

Social and Management Research Quantitative Analysis for Medium Sample: Comparing of Lisrel, Tetrad, GSCA, Amos, SmartPLS, WarpPLS, and SPSS

Agus Purwanto¹, Masduki Asbari², Teguh Iman Santoso³, Vip Paramarta⁴, Denok Sunarsi⁵

¹Universitas Bina Bangsa, Indonesia

¹AGUSPATI Research Institute, Indonesia

²STMIK Insan Pembangunan, Indonesia

³Universitas Sumatera Selatan, Indonesia

⁴Universitas Sangga Buana Bandung,, Jawa Barat, Indonesia

⁵Universitas Pamulang, Tangerang Selatan, Banten, Indonesia

Email: aguspurwanto.prof@gmail.com

(**Received:** Juny 20-2020; **revised:** December 22-2020; **published:** December 31-2020)

ABSTRACT

The purpose of this study is to compare the results of quantitative research data processing in the social field using Lisrel, Tetrad, GSCA, SPSS, SmartPLS, WarpPLS and Amos software. This research method is quantitative and research data analysis uses the four types of software to obtain a comparison of the results of the analysis. The analysis in this study focuses on the analysis of hypothesis testing and regression analysis. Regression analysis is used to measure how much influence the independent variable has on the dependent variable. The data from this study used quantitative data derived from questionnaire data totaling 122 respondents with four research variables, namely transformational leadership variables, leader member exchange, organizational citizenship behavior and performance. Based on the results of the analysis using SPSS, SmartPLS, WarpPLS and Amos software, it was found that there was no significant difference in the significance value of p-value and t-value. There is also no significant difference in the determination value, and the correlation value in the resulting structural equation also has no significant difference in results.

Keywords: *Quantitative analysis; Lisrel; Amos; SmartPLS; WarpPLS; SPSS; Social and Management Research*

INTRODUCTION

The use of statistical tools or software for quantitative research has been a lot, the use of the structural equation modeling (SEM) method has dominated most studies such as Goestjahjanti et al. (2020); Asbari et al. (2021); Novitasari et al. (2021) and Purwanto et al. (2021) who used PLS-SEM with SmartPLS Software. can et al. (2014); Choudhary et al. (2013); Wang et al. (2021) and Ichasn et al. (2021) who conducted research and used SPSS

software for data analysis. Other researchers Akbar, A. (2021); Rochiyati et al. (2020); Azzahra, S. (2021) who conducts research in the social field and uses WarpPLS Software for data analysis. Purwanto et al.(20121); Moradi et al. (2021); Ghanbari et al. (2021) and Zavvar et al. (2020) conducted research in social and management using Lisrel Software for data analysis.

According to Fornell, C., & Bookstein, FL (1982) there are two types of SEM that have been widely used for research, namely covariance-based structural equation modeling (CB-SEM) developed by Joreskog (1969) and partial least squares path modeling (PLS-SEM) which was developed by World (1980), there are several CB-SEM software such as AMOS and LISREL while PLS-SEM are SmartPLS and WarpPLS. According to Hair et al. (2019) CB-SEM aims to estimate a structural model based on a strong theoretical study to test the causal relationship between latent variables and measure the feasibility of the model and confirm it according to the empirical data so that a strong theoretical base is needed, fulfills various parametric assumptions and fulfills the model feasibility test (goodness of fit). Therefore, CB-SEM is very appropriate to be used to test the theory and get justification for the test with a series of complex analyzes. According to Hair et al (2017) PLS-SEM aims to test the predictive relationship between constructs by seeing whether there is a relationship or influence between these constructs. PLS-SEM testing can be done without a strong theoretical basis and is very appropriate to be used in research that aims to develop theory.

Many studies have conducted comparative analysis of research data analyst software such as that conducted by Ali et al. (2015) & Rigdon et al. (2017) who compared the results of data analysis with CB-SEM and PLS-SEM in the tourism sector, then Amaro et al. (2015) compared the results of data analysis with CB-SEM and PLS-SEM in the field of management. Afthanorhan et al (2020) compared the results of reliability and validity on CB-SEM and PLS-SEM. Another study by Astrachan et al (2014) conducted a comparative study of the results of SEM and PLS-SEM for family company research. Mohamad et al. (2019) compares the results of CB-SEM and PLS-SEM on economic and sharia research. Likewise Ong et al. (2017) conducted a study comparing the results of data processing with SPSS, PLS, and AMOS in social and management research. The results of these studies conclude that the CB-SEM and PLS-SEM methods produce slightly different values for each of the predicted parameters even though they use the same model and data. According to Zuhdi et al (2016) the CB-SEM method is coefficient-oriented with the aim of testing the theory, confirming the theory or comparing it with other alternative theories, while PLS-SEM is oriented to predicting construct variables with the aim of developing theory. The two methods cannot be compared due to the difference in the two properties in estimating the parameters. The estimated coefficient values of the structural and measurement models in CB-SEM are smaller than those of PLS-SEM (Zuhdi et al, 2016). Many researchers are still unsure and do not have confidence about the software that will be used for research, therefore there needs to be a study or research that is able to answer this problem. The purpose of this study was to compare the results of social research data processing using SPSS, SmartPLS, WarpPLS and Amos software.

