2.	*Knowledge management, and personality*	42,1%		2	
3.	*Knowledge management, and transformational leadership*	38,9%			3
4.	Transformational leadership and personality	33,8%	Further research on transformational leadership and personality with innovativeness.		
5.	*Knowledge management*	37,7%	Further research on knowledge management with innovativeness.		
6.	Personality	32,5%	Further research on personality with innovativeness.		
7.	Transformational leadership	18,4%	Further research on transformational leadership with innovativeness.		

Table 2 shows that the implementation of the action plan program in order to increase teacher innovativeness based on the conclusions, implications and suggestions of the research results is by organizing training with the development of knowledge management to increase teacher innovativeness.

III. RESULTS AND DISCUSSION

RESULTS

The description of the research data begins with the presentation of descriptive statistical analysis data which aims to describe the data from each of the research variables, then the data analysis requirements test aims to determine the validity of the use of paramatric statistics in hypothesis testing and inferential results to test the hypothesis. The data were obtained through the measurement of innovativeness variables, knowledge management, transformational leadership, and personality based on the results of respondents' responses to the questionnaire for each variable. The data collected came from a research sample of 271 certified civil servant teachers in SD Negeri Bogor City.The statistical description results are shown in the following table.

Table 3.
Variable Descriptive Statistics

No	Description	Y	X^1	X^2	X^3
1.	Lots of data	271	271	271	271
2.	Mean	129	143	123,5	132,5
3.	Modus	127	142	126	135
4.	Standard Deviation	7,8	9	6	11
5.	Vairians	61	76	34	121
6.	Range	42	47	34	51
7.	Maximum score	150	166	138	155
8.	Minimum score	108	119	104	104
9.	Class length	9	9	9	9
10.	Many classes	5	6	4	6

Table 1 above explains the calculation of statistical descriptions of the four variables, namely innovativeness, knowledge management, transformational leadership, and personality. Then calculate the data distribution, linearity, and regression and prove the hypothesis. The following is presented a summary of the data hypothesis. Furthermore, calculating the distribution of data, and obtained data with normal distribution, linearity, and regression. The results of the calculation of normality, then the resulting data has a number distribution, linearity and regression as well. Proof of hypothesis. The following is presented a summary of the data hypothesis.

Table 4 Summary of research hypotheses

No	Correlation	Correlation Coefficient	Significance of Correlation t_{count}	t_{table} *) a= 0,05	t_{tabel} *) a= 0,01	Conclusion
1	$X_1 - Y$	r_{y1} = 0,614	6,666	1,97	2,58	H_0 is rejected, H1 is accepted. There is a positive relationship between Knowledge Management and innovativeness
2	$X_2 - Y$	r_{y2} = 0,429	3,064	1,97	2,58	H_0 is rejected, H1 is accepted. There is a positive relationship between Transformational Leadership and innovativeness
3	X_3 -Y	r_{y3} = 0,570	5,633	1,97	2,58	H_0 is rejected, H1 is accepted. There is a positive relationship between personality and innovativeness
4	$X_1X_2 - Y$	r_{y12}= 0,624	23,938	3,04	4,71	H_0 is rejected, H1 is accepted. There is a positive relationship between Knowledge Management, and Transformational Leadership and innovativeness
5	$X_1X_3 - Y$	r_{y13} = 0,649	28,934	3,04	4,71	H_0 is rejected, H1 is accepted. There is a positive relationship between Knowledge Management and Personality with innovativeness
6	X_2X_3 -Y	r_{y23} = 0,581	17,267	3,04	4,71	H_0 is rejected, H1 is accepted. There is a positive relationship between Transformational Leadership and Personality with innovativeness
7	$X_1,X_2X_3 - Y$	r_{y123}=0,652	19,666	2,65	3,88	H_0 is rejected, H1 is accepted. There is a positive relationship between Knowledge Management, Transformational Leadership and Personality with innovativeness

Table 2 above shows that from the results of processing and calculation of research data, it is known that the hypotheses proposed in this study are all accepted, where the relationship between the research variables, either partially or simultaneously, is positive and very significant. The results of the first hypothesis test concluded that the relationship between Knowledge Management and Innovation is a very significant positive which is indicated by the value of tcount> ttable (6.666> 1.97) at the level of ***a*** = 0.05. The resulting correlation equation means that every increase of one level of Knowledge Management will result in an increase in innovativeness of 0.377 at a constant of 81.294. The results of the second hypothesis test concluded that the relationship between Transformational Leadership and Innovation is a very significant positive as indicated by the value of tcount> ttable (3.064> 1.97) at the level of ***a*** = 0.05. The resulting correlation equation is, which means that every increase of one level of Transformational Leadership will result in an increase in Innovation of 0.184 at a constant of 99.054. The relationship between personality and innovativeness is a very significant positive which is indicated by the value of tcount> ttable (5.633> 1.97) at the level of ***a*** = 0.05. The resulting correlation equation is, which means that every increase of one Personality level will result in an increase in the Innovation of 0.325 at the constant 98.933. Then the relationship between Knowledge Management and Transformational Leadership together with innovativeness is a very significant positive as indicated by the value of Fcount> Ftable (23.938> 3.04) at the level of ***a*** = 0.05. The equation obtained is, this shows that an increase in one level of Knowledge Management will result in an increase in Innovation of 0.353 at a constant of 67.488, and each increase of one level of Transformational Leadership will result in an increase in Innovation of 0.102 at a

