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Modelling and Optimizing Teacher's Innovativeness
(An Empirical Study using POP SDM Method on Teachers of State Primary Schools)

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Abstract *– The objective of the research is about finding strategies of teacher's innovativeness by using POP SDM method where it firstly conducted by qualitative research to explore variables affecting teacher's innovativeness. The dominant variables are creativity and personality as independent variables, and perceived organizational support (POS) as intervening one. After finding variables and constructing model constellation through theoretical framework and expert judgment, then the model is examined by a quantitative research using path analysis on 155 teachers of state primary schools at South Tangerang. On the basis of hypotheses test, the direct effect of variables upon teacher's innovativeness is* $\hat{Y}= 0{,}283X_1 + 0{,}235X_2 + 0{,}481X_3$*, the direct effect of independent variables upon intervening is* $X_3 = 0{,}381\ X_1 + 0{,}573\ X_2$*. Whereas the indirect effect of creativity upon teacher's innovativeness through POS is* $\beta x_1 y x_3 = 0{,}183$*, this value is* $< 0{,}283X_1$ *which means POS is not significantly effective as intervening on the effect of creativity upon teacher's innovativeness through POS. While the indirect effect of personality upon teacher's innovativeness through POS is* $\beta x_2 y x_3 = 0{,}276$ *that it is* $> 0{,}235X_2$ *which means POS is significantly effective as intervening on the effect of personality upon teacher's innovativeness through POS. Eventually, Sitorem analysis is conducted to determine teacher's innovativeness improvement by strengthening weak indicators and maintaining good ones in variables ordering based on the highest coefficient correlation. On the basis of SITOREM result, the indicators prioritized to be improved are sequentially from POS, creativity, and personality.*

Keywords — *teacher's innovativeness, creativity, personality, perceived organizational support, SITOREM*
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I. INTRODUCTION

The industrial 5.0, *Merdeka Belajar* program, and remote learning during the Covid-19 emergency were likely tit for tat where conventional learning changed and moved to become more effective, innovative, and contextual in line with the current global changes. These three ideas became a crucial challenge in the context of transforming Indonesian education for a better and more advanced one. Conventional teaching trends that placed the teacher as the only source of knowledge also needed to be reviewed. Teacher in today's era is as facilitator who helps students to develop and to be able to contribute to society. This demand is in line with National Education System Law No.20 of 2003, Republic of Indonesia Law No. 14 of 2005 concerning Teachers and Lecturers, as well as Government Regulation No. 19 of 2005 concerning National Education Standards states that teachers are professional educators who are relevant and have competence as learning agents. Teacher must have the courage to innovate so as to be able to support student transitions through the learning process and make improvements to their performance. The main purpose of this innovation is to increase capacity, namely the ability of human resources, money, facilities and infrastructure, including organizational structures and procedures.

Innovation is often defined as the intentional introduction and application within a role, group or organization of ideas, processes or procedures, net to the relevant unit of adoption, designed to significantly benefit the individual, the group, organization or wider society [1]. Innovativeness as the encompassing concepts of newness in systems, processes, products and services, behavioural change, environmental adaptation, and learning and knowledge development; all of which occurs in context over time [2]. Innovative is an individual activity in an effort to create something new or renewal of what has existed before in order to create convenience and as a solution to problems for organizations and society. There are five dimensions in terms of innovativeness that have been synthesized which are then derived into indicators. 1) The dimension of idea/idea innovation, namely individual activity to find new ideas to improve products and services, includes: a) creation

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and/ or discovery of new ideas, and b) Introduction of new ideas. 2) Product innovation dimensions, namely individual activities in creating, developing, and/or updating a product, including: a) Creation/ manufacturing of new products/ services, b) Improvement of existing products/ services, and c) Development of existing products/ services there is. 3) The dimension of process innovation is the development or improvement of stages/ processes which include: a) Improvement of processes (systems and procedures) and b) Development of organizational strategy. 4) The dimension of service innovation is the development and improvement of services for customer satisfaction, by means of: a) Service improvement and b) Creation of new services. 5) The dimension of method innovation is an activity to improve systems, methods and procedures, which include: a) Development of work methods and b) Updating of work systems.