METHOD

This research method is quantitative, research data analysis uses the four types of software to obtain a comparison of the results of the analysis. The analysis in this study focuses

on the analysis of hypothesis testing and regression analysis. Regression analysis is used to measure how much influence the independent variable has on the dependent variable. The data from this study used quantitative data derived from questionnaire data, totaling 122 respondents. In the data there are 4 variables, namely transformational leadership variables, leader member exchange, organizational citizenship behavior and performance which were developed from Purwanto et al. (2020); Asbari et al. (2021) and Novitasari et al (2020) with the following research model:

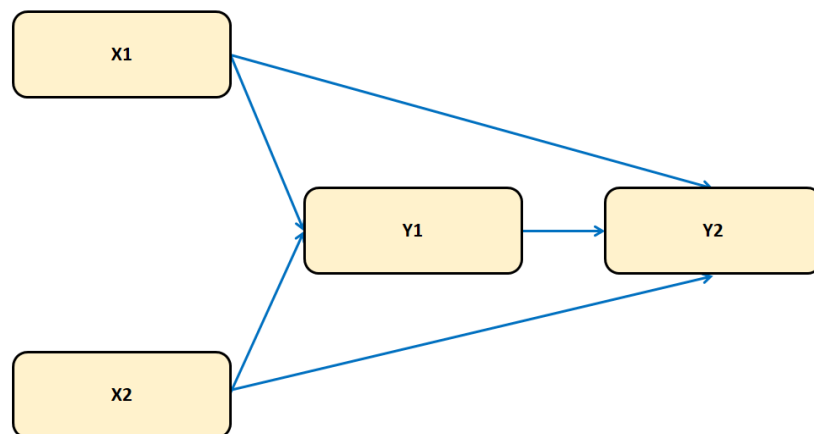


Fig 1. Research Model

X1 is transformational leadership, X2 is leader member exchange, Y1 is organizational citizenship behavior and Y2 is performance. The relationship models to be analyzed are as follows:

1. The relationship between transformational leadership (X1) and organizational citizenship behavior (Y1).
2. The relationship between transformational leadership (X1) and performance (Y2).
3. The relationship between leader member exchange (X2) and organizational citizenship behavior (Y1).
4. The relationship between leader member exchange (X2) and performance (Y2).
5. The relationship between transformational leadership (X1) and performance (Y2) through organizational citizenship behavior (Y1).
6. The relationship between leader member exchange (X2) and performance (Y2) through organizational citizenship behavior (Y1).

RESULT AND DISCUSSION

t-Value Analysis

The first stage of data analysis is testing the significance of the relationship between the independent variables of transformational leadership (X1), Leader member exchange (X2) with

the dependent variable of organizational citizenship behavior (Y1) and performance (Y2) by looking for t-Value using SPSS software, Amos, SmartPLS, WarpPLS and SPSS, The decision criteria if the t-Value value is greater than 1.96 or > 1.96 then the relationship is significant, if less than 1.96 or < 1.96 then the relationship is not significant. For WarpPLS does not produce a t-statistic value, the significance test can be seen on the p-value, so that the t-statistic value will be obtained.

The test results with 4 software for a direct relationship can be seen in Table 1 below:

Table 1
Comparison of t-Value Results Direct Relationship

	Lisrel	Amos	Tetrad	GSCA	SmartPLS	WarpPLS	SPSS	Result
X1-Y1	2.012	2,115	2.453	-	2,347	-	2,795	Significant
X1-Y2	0.875	0,795	0.965	-	1,027	-	1,291	Not Significant
X2-Y1	3.234	3,629	3.875	-	3,934	-	4,155	Significant
X2-Y2	1.981	1,976	1.973	-	3,263	-	2,206	Significant
Y1-Y2	3.987	4,048	3.672	-	3,257	-	6,524	Significant

Source: SPSS, SmartPLS, WarpPLS and Amos Processing Results (2021)

1. The relationship between transformational leadership (X1) and organizational citizenship behavior (Y1)

Based on the results of the software analysis, the results of the t-Value using Amos of 2.115 are greater than 1.96 so that it can be concluded that the relationship between X1 and Y1 is significant. The result of t-Value using SmartPLS is 2.347 which is greater than 1.96 so that it can be concluded that the relationship between X1 and Y1 is significant. The result of t-Value using SPSS is 2.795 which is greater than 1.96 so that it can be concluded that the relationship is significant.

