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Managerial Leadership and Performance as Fully Mediated by Transformational Leadership through Structural Equation Modeling

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ABSTRACT: This study investigated the relationships among managerial leadership, transformational leadership, and performance of school administrators of Northern Iloilo Polytechnic State College (NIPSC) through Structural Equation Modeling (SEM). Covariance-Based SEM (CB-SEM), Confirmatory Factor Analysis (CFA) with its default Maximum Likelihood Estimation (MLE) were used to test the hypothesized model that managerial leadership covary transformational leadership which were both related to the school administrators' performance. Results revealed that of the eight alternative models, two equivalent models, one model generates every probability distribution that can be generated by another model, Model B3 and Model D3 were generated, got the smallest Alkaike Information Criterion (AIC) and Bayes Information Criterion (BIC) indicating that both models had relatively better fit. Model B3 and Model D3 have the same degrees of freedom but feature a different configuration of paths among the same variables. However, of the two equivalent models, model B3 was rejected due to discriminant validity concerns while model D3 passed both measurement model and structural model, model D3 was confirmed and retained. As contribution to the fields of education, management and leadership, the researcher confirmed and recommends, through CB-SEM using CFA with its default MLE, the Managerial Leadership and Performance as fully mediated by Transformational Leadership Model.

KEYWORDS: Managerial Leadership, Transformational Leadership, Performance, Full Mediation Model, Structural Equation Modeling

I. INTRODUCTION

This study investigated the relationships among managerial leadership, transformational leadership, and performance of school administrators of Northern Iloilo Polytechnic State College (NIPSC) through Structural Equation Modeling (SEM).

Higher Education Institutions (HEIs) are responsible for educating and developing future leaders of the country. Leadership is critically important because it affects the health of the organization and is one of the most significant contributors to organizational performance (Kieu, 2010). There is great interest in educational leadership in the early part of the 21st century because of the widespread belief that the quality of leadership makes a significant difference to school and student outcomes (Bush, 2007).

Steve Jobs, Apple CEO said "management is about persuading people to do things they do not want to do, while leadership is about inspiring people to do the things that they never thought they could do. Management is the systematic side of running an organization, of setting goals and strategy, of allocating resources and evaluating results while leadership is an approach that generates, but does not demand, enthusiasm, loyalty and respect, an important secret to increasing organization's productivity, morale, profitability and efficiency. Leadership is not about being in charge - it is about leading the charge" (Lawn, 2013). Management guru Peter Drucker is credited with saying, "Leaders do the right things and managers do things right", (Thomas, 2017). Organizations need strong leadership and strong management for optimal effectiveness, leaders to challenge the status quo and to inspire and persuade organization members, managers to assist in developing and maintaining a smoothly functioning workplace. The balance between the roles of manager and leader is essential to ensure that the best results are obtained (Ioana & Marcela, 2016).

Management and leadership are inextricably interwoven. Management has a few tasks not shared by leadership, while leadership has no distinct tasks within its boundary (Nienaber, 2010). Leadership and management must go hand in hand. They are not the same thing but necessarily linked and complementary. Any effort to separate the two is likely to cause more problems than it solves (Sharma et al., 2013).

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All leaders must resolve the conflict between leadership and management. "Management is about coping with complexity, while leadership is about coping with change and improvement. While the leader empowers, the manager controls. Leadership changes the world and management maintains it. The fundamental purpose of management is to keep the current system functioning well while the fundamental purpose of leadership is to produce useful change" (Allman, 2009).

This study responds to calls for research studies to explore the mediating mechanism in the Transformational Leadership (TL) process (Judge et al., 2006 in Ribeiro, & Gomes, 2018), as the mediation effects explain the conditions in which TL is related to the favorable outcomes.

II. METHODOLOGY

A. *Data Gathering Instruments*

Transformational Leadership Scale was adopted from Podsakoff, MacKenzie, Moorman, & Fetter, (1990). It has six indicators, namely: High Performance Expectation (HPE) with Cronbach's alpha = .754 (three items), Provide an Appropriate Model (PAAM) with Cronbach's alpha = .941 (three items), Identifying and Articulating a Vision (IAV) with Cronbach's alpha = .896 (five items), Fostering Acceptance of Group Goals (FAGG) with Cronbach's alpha = .872 (four items), Individual Support (Ind_Sup) with Cronbach's alpha = .747 (four items), and Intellectual Stimulation (Int_Sti) with Cronbach's alpha = .884 (four items).

The **Managerial Leadership Questionnaire** was lifted from the Competency Framework for Southeast Asian School Heads, 2014 Edition which was developed by SEAMEO INNOTECH. Managerial Leadership is one of the five general competencies (Strategic Thinking and Innovation, **Managerial Leadership**, Instructional Leadership, Personal Excellence and Stakeholder Engagement). Managerial Leadership has eight enabling competencies: Manages financial resources (MFR) with Cronbach's alpha = .894 (four items), Manages learning environment (MLE) with Cronbach's alpha = .863 (four items), Manages systems and procedures (MSP) with Cronbach's alpha = .904 (four items), Manages school personnel requirements (MSPR) with Cronbach's alpha = .854 (five items), Supports professional development of staff (SPDS) with Cronbach's alpha = .874 (five items), Recognizes staff performance (RSP) with Cronbach's alpha = .854 (four items), Demonstrates program and project management skills (DPPMS) with Cronbach's alpha = .878 (three items), and Promotes school-based programs and projects that support sustainable development (PSBPPSSD) with Cronbach's alpha = .929 (four items).