The facts generate based on a preliminary survey using a questionnaire on 30 teachers, there were: 1) 38% of teachers who have problems with Innovation of Ideas, 2) 47% of teachers with problems in Product Innovation, 3) 42% of teachers with problems in Process Innovation, 4) 34% of teachers with problems in Service Innovation, 5) 49% of teachers with problems in Method Innovation. Based on the facts obtained in the research field, it is very important especially in teacher innovation, to be immediately improved and implemented.

II. METHOD

This research used POP SDM (Modeling and Optimizing Strengthening Management Resources) as an alternative sequential exploratory method begins by conducting qualitative research with the aim of exploring variables that are thought to influence positive and dominant towards the resources to be strengthened. Based on the variables found, a constellation of the effects of these variables on resources is then compiled which will be strengthened to produce a research hypothesis. Furthermore, at the quantitative stage, hypothesis testing was carried out using path analysis. Based on the findings of the path analysis results, SITOREM (Scientific Identification Theory to conduct Operation Research in Education Management) analysis was carried out to determine priorities for handling weak indicators. The end result of implementing POP SDM is recommendations and strategies for improving aspects of management resources that are still weak as priority treatments that are positively beneficial to the organization. [3]

In the qualitative research, the data were taken by interviewing 21 principle of state primary schools to explore variables affecting teacher's innovativeness.

Here are variables found on the basis of qualitative research:

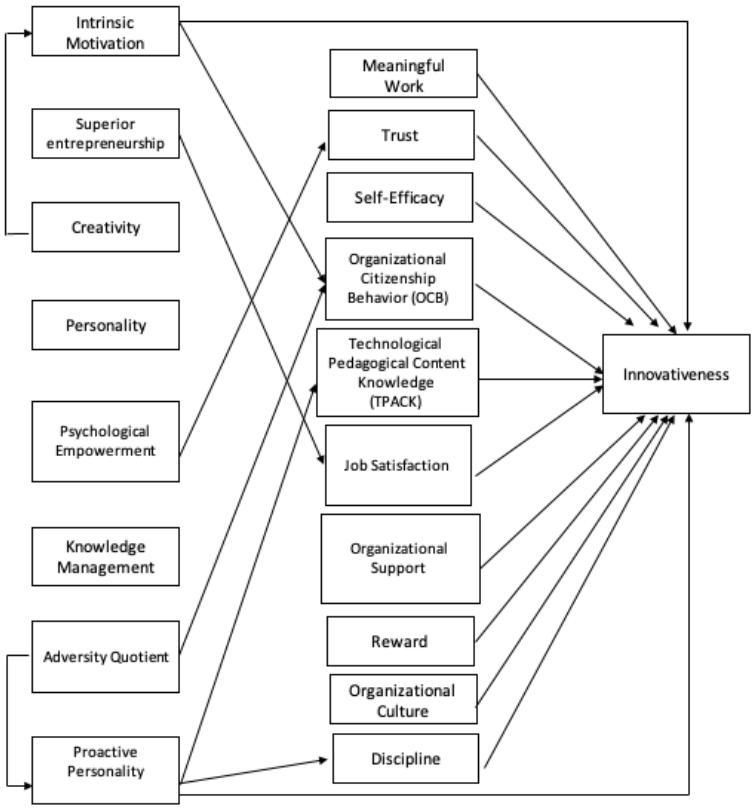

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Fig. 1 Variables found on qualitative research

Based on analysis using tally mark, the variables then constructed upon model constellation that firstly verified by theoretical reviews and expert judgment. Here is the model constellation according to qualitative research.