2. The relationship between transformational leadership (X1) and performance (Y2)

Based on the results of the software analysis, the results of the t-Value using Amos of 0.795 are smaller than 1.96 so that it can be concluded that the relationship between X1 and Y2 is not significant. The result of t-Value using SmartPLS is 1.027 which is smaller than 1.96, so it can be concluded that the relationship between X1 and Y2 is not significant. The results of the t-Value using SPSS of 1.291 are smaller than 1.96 so that it can be concluded that the relationship between X1 and Y2 is not significant.

3. The relationship between leader member exchange (X2) and organizational citizenship behavior (Y1)

Based on the results of the software analysis, the results of the t-Value using Amos of 3.629 are greater than 1.96 so that it can be concluded that the relationship between X2 and Y1 is significant. The result of t-Value using SmartPLS is 3.934 which is greater than 1.96 so that it can be concluded that the relationship between X2 and Y1 is significant. The results of the t-Value using SPSS of 4.155 are greater than 1.96 so that it can be concluded that the relationship between X2 and Y1 is significant.

4. The relationship between leader member exchange (X2) and performance (Y2)

Based on the results of the software analysis, the results of the t-Value using Amos of 1.976 are greater than 1.96 so that it can be concluded that the relationship between X2 and Y2 is significant. The t-Value using SmartPLS is 3.263, which is greater than 1.96, so it can be concluded that the relationship between X2 and Y2 is significant. The results of the t-Value using SPSS of 2.206 are greater than 1.96 so that it can be concluded that the relationship between X2 and Y2 is significant.

5. The relationship between organizational citizenship behavior (Y1) and performance (Y2)

Based on the results of the software analysis, the results of the t-Value using Amos of 4.048 are greater than 1.96 so that it can be concluded that the relationship between Y1 and Y2 is significant. The result of t-Value using SmartPLS is 3.257 which is greater than 1.96, so it can be concluded that the relationship between Y1 and Y2 is significant. The results of the t-Value using SPSS of 6.524 are greater than 1.96 so that it can be concluded that the relationship between Y1 and Y2 is significant. The test results with 4 software for indirect relationships are as follows:

Table 2
Comparison of t-Value Results Indirect Relationship

	Lisrel	Tetrad	GSCA	Amos	SmartPLS	WarpPL S	SPSS	Result
X1-Y1-Y2	1.976	2.087	-	1,994	2,268	-	2,141	Significant
X2-Y1-Y2	3.021	3.123	-	3,010	3,240	-	2,442	Significant

Source: SPSS, SmartPLS, WarpPLS and Amos Processing Results (2021)

6. The relationship between transformational leadership (X1) and performance (Y2) through organizational citizenship behavior (Y1)

Based on the results of software analysis, the results of the t-Value using Amos of 1.994 are greater than 1.96 so that it is concluded that the relationship between X1 and Y2 through Y1 is significant. The result of t-Value using SmartPLS is 2.268 which is greater than 1.96 so that it can be concluded that the relationship between X1 and Y2 through Y1 is significant. The result of t-Value using SPSS is 2.141 which is greater than 1.96 so that it can be concluded that the relationship between X1 and Y2 through Y1 is significant.

7. The relationship between leader member exchange (X2) and performance (Y2) through organizational citizenship behavior (Y1)

Based on the results of software analysis, the results of the t-Value using Amos of 3.010 are greater than 1.96, so it can be concluded that the relationship between X2 and Y2 through Y1 is significant. The result of t-Value using SmartPLS is 3.240, which is greater than 1.96, so it can be concluded that the relationship between X2 and Y2 through Y1 is significant. The results of the t-Value using SPSS of 2.442 are greater than 1.96 so that it can be concluded that the relationship between X2 and Y2 through Y1 is significant.

p-Value Analysis

The second stage is data analysis, namely testing the significance of the relationship between the independent variables of transformational leadership (X1), leader member exchange (X2) with the dependent variable of organizational citizenship behavior (Y1) and performance (Y2) by looking for p-value using SPSS, Amos, SmartPLS software. , WarpPLS and SPSS. The decision criteria are if the p-value is less than 0.050 or <0.050 then the relationship is significant, if it is more than 0.050 or >0.050 then the relationship is not significant.