constant of 67.488. Furthermore, the relationship between Knowledge Management and Personality together with Innovation is a very significant positive as indicated by the value of Fcount> Ftable (28.934> 3.04) at the level of ***a*** = 0.05. The equation obtained is, this shows that an increase in one level of Knowledge Management will result in an increase in Innovation of 0.293 at a constant of 72.533, and every increase of one Personality level will result in an increase in Innovation of 0.207 at a constant of 72.533. Then the relationship between Transformational Leadership and Personality together with innovativeness is positive and very significant as indicated by the value of Fcount> Ftable (17.267> 3.04) at the level of 0,0 = 0.05. The equation obtained is. The last hypothesis is the relationship between Knowledge Management, Transformational Leadership and Personality together with Innovation is positive and very significant as indicated by the value of Fcount> Ftable (19.666> 2.65) at the level of ***a*** = 0.05.

The results of the SITOREM analysis show that based on the priority order of improvements that need to be improved to serve as recommendations for improvement, namely: 1) Knowledge Dissemination, 2) Conscientiousness, 3) Openness to Experience, 4) Individualized Consideration, 5) Business Innovation, and 6) Organizational Innovation.

While the maintained order can be proposed to compile an action plan, namely: 1) Idealized Influenced, 2) Product Innovation, 3) Emotional Stability, 4) Process Innovation, 5) Inspirational Motivation,, 6) Knowledge Application, 7) Knowledge Storing, 8) Agreeableness, 9) Service Innovation, 10) Knowledge Acquisition, 11) Intellectual Stimulation, 12) Extraversion, and 13) Knowledge Evaluating.

IV. DISCUSSION

The results prove that the factors of knowledge management, transformational leadership, and personality have a relationship with teacher innovativeness. Research findings regarding the relationship between transformational leadership and innovation are also investigated (Sherine et al., 2019) the result that transformational leadership is good for organizations around more innovative products and processes, but also for team members engaged in more creative team environments. (Suleimanova, 2013; Luck et al., 2012). Individuals with open personalities have experiences that lead to innovation. (Hsieh et al., 2011; Paulsen et al., 2013). Knowledge management has a relationship with teacher innovativeness, that knowledge management, which includes knowledge creation, knowledge organization, knowledge storage, knowledge sharing and knowledge utilization, has a relationship and even influences teacher innovativeness. Teachers must be able to create, organize, store, share, and use knowledge. (Samina, et al., 2015; (Beni, 2016); (Hsieh et al., 2011); Hamdy et al., 2019; Yesil & Sozbilir, 2013).

The findings obtained in this study identified that if the teacher has a high level of Knowledge Management, good Transformational Leadership and a good personality, together these three variables contribute to increasing innovativeness.

To determine the pure contribution of each independent variable to the dependent variable, a partial correlation analysis has been carried out. The pure contribution of each variable is known by controlling the other independent variables.

First, the partial relationship between Knowledge Management and Innovation if Transformational Leadership is in constant condition, obtained ry1-2 of 0.349 with weak criteria, this shows that Knowledge Management is not the only variable / factor that can influence Innovation, but there are other variables. which can influence where one of them is Transformational Leadership.

Second, the partial relationship between Knowledge Management and Innovation if Personality is constant, obtained ry1-3 of 0.284 with weak criteria, this indicates that Knowledge Management is not the only variable / factor that can affect Innovation, but there are other variables that can be used. influence where one of them is Personality.

Third, the partial relationship between Transformational Leadership and Innovation if Personality is in constant condition, obtained ry2-3 of 0.098 with very weak criteria, this shows that Transformational Leadership is not the only variable / factor that can influence Innovation, but there are other variables. which can affect where one of them is personality.

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V. CONCLUSION

The results of the study, it can be concluded that this study has found efforts to increase the innovativeness of certified civil servant teachers in SD Negeri Bogor City through strengthening knowledge management, transformational leadership, and personality. In this study, the findings obtained must be improved so that the innovativeness of the teachers can be maximally increased. Research suggestions for indicators that are already good can be maintained, while indicators that are not good for improvement. In this study, the findings obtained must be improved so that the innovativeness of teachers can be maximally increased. Research suggestions for indicators that are already good can be maintained, while indicators that are not good for improvement.

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