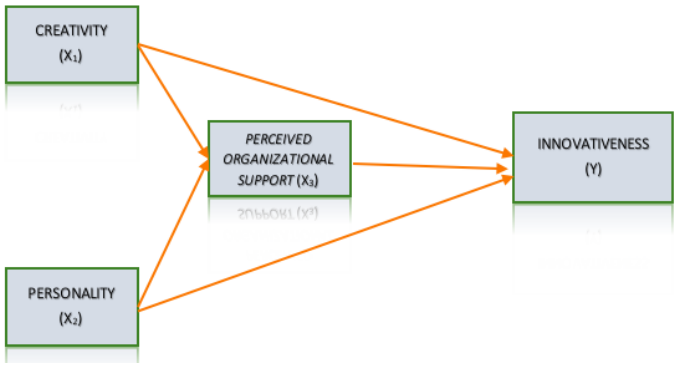

Fig. 2 Research Model Constellation

Based on the model constellation of research had been determined, the research hypotheses were as follow:

1. There is a direct positive effect of Creativity (X_1) on Innovativeness (Y)
2. There is a direct positive effect of Personality (X_2) on Innovativeness (Y)
3. There is a direct positive effect of Perceived Organizational Support (X_3) on Innovativeness (Y)
4. There is a direct positive effect of Creativity (X_1) on Perceived Organizational Support (X_3)
5. There is a direct positive effect of Personality (X_2) on Perceived Organizational Support (X_3)
6. There is an indirect positive effect of Creativity (X_1) on Innovativeness (Y) through POS (X_3)
7. There is an indirect positive effect of Personality (X_2) on Innovativeness (Y) through POS (X_3)

Inferential statistics analysis use path analysis and it describes the effect of the independent variables (X) on innovativeness as the dependent variable (Y). Path analysis is also an application derived from multiple regression analysis which is used to analyze the direct and indirect effects of one variable on another. It is an extension of multiple regression but allows researchers to infer and test a sequence of causal links between variables of interest. It also allows re- searchers to examine the relationships between multiple predictor and criterion variables simultaneously [4].

The path analysis model tested in this study is described as follows:

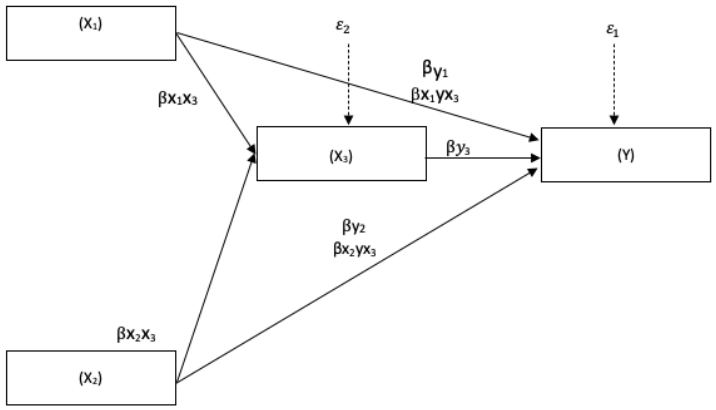

Fig. 3 Path Analysis Model

After research hypotheses were done quantitatively, the next step is to analyze indicators in order to optimize the research variable indicators, either through improving, maintaining, or developing. Analysis of indicators in this study uses SITOREM (Scientific Identification Theory to Conduct Operation Research in Education Management). The stages of analysis of research variable indicators using the SITOREM method are as follows:

1. Noticing the strength of influence between variables

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2. Noticing the results of the indicator weighting in the form of an order of priority indicators of each variable studied.
3. Noticing the value of the indicator in two classes, which are already in good condition and the indicators which are still weak.
4. In assessing the weighting of indicators, experts will pay attention to aspects of Cost, Benefit, Urgency and Importance.

III. RESULT AND DISCUSSION

According to the causal relationship between variables in sub structure 1 which consists of one endogenous variable, innovativeness (Y), and three exogenous variables, Creativity (X_1), Personality (X_2), and Perceived Organizational Support (X_3).