The test results with 4 software for direct connection are as follows:

Table 3
Comparison of P-value

	Lisrel	Amos	Tetrad	GSCA	SmartPLS	WarpPLS	SPSS	Result
X1-Y1	0.232	0,034	0,021	-	0,019	0,003	0,006	Significant
X1-Y2	0.321	0,427	0.387	-	0,305	0,143	0,200	Not Significant
X2-Y1	0.000	< 0,001	0.000	-	0,000	<0,001	0,000	Significant
X2-Y2	0.021	0,041	0.001	-	0,001	0,017	0,030	Significant
Y1-Y2	0.000	< 0,001	0.002	-	0,000	<0,001	0,000	Significant
X1-Y1-Y2	-	-	0.001	-	0,024	0,017	-	Significant
X2-Y1-Y2	-	-	0.003	-	0,001	<0,001	-	Significant

Source: SPSS, SmartPLS, WarpPLS and Amos Processing Results (2021)

1. The relationship between transformational leadership (X1) and organizational citizenship behavior (Y1)

Based on the results of the software analysis, the p-value using Amos was 0.034 less than 0.050, so it was concluded that the relationship between X1 and Y1 was significant. The p-value using SmartPLS is 0.019 less than 0.050 so it can be concluded that the relationship between X1 and Y1 is significant. The p-value using WarpPLS is 0.003 less than 0.050 so it can be concluded that the relationship is significant. The p-value using SPSS is 0.006 less than 0.050, so it can be concluded that the relationship between X1 and Y1 is significant.

2. The relationship between transformational leadership (X1) and performance (Y2)

Based on the results of software analysis, the p-value using Amos was 0.427 more than 0.050, so it was concluded that the relationship between X1 and Y2 was not significant. The p-value using SmartPLS is 0.305, which is greater than 0.050, so it can be concluded that the relationship between X1 and Y2 is not significant. The result of p-value using WarpPLS is 0.143 more than 0.006 so it can be concluded that the relationship between X1 and Y2 is not significant. The results of the p-value using SPSS of 0.006 is less than 0.006 so it can be concluded that the relationship between X1 and Y2 is not significant.

3. The relationship between transformational leadership (X2) and organizational citizenship behavior (Y1)

Based on the results of software analysis, the p-value using Amos is 0.000 less than 0.050 so that it can be concluded that the relationship between X2 and Y1 is significant. The p-value using SmartPLS is 0.000 less than 0.050 so it can be concluded that the relationship between X2 and Y1 is significant. The p-value using WarpPLS is 0.000 less than 0.050 so it can be

concluded that the relationship is significant. The p-value using SPSS is 0.000 less than 0.050, so it can be concluded that the relationship between X2 and Y1 is significant.

4. The relationship between transformational leadership (X2) and performance (Y2)

Based on the results of the software analysis, the p-value using Amos was 0.041 which was smaller than 0.050 so that it was concluded that the relationship between X2 and Y2 was significant. The p-value using SmartPLS is 0.001 less than 0.050 so it can be concluded that the relationship between X2 and Y2 is significant. The p-value using WarpPLS is 0.017 less than 0.050 so it can be concluded that the relationship is significant. The p-value using SPSS is 0.030 less than 0.050, so it can be concluded that the relationship between X2 and Y2 is significant.

5. The relationship between organizational citizenship behavior (Y1) and performance (Y2)

Based on the results of software analysis, the p-value using Amos was 0.000 less than 0.050, so it was concluded that the relationship between Y1 and Y2 was not significant. The p-value using SmartPLS is 0.000 less than 0.050 so it can be concluded that the relationship between Y1 and Y2 is significant. The p-value using WarpPLS is 0.000 less than 0.050 so it can be concluded that the relationship between Y1 and Y2 is significant. The p-value using SPSS is 0.000 less than 0.050, so it can be concluded that the relationship between Y1 and Y2 is significant.

6. The relationship between transformational leadership (X1) and performance (Y2) through organizational citizenship behavior (Y1)

Based on the results of the software analysis, the p-value using SmartPLS was 0.024 less than 0.050, so it was concluded that the relationship between X1 and Y2 through Y1 was significant. The result of p-value using WarpPLS is 0.017 less than 0.050 so it can be concluded that the relationship between X1 and Y2 through Y1 is significant.

7. The relationship between leader member exchange (X2) and performance (Y2) through organizational citizenship behavior (Y1)

Based on the results of the software analysis, the p-value using SmartPLS is 0.001 less than 0.050, so it can be concluded that the relationship between X2 and Y2 through Y1 is significant. The result of the p-value using WarpPLS is 0.001 less than 0.050 so it can be concluded that the relationship between X2 and Y2 through Y1 is significant.

Determination Analysis

Testing the coefficient of determination to calculate the influence of the independent variable on the dependent variable. In this study, the coefficient of termination of R Square was calculated for the independent variables of organizational citizenship behavior (Y1) and performance (Y2). The results of the R Square test using Amos, SmartPLS, WarpPLS and SPSS are as follows:

Table 4

Comparison of R Square Hasil Results

	Lisrel	Amos	Tetrad	GSCA	SmartPLS	WarpPLS	SPSS
Y1	0.231	0,344	-	0.365	0,301	0,296	0,288
Y2	0.568	0,609	-	0.581	0,547	0,543	0,513

Source: SPSS, SmartPLS, WarpPLS and Amos Processing Results (2021)

Based on the results in Table 4, the R Square value for organizational citizenship behavior (Y1) using Amos is 0.344 or 34.4%, meaning that organizational citizenship behavior (Y1) is influenced by transformational leadership variables (X1) and leader member exchange (X2). of 34.4% while the remaining 65.6% is influenced by other variables not discussed in this study. The value of R Square for organizational citizenship behavior (Y1) using SmartPLS is 0.301 or 30.1%, meaning that the variable organizational citizenship behavior (Y1) is influenced by transformational leadership variables (X1) and leader member exchange (X2) by 30.1% while the remaining 69.9% is influenced by other variables not discussed in this study. The value of R Square for organizational citizenship behavior (Y1) using WarpPLS is 0.296 or 29.6%, meaning that the variable organizational citizenship behavior (Y1) is influenced by transformational leadership variables (X1) and leader member exchange (X2) by 29.6% while the remaining 70.4% is influenced by other variables not discussed in this study. The value of R Square for organizational citizenship behavior (Y1) using SPSS is 0.288 or 28.8%, meaning that the variable organizational citizenship behavior (Y1) is influenced by transformational leadership variables (X1) and leader member exchange (X2) by 28.8% while the remaining 72.1% is influenced by other variables not discussed in this study.

Based on the results in Table 4, the R Square value for performance (Y2) using Amos is 0.609 or 60.9%, meaning that the performance variable (Y2) is influenced by transformational leadership variables (X1) , leader member exchange (X2) and organizational citizenship behavior. of 60.9% while the remaining 39.1% is influenced by other variables not discussed in this study. The value of R Square for performance (Y2) using SmartPLS is 0.547 or 54.7%, meaning that the performance variable (Y2) is influenced by transformational leadership variables (X1), leader member exchange (X2) and organizational citizenship behavior by 54.7% while the remaining 45.3% is influenced by other variables not discussed in this study. The value of R Square for performance (Y2) using SmartPLS is 0.543 or 54.3%, meaning that the performance variable (Y2) is influenced by transformational leadership variables (X1), leader member exchange (X2) and organizational citizenship behavior by 54.3% while the remaining 45.7% is influenced by other variables not discussed in this study. The value of R Square for performance (Y2) using SPSS is 0.513 or 51.3%, meaning that the performance variable (Y2) is influenced by transformational leadership variables (X1), leader member exchange (X2) and organizational citizenship behavior by 51.3% while the remaining 48.7% is influenced by other variables not discussed in this study.

Coorelation Analysis Testing

The correlation coefficient shows the strength of the linear relationship and the direction of the relationship between variables. If the correlation coefficient is positive, then the two variables have a unidirectional relationship. This means that if the value of the variable X is high, then the value of the variable Y will be high as well. Conversely, if the correlation

coefficient is negative, then the two variables have an inverse relationship. This means that if the value of the variable X is high, then the value of the variable Y will be low and vice versa. To make it easier to interpret the strength of the relationship between two variables, the following criteria are provided:

- 0 means there is no correlation between two variables
- >0.00 – 0.25 means the correlation is very weak
- > 0.25 – 0.50 means enough correlation
- >0.50 – 0.75 means strong correlation
- > 0.75 – 0.99 means the correlation is very strong
- 1.00 means perfect correlation

The results of testing the correlation coefficient for structural equations using Amos, SmartPLS, WarpPLS and SPSS software are as follows:

Table 5
Comparison of Structural Equation Results

Software	Equation
Amos	Y1= a + 0.33X1 + 0.63X2 + e Y2= a + 0.09X1 + 0.25X2 + 0.52Y1 +e
Lisrel	Y1= a + 0.313X1 + 0.59X2 + e Y2= a + 0.08X1 + 0.21X2 + 0.0Y1 +e
GSCA	Y1= a + 0.29X1 + 0.67X2 + e Y2= a + 0.08X1 + 0.23X2 + 0.49Y1 +e
Tetrad	Y1= a + 0.26X1 + 0.71X2 + e Y2= a + 0.09X1 + 0.21X2 + 0.44Y1 +e
SmartPLS	Y1= a + 0.257X1 + 0.4X2 + e Y2= a + 0.107X1 + 0.226X2 + 0.53Y1 + e
WarpPLS	Y1= a + 0.261X1 + 0.384X2 + e Y2= a + 0.105X1 + 0.206X2 + 0.563Y1 + e
SPSS	Y1= 1.357+ 0,316X1 + 0,0.664X2 + e Y2 = -3.114 + 0.135X1 + 0.341X2 + 0.596Y1 + e

Source: SPSS, SmartPLS, WarpPLS and Amos Processing Results (2021)