The substructural equation 1 is $\hat{Y} = \beta y_1 X_1 + \beta y_2 X_2 + \beta y_3 X_3 + \varepsilon_1$

Table 1. Coefficient Model Substructural 1

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	17.804	6.534		2.725	.007
	Creativity	.307	.075	.283	4.111	.000
	Personality	.244	.096	.235	2.542	.012
	POS	.488	.068	.481	7.219	.000

a. Dependent Variable: Innovativeness

Based on the table above, the significance value of each variable that proves the hypothesis is rejected or accepted is indicated by a number less than 0.05. The significance value of the variables X_1 (Creativity), X_2 (Personality), and X_3 (POS) is shown with a number less than 0.05, mean that Creativity (X_1), Personality (X_2), and X_3 (POS) have a direct positive and significant effect on innovativeness.

Therefore, the structural equation for sub structural 1 is $\hat{Y} = 0{,}283\ X_1 + 0{,}235 X_2 + 0{,}481 X_3$

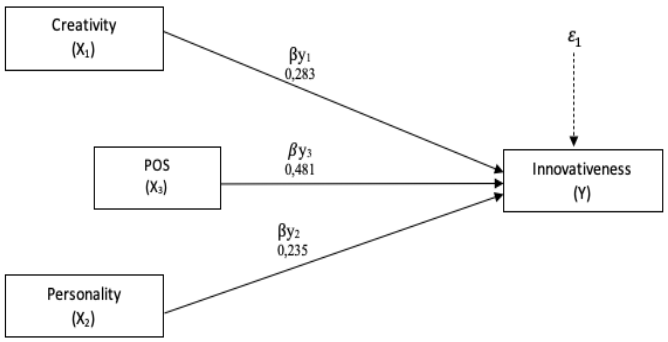

Fig. 4 Causal Correlations in Sub Structural 1

The causal relationship between variables in sub-structure 2 consists of one endogenous variable, POS (X_3) and two exogenous variables, Creativity (X_1) and Personality (X_2). Sub structural equation is $X_3 = \beta x_1 x_3 X_1 + \beta x_2 x_3 X_2 + \varepsilon_2$

Table 2. Coefficient Model Substructural 2

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	19.502	7.702		2.532	.012
	Creativity	.407	.084	.381	4.870	.000
	Personality	.586	.105	.573	5.567	.000

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a. Dependent Variable: POS

The results of the analysis show that the two variable path coefficients are significant with a probability value (sig.) 0.000 <0.05. Therefore, structural equation for sub structural 2 is: $X_3 = 0{,}381\ X_1 + 0{,}573X_2$.

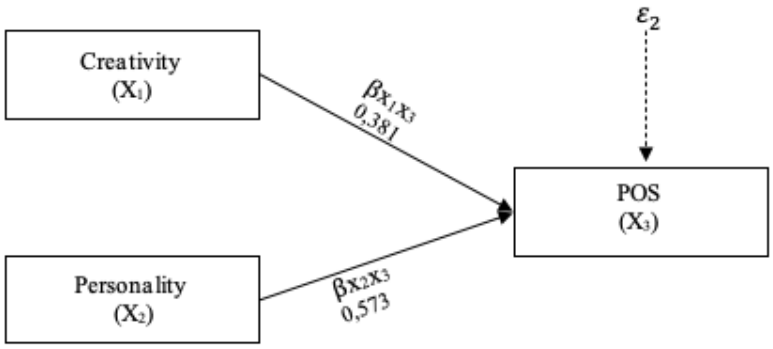

Fig. 5 Causal Correlations in Sub Structural 2

After knowing the direct effect of each independent variable on the dependent variable in both the first and second regression equations, then the indirect effect of Creativity and Personality upon Innovativeness through POS can be seen as follow:

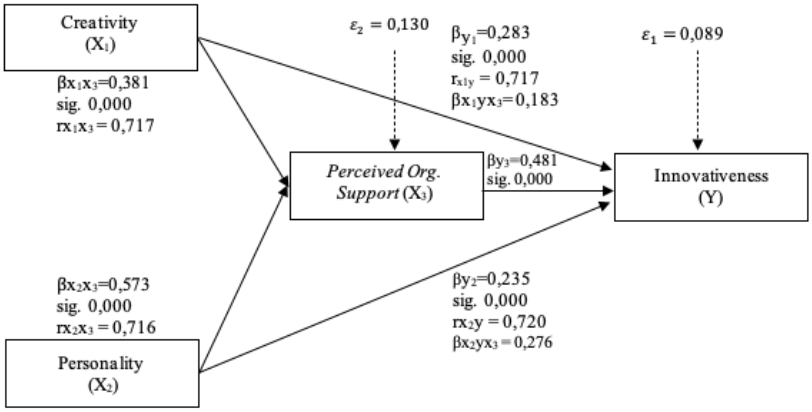

Fig. 6 Combined Causal Relationship between Sub Structural 1 and 2

Based on Path Analysis, it can be proven that:

1. Direct effect of Creativity (X_1) on Innovativeness (Y)
   The direct effect of Creativity (X_1) on the Innovativeness (Y) has a $\beta y_1 = 0.283$ with a significance level of 0.000 <0.05. It can be concluded that there is a significant positive direct effect of Creativity (X_1) on Innovativeness (Y).
2. Direct effect of Personality (X_2) on Innovativeness (Y)
   The direct effect of Personality (X_2) on Innovativeness (Y) has a $\beta y_2 = 0.235$ with a significance level of 0.012 <0.05. It can be concluded that there is a significant positive direct effect of Personality (X_2) on Innovativeness (Y).
3. Direct effect of POS (X_3) on Innovativeness (Y)
   The direct effect of POS (X_3) on Innovativeness (Y) has a βy_4= 0.481 with a significance level of 0.000 <0.05. It can be concluded that there is a significant positive direct effect of POS (X_3) on Innovativeness (Y).
4. Direct effect of Creativity (X_1) on POS (X_3)
   The direct effect of Creativity (X_1) on POS (X_3) has a number βx_1x_3= 0.381 with a significance level of 0.000 <0.05. It can be concluded that there is a significant positive direct effect of Creativity (X_1) on POS (X_3).

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5. Direct effect of Personality (X_2) on POS (X_3)
   The direct effect of Personality (X_2) on POS (X_3) has a number $\beta x_2x_3 = 0.573$ with a significance level of 0.000 <0.05. It can be concluded that there is a significant positive direct effect of the Personality (X_2) on POS (X_3).
6. Indirect effect of Creativity (X_1) on Innovativeness (Y) through POS (X_3)
   Based on the table calculations, Creativity has a positive indirect effect but it is smaller than the direct effect of creativity on innovativeness $\beta x1yx4 = 0.183 < \beta y1 = 0.283$ so that it can be concluded that POS does not function effectively on innovativeness as an intervening variable on the effect of creativity on innovativeness.
7. Indirect effect of Personality (X_2) on Innovativeness (Y) through POS (X_3).
   Based on the calculation, personality has a direct effect on innovativeness through POS and the value indirect effect is more than the direct effect $\beta x3yx4 = 0.276 > \beta y3 = 0.235$, so it can be concluded that the POS functions effectively on innovativeness as an intervening variable on the effect of personality on innovativeness. This means that innovativeness improvements can be made both directly and indirectly through POS.

Based on the results of the path analysis, the path coefficient values are obtained which describe the strength of the influence between the variables shown in the following table:

Table 3. Contribution Analysis (Coefficient of Determination)

No.	Direct effect between variables	Coefficient Correlation	Coefficient Determination	Contribution (%)
1.	Perceived Organizational Support on Innovativeness	0,481	0,66	66%
2.	Creativity on Innovativeness	0,283	0,574	57,4%
3.	Personality on Innovativeness	0,235	0,519	51,9%

From the table above, it can be seen that Perceived Organizational Support is at first rank with the highest coefficient value of effect on Innovativeness at 0.481, followed by Creativity at 0.283 and Personality at 0,235.

The strength value of correlation between independent variables and the dependent variable are obtained from statistical analysis based on data obtained from research respondents, then the order of priority indicators for each research variable is compiled through expert judgment where expert would provide suggestions, inputs, and assessments based on elements of Cost, Benefit, Urgency, and Importance. Thus, the expert's assessment will ultimately determine the priority arrangement of indicators that need to be repaired and maintained or developed immediately. The results of SITOREM in this study are as follows:

Table 4. Determination of Priority for Handling Indicators Based on Expert Judgment

PERCEIVED ORGANIZATIONAL SUPPORT (ry_4= 0,481), Rank 1		
Indicator before Expert's Judgement	**Indicator after Expert's Judgement**	**Indicator Value**
1. Fairness	1st Being Cared for Well-Being (18,3%)	4,04
2. Supervisor Support	2nd Rewards (16,9%)	4,00
3. Rewards	3rd Improving Work Support (16,5%)	3,71
4. Being Valued	4th Fairness (16,4%)	3,90
5. Being Cared for Well-Being	5th Being Valued (16%)	3,81
6. Improving Work Support	6th Supervisor Support (15,9%)	4,04
CREATIVITY (ry_1= 0,283), Rank 2		
Indicator before Expert's Judgement	**Indicator after Expert's Judgement**	**Indicator Value**
1. Utilize prior knowledge	1st Learn new things (15,9%)	3,86
2. Enjoy challenging activities	2nd Solve problems confidently (15,8%)	4,04
3. Learn new things	3rd Opened to other people's ideas (15,9)	3,82
4. Opened to people's ideas	4th Act bravely(14,1%)	3,99
5. Look for solutions skilfully	5th Look for solutions skilfully (14,1%)	3,76
6. Solve problems confidently	6th Utilize prior knowledge (13,8%)	4,08
7. Act bravely	7th Enjoy challenging activities (11,5%)	3,75
PERSONALITY (ry_2= 0,235), Rank 3		
Indicator before Expert's	**Indicator after Expert's Judgement**	**Indicator**

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Judgement		Value
1. Openness to experience	1st Emotional Stability (23,3%)	3,82
2. Conscientiousness	2nd Agreeableness (20,2%)	3,77
3. Extroversion	3rd Openness to experience (19,4%)	4,13
4. Agreeableness	4th Conscientiousness (18,9)	4,01
5. Emotional Stability	5th Extroversion (18,3%)	4,05

INNOVATIVENESS		
Indicator before Expert's Judgement	**Indicator after Expert's Judgement**	**Indicator Value**
1. Innovation of idea	1st Innovation of product (21,6%)	3,96
2. Innovation of product	2nd Innovation of idea (20,4%)	4,03
3. Innovation of process	3rd Innovation of service (19,7%)	3,73
4. Innovation of service	4th Innovation of process (19,2%)	4,00
5. Innovation of method	5th Innovation of Method (19,2%)	3,84

Furthermore, the optimal solution can be determined as in the following table:

Table 5. The Optimal Solution

Priority Order of Indicators repaired	Indicators which are maintained
1st Improving work support	1 Being cared for well-being
2nd Fairness	2 Rewards
3rd Being valued	3 Supervisor support
4th Learn new things	4 Solve problem confidently
5th Opened to other people's ideas	5 Utilize prior knowledge
6th Act bravely	6 Openness to experience
7th Look for solutions skulfully	7 Conscientiousness
8th Enjoy challenging activities	8 Extroversion
9th Emotional stability	9 Aplikasi pengetahuan
10th Agreeableness	10 Innovation of idea
15th Innovation of product	11 Innovation of process
16th Innovation of service	
17th Innovation of method	

According to hypotheses test using path analysis and SITOREM proved that Creativity, Personality, and Perceived Organizational Support strengthen teacher's innovativeness through optimizing indicators within variables.