The results of the structural equation using Amos software obtained the equation is $Y1 = 0.09X1 + 0.25X2 + 0.52Y1$, This means that the correlation coefficient value of the influence of transformational leadership variables (X1) on performance (Y2) is 0.09, meaning that there is a very weak correlation and shows that if the value of transformational leadership (X1) increases by 1, while the value of leader member exchange (X2) and organizational citizenship behavior (Y1) remains, the value of performance (Y2) will increase by 0.09. This means that the partial effect of transformational leadership on performance is 9%. The value of the correlation coefficient of the influence of the leader member exchange variable (X2) on performance (Y2) is 0.25, meaning that there is a sufficient correlation and shows that if the leader member exchange (X2) value increases by 1, while the value of transformational leadership (X1) and organizational citizenship behavior (Y1) remains, the performance value (Y2) will increase by 0.25. This means that the influence of leader member exchange (X2) on performance partially is

25%. The correlation coefficient value of the influence of organizational citizenship behavior (Y1) on performance (Y2) is 0.52, meaning that there is a strong correlation and it shows that if the value of organizational citizenship behavior (Y1) increases by 1, while the value of transformational leadership (X1) and leader-member exchange (X2) remains the value of performance (Y2) will increase by 0.52. This means that the effect of organizational citizenship behavior (Y1) on performance partially is 52%.

The results of the structural equation using SmartPLS software obtained the equation is $Y2 = 0.107X1 + 0.226X2 + 0.53Y1$, This means that the correlation coefficient value of the influence of transformational leadership variable (X1) on performance (Y2) is 0.107, meaning that there is a very weak correlation and indicates that if the value of transformational leadership (X1) increases by 1, while the value of leader member exchange (X2) and organizational citizenship behavior (Y1) remains, the performance value (Y2) will increase by 0.107. This means that the partial effect of transformational leadership on performance is 10.7%. The value of the correlation coefficient of the influence of the leader member exchange variable (X2) on performance (Y2) is 0.226, meaning that there is a sufficient correlation and shows that if the leader member exchange (X2) value increases by 1, while the value of transformational leadership (X1) and organizational citizenship behavior (X1) Y1) remains then the performance value (Y2) will increase by 0.226 . This means that the effect of leader member exchange (X2) on performance partially is 22.6%. The correlation coefficient value of the influence of organizational citizenship behavior (Y1) on performance (Y2) is 0.53 meaning that there is a strong correlation and shows that if the value of organizational citizenship behavior (Y1) increases by 1, while the value of transformational leadership (X1) and leader- member exchange (X2) remains then the performance value (Y2) will increase by 0.53, this means that the effect of organizational citizenship behavior (Y1) on performance partially is 53%.

The results of the structural equation using WarpPLS software obtained the equation is $Y2 = a + 0.105X1 + 0.206X2 + 0.563Y1 + e$, This means that the correlation coefficient value of the influence of transformational leadership variables (X1) on performance (Y2) is 0.105, meaning that there is a very weak correlation and shows that if the value of transformational leadership (X1) increases by 1, while the value of leader member exchange (X2) and organizational citizenship behavior (Y1) remains, the value of performance (Y2) will increase by 0.105. This means that the partial effect of transformational leadership on performance is 10.5%. The value of the correlation coefficient of the influence of the leader member exchange variable (X2) on performance (Y2) is 0.206, meaning that there is a sufficient correlation and indicates that if the leader member exchange (X2) value increases by 1, while the value of transformational leadership (X1) and organizational citizenship behavior (X1) Y1) is fixed then the performance value (Y2) will increase by 0.206 . This means that the effect of leader member exchange (X2) on performance partially is 20.6%. The correlation coefficient value of the influence of organizational citizenship behavior (Y1) on performance (Y2) is 0.563, meaning that there is a strong correlation and shows that if the value of organizational citizenship behavior (Y1) increases by 1, while the value of transformational leadership (X1) and leader-member exchange (X2)) remains, the performance value (Y2) will increase by 0.563, this means that the effect of organizational citizenship behavior (Y1) on performance partially is 56.3%.

The results of the structural equation using SPSS software obtained the equation is $Y2 = -3.114 + 0.135X1 + 0.341X2 + 0.596Y1 + e$, meaning that the correlation coefficient value of the influence of transformational leadership variables (X1) on performance (Y2) is 0.135, meaning that there is a very weak correlation shows that if the value of transformational leadership (X1) increases by 1, while the value of leader member exchange (X2) and organizational citizenship behavior (Y1) remains, the value of performance (Y2) will increase by 0.135. This means that the partial effect of transformational leadership on performance is 13.5%. The value of the correlation coefficient of the influence of the leader member exchange variable (X2) on performance (Y2) is 0.341, meaning that there is a sufficient correlation and shows that if the leader member exchange (X2) value increases by 1, while the value of transformational leadership (X1) and organizational citizenship behavior (X1) Y1) remains, then the performance value (Y2) will increase by 0.341 . This means that the influence of leader member exchange (X2) on performance partially is 34.1%. The correlation coefficient value of the influence of organizational citizenship behavior (Y1) on performance (Y2) is 0.596, meaning that there is a strong correlation and it shows that if the value of organizational citizenship behavior (Y1) increases by 1, while the value of transformational leadership (X1) and leader member exchange (X2) is fixed, then the performance value (Y2) will increase by 0.596, this means that the effect of organizational citizenship behavior (Y1) on performance partially is 59.6%.