Creativity as an activity to solve problems effectively, which includes fluency, flexibility, individuality, redefinition, elaboration, expression, productivity, originality, and sensitivity. It is in line with creativity is an activity in generating ideas which are the result of a combination of thoughts, mentality, and attitudes which are also influenced by the social environment [5]. Creativity and innovation are basically synergized and related, where creativity is an individual's imaginative power that initiates innovative activities in realizing creative ideas with procedures and practices into products, services, services or systematic methods that are new, practical and have value and high use.

Innovativeness is affected by personality. Personality refers to structures and tendencies within people that explain their characteristic patterns of thinking, emotions, and behavior. Personality Factors "The Big Five": a) Consciousness, characterized by the character: reliable, organized, ambitious, like to work hard, and persistent; b) Agreeable: friendly, cooperative, sympathetic to others, helpful, polite and warm; c) Neuroticism: related to a person's emotional level such as anxiety, temperament, jealousy, and emotional instability; d) Openness to experience: being curious, imaginative, creative, complex, and proficient; e) Extraversion: talkative, sociable, passionate, assertive, brave, and dominant [6]. Personality is a description of a person who functions as a driving force for individual behavior in various situations. Personality characteristics are indicated by: a) High agreeableness: having a high caring attitude towards others, being friendly, empathetic, and helpful; b) Emotional stability: Emotional stability with a tendency toward kindness, selflessness, generosity, and being fair [7]. Personality that is good, strong, and has character is always able to improve teacher performance and even

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increase innovation. Based on the results of this study, personality shows its influence to strengthen teacher innovation.

Besides creativity and personality, ccording to the hypotheses result, perceived organizational support proved its effect upon achieving innovativeness. POS reflects the best efforts of employees in carrying out personal tasks and organizational goals as a positive response that comes from their belief in being valued, cared for their welfare and have significant organizational support. He also provides dimensions related to POS as follows: a) Being valued: employees' perceptions of feeling valued by the organization; b) Being cared for well-being: employees' perceptions regarding their welfare; c) Having significant supports of organization: perceptions of related employees have significant organizational support [8]. In addition, POS also refers to the support felt from the organization referring to employees' beliefs about the extent to which the organization cares about their well-being and values their contribution, such as: a) Support from superiors to apply the knowledge, skills and attitudes learned in work; b) Organizational support for the transfer of training and development [9].

To carry out an innovation, means doing work that has high use value, requires additional concentration, and a different focus outside of the usual work. Therefore, doing innovation must be supported by encouragement and perceived organizational support.

CONCLUSION

1. There is a significant positive direct effect of Creativity on Innovativeness, so that strengthening Creativity can increase Innovativeness by strengthening the Creativity indicators. Such as: learn new things, opened to other people's idea, acting bravely, look for solutions skillfully, and enjoy challenging activities.
2. There is a significant positive direct effect of Personality on Innovativeness so that strengthening Personality can increase Innovativeness by strengthening Personality indicators, such as: emotional stability and agreeableness.
3. There is a significant positive direct effect of Perceived Organizational Support (POS) on Innovativeness so that strengthening POS can increase Innovativeness by strengthening POS indicators, such as: improving work support, fairness, and being valued.
4. There is a significant positive direct effect on Creativity on POS so that strengthening Creativity can increase POS by strengthening the Creativity indicators, namely learning new things, behaving openly to ideas/other people's input, acting boldly, finding solutions skillfully, and liking challenging activities.
5. There is a significant positive direct effect of Personality on POS so that strengthening Personality can increase POS by strengthening Personality indicators, such as: emotional stability and agreeablenes.
6. The POS variable does not function effectively as an Intervening Variable in the relationship between Creativity and Innovativeness, so that an increase in Innovativeness cannot be done through strengthening the POS Variable and is more effectively done directly through strengthening Creativity.
7. The POS Variable functions effectively as an Intervening Variable in the relationship between Personality and Innovativeness, so that an increase in Innovativeness can be done through strengthening the POS Variables and is effectively done both directly and indirectly through strengthening Personality.

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