In general, the use of CB-SEM aims to estimate the structural model based on a strong theoretical analysis to test the causal relationship between the constructs or latent variables as well as measure the feasibility of the model and confirm it according to the empirical data. Consequently, the use of CB-SEM requires a strong theoretical basis, fulfills various parametric assumptions and fulfills the model's feasibility test (goodness of fit). Therefore, CB-SEM is very appropriate to be used to test the theory and get justification for the test with a series of complex analyzes.

Meanwhile, PLS-SEM aims to test the predictive relationship between the constructs by seeing whether there is a relationship or influence between the constructs. The consequence of using PLS-SEM is that the test can be carried out without a strong theoretical basis, ignoring several assumptions (non-parametric) and the accuracy parameters of the prediction model seen from the coefficient of determination (R-square). Therefore, PLS-SEM is very appropriate to be used in research that aims to develop theory. So it can be concluded that, if the hypothesized structural model and measurement model are correct in this case explaining the covariance of all indicators and data conditions or the number of samples can be met, then covariance based SEM provides optimal estimates of model parameters. However, if the researcher's goals and views are from data to theory, the number of samples is limited and cannot meet various parametric assumptions, then PLS is a suitable analytical technique.

CONCLUSION

Based on the results of the analysis using Lisrel, Tetrad, GSCA, SPSS, SmartPLS, WarpPLS and Amos software, it was found that there was no significant difference in the significance value of p-value and t-value. There is also no significant difference in the determination value, and the correlation value in the resulting structural equation also has no significant difference in results. The correlation coefficient test results also show that the results are not much different between the Amos, SmartPLS, WarpPLS, and SPSS software. So this

study found the fact that the four software can be used entirely for social and management research, without any concerns about the difference in processing results. Suggestions for the next researcher is to add comparisons with other software, for example Lisrel.

REFERENCES

- Afthanorhan, A., Awang, Z., & Aimran, N. (2020). An extensive comparison of CB-SEM and PLS-SEM for reliability and validity. *International Journal of Data and Network Science*, 4(4), 357-364,
- Akbar, A. (2021). Transformational Leadership with Moon Character: Empirical Evidence at STIEM Bongaya Campus. *Jurnal Manajemen*, 25(1), 109-124,
- Ali, F., & Kim, W. G. (2015). A comparative study of CB-SEM and PLS-SEM for theory development in hospitality research. 3rd World Research Summit for Tourism and Hospitality, Orlando, FL.
- Amaro, S., Abrantes, J. L., & Seabra, C. (2015). Comparing CB-SEM and PLS-SEM results: an empirical example.
- Asbari, M., Hidayat, D. D., & Purwanto, A. (2021). Managing Employee Performance: From Leadership to Readiness for Change. *International Journal of Social and Management Studies*, 2(1), 74-85,
- Asbari, M., Prasetya, A. B., Santoso, P. B., & Purwanto, A. (2021). From Creativity to Innovation: The Role of Female Employees' Psychological Capital. *International Journal of Social and Management Studies*, 2(2), 66-77.
- Asbari, M., Purba, J. T., Hariandja, E. S., & Sudibjo, N. (2021). From Leadership to Innovation: Managing Employee Creativity. *Jurnal Manajemen Strategi Dan Aplikasi Bisnis*, 4(1), 143–154, <https://doi.org/https://doi.org/10,36407/jmsab.v4i1,287>
- Astrachan, C. B., Patel, V. K., & Wanzenried, G. (2014). A comparative study of CB-SEM and PLS-SEM for theory development in family firm research. *Journal of Family Business Strategy*, 5(1), 116-128.
- Azzahra, S. (2021). The Influence of Role Ambiguity, Job Stress and Leadership on Job Satisfaction and Employee Turnover at PT. Bank BRI Syariah Samarinda Branch. *Saudi J Bus Manag Stud*, 6(1), 15-23,
- Choudhary, A. I., Akhtar, S. A., & Zaheer, A. (2013). Impact of transformational and servant leadership on organizational performance: A comparative analysis. *Journal of business ethics*, 116(2), 433-440,
- Fornell, C., & Bookstein, F. L. (1982). Two structural equation models: LISREL and PLS applied to consumer exit-voice theory. *Journal of Marketing research*, 19(4), 440-452,
- Ghanbari, S., & Soltangholi, F. (2020). The Role of Managers' Spiritual leadership in Teachers' Work Engagement with Mediation of Social Capital. *Jsa*, 8(3), 238-215,

- Goestjahjanti, S. F., Novitasari, D., Hutagalung, D., Asbari, M., & Supono, J. (2020). Impact of Talent Management, Authentic Leadership and Employee Engagement on Job Satisfaction: Evidence From South East Asian Industries. *Journal of Critical Reviews*, 7(19), 67-88.
- Hair Jr, J. F., Matthews, L. M., Matthews, R. L., & Sarstedt, M. (2017). PLS-SEM or CB-SEM: updated guidelines on which method to use. *International Journal of Multivariate Data Analysis*, 1(2), 107-123,
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European business review*.
- Ichsan, R. N., Nasution, L., Sinaga, S., & Marwan, D. (2021). The influence of leadership styles, organizational changes on employee performance with an environment work as an intervening variable at pt. Bank sumut binjai branch. *Journal of Contemporary Issues in Business and Government*, 27(2), 258-264,
- İşcan, Ö. F., Ersarı, G., & Naktiyok, A. (2014). Effect of leadership style on perceived organizational performance and innovation: the role of transformational leadership beyond the impact of transactional leadership—an application among Turkish SME's. *Procedia-Social and Behavioral Sciences*, 150, 881-889.
- Jöreskog, K. G., Olsson, U. H., & Wallentin, F. Y. (2016). *Multivariate analysis with LISREL*. Springer.
- Mohamad, M., Afthanorhan, A., Awang, Z., & Mohammad, M. (2019). Comparison between CB-SEM and PLS-SEM: Testing and confirming the maqasid syariah quality of life measurement model. *The Journal of Social Sciences Research*, 5(3), 608-614,
- Moradi, M., & Zandipak, R. (2021). Wisdom-based management style and the structures and paths to achieve it and its relationship with transformational leadership (Case study: five star hotels in Tehran).
- Nam, S. T., Kim, D. G., & Jin, C. Y. (2018). A Comparison Analysis among *Structural equation modeling* (AMOS, LISREL and PLS) Using the Same Data. *Journal of the Korea Institute of Information and Communication Engineering*, 22(7), 978-984,
- Novitasari, D., Goestjahjanti, F. S., & Asbari, M. (2020). The Role of Readiness to Change between Transformational Leadership and Performance: Evidence from a Hospital during Covid-19 Pandemic. *APMBA (Asia Pacific Management and Business Application)*, 9(1), 37–56, <https://doi.org/10.21776/ub.apmba.2020,009.01,4>
- Novitasari, D., Siswanto, E., Purwanto, A., & Fahmi, K. (2020). Authentic Leadership and Innovation: What is the Role of Psychological Capital?. *International Journal of Social and Management Studies*, 1(1), 1-21,
- Ong, M. H. A., & Puteh, F. (2017). Quantitative data analysis: Choosing between SPSS, PLS, and AMOS in social science research. *International Interdisciplinary Journal of Scientific Research*, 3(1), 14-25,

- Purwanto, A. (2021). Partial Least Squares Structural Squation Modeling (PLS-SEM) Analysis for Social and Management Research : A Literature Review. *Journal of Industrial Engineering & Management Research*, 2(4), 114 - 123, <https://doi.org/10.7777/jiemar.v2i4.168>
- Purwanto, A., Bernarto, I., Asbari, M., Wijayanti, L. M., & Hyun, C. C. (2020). Effect of transformational and transactional leadership style on public health centre performance. *Journal of Research in Business, Economics, and Education*, 2(1).
- Purwanto, A., Purba, J.T., Bernarto, I., Sijabat, R. (2021). The Role of Transformational Leadership, *Organizational citizenship behaviour*, Innovative Work Behaviour, Quality Work Life, Digital Transformation and *Leader member exchange* on Universities Performance. *Linguistica Antverpiensia*. 2021(2). 2908-2932
- Rigdon, E. E., Sarstedt, M., & Ringle, C. M. (2017). On comparing results from CB-SEM and PLS-SEM: Five perspectives and five recommendations. *Marketing: ZFP–Journal of Research and Management*, 39(3), 4-16,
- Rochiyati Murniningsih, M., & Hanafi, M. (2020). The Role of Entrepreneurial Leadership and ICT in Encouraging Competitive Advantage in SME's.
- Wang, X., Wilson, J., & Li, W. (2021). An Empirical Investigation of Leadership and Human Resources Capacities as Key Actors in the Implementation of Smart Education. *Education Sciences*, 11(3), 138.
- Wold, H. (1980). Model construction and evaluation when theoretical knowledge is scarce: Theory and application of partial least squares. In *Evaluation of econometric models* (pp. 47-74). Academic Press.
- Zavvar, T., Homayouni, B. N., & Tanhaiyan, M. (2020). Structural Equation Modeling of Intellectual and Social Capital according to transformational Leadership of Tabriz Elementary Schools.
- Zuhdi, Z., Suharjo, B., & Sumarno, H. (2016). Perbandingan pendugaan parameter koefisien struktural model melalui SEM dan PLS-SEM. *Journal of Mathematics and Its Applications*, 15(2), 11-22,