Questionnaire for Administrators' Performance was adopted from Deguma, G.E., (2016). Questionnaire for Administrators' Performance has six indicators, namely: Planning and Organizing (P_O) with Cronbach's alpha = .871 (six items), Communicating/Leading (C_L) with Cronbach's alpha = .745 (three items), Decision-making (D_M) with Cronbach's alpha = .896 (five items), Evaluating (EVAL) with Cronbach's alpha = .883 (five items), Improving the Unit and the Instruction (IUI) with Cronbach's alpha = .921 (four items). Note: Total Effectiveness (TE) is a one-item indicator. For reliability testing purposes it was included in all other indicators for Performance with an average Cronbach's alpha = .897.

All instruments were internally consistent or reliable having Cronbach's alpha > 0.70. The instrument is internally consistent or reliable if Cronbach's alpha is ≥ 0.70 (Fornell & Larcker, 1981; Nunnally, 1978; Nunnally & Bernstein, 1994; Kock, 2015 in Amora, 2016).

Cronbach's alpha was used to determine the internal consistency or reliability of the instruments (although all instruments were adopted) utilizing the 33 faculty members of Capiz State University, Pilar Campus (CAPSU-Pilar), who rated their school administrators, as respondents for the said test because the researcher foresaw that it would be problematic to conduct SEM if the instruments had low internal consistency or reliability.

If the internal consistency is low, then the content of the items may be so heterogeneous that the total score is not the best possible unit of analysis, Kline (2016).

B. *Respondents of the Study*

The respondents of the study were the 230 faculty members of the seven campuses of NIPSC who were randomly selected using stratified random sampling technique with campus as stratum. The respondents rated their school administrators' managerial leadership, transformational leadership, and performance according to their administrative designation (Vice President for Academic Affairs, Vice President for Administrative and Finance, Campus Administrator, Director, Dean, Associate Dean, Program Chairperson, and Principal).

C. *Structural Equation Modeling (SEM)*

Hypotheses

H_1: Managerial leadership of school administrators is directly related to their performance, **(ML) → (P).**

H_2: Transformational leadership of school administrators is directly related to their performance, **(TL) → (P).**

H_3: Managerial leadership and transformational leadership of school administrators are both directly related to their performance,

(ML) ←→ (TL) → (P).

Figure 1 shows the hypothesized model.

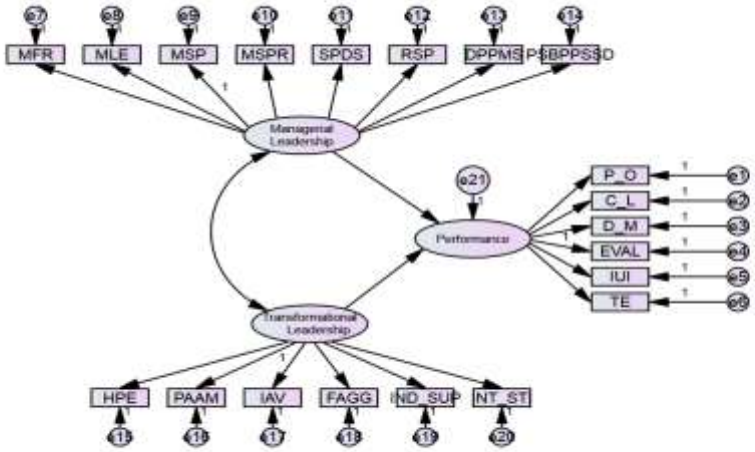

Figure 1. Path Diagram of the Hypothesized Model of Managerial Leadership, Transformational Leadership, and Performance

Covariance-Based SEM (CB-SEM), Confirmatory Factor Analysis (CFA) through AMOS (Analysis of Moment Structure) Software with its default Maximum Likelihood Estimation (MLE) was used to test the hypothesized model.

SEM is a family of statistical models that seek to explain the relationships among multiple variables. It examines the structure of the interrelationships expressed in a series of equations, similar to a series of multiple regression equations which depict the relationships among constructs which are unobservable or latent factors represented by multiple variables (Bag, 2015).

SEM is a statistical methodology where the researcher defines a theoretical model of relations between the variables, using two or more observed variables as indicators of an unobserved underlying construct termed a latent variable. The theoretical or hypothesized model can be tested statistically to determine the extent to which it is consistent with the data or how well it fits the data (Skaalvik and Skaalvik, 2010). It is also applied in testing causal relationships among variables (Loon 2008 in Parco-Tropicales & de Guzman, 2014).

SEM can be classified into covariance-based SEM (CB-SEM) and component-based SEM (PLS-SEM). Covariance based SEM is used with an objective of model validation and requires a large sample. Component based SEM is used for score computation and can be carried out on very small sample (Tenenhaus, 2008 in Bag, 2015). CB-SEM is used when the sample size is large, data is normally distributed and the model is correctly specified. PLS-SEM becomes a good alternative to CB-SEM when the sample size is small, researcher has little available theory, predictive accuracy is paramount and correct model specification cannot be ensured (Bag, 2015).

The Structural Equation Modeling may be used to **build or test theory.** Confirmatory technique may be used to build theory derived from well-established set of constructs. Regardless of whether the SEM technique is exploratory or confirmatory it possesses the ability to integrate **measurement** and **structural models** (Roberts, Thatcher and Grover, 2010 in Bag, 2015).

The fit indices are intended to inform the researcher how closely the data fit the model. If the goodness of fit is adequate, the plausibility of the postulated relations among the variables is strengthened; if the fit is inadequate, the tenability of the postulated relations is rejected (Byrne, 2001 in Dion, 2008). The major reason for computing a fit index is that the chi square is statistically significant, but the researcher still wants to claim that the model is a "good fitting" model (Kenny, 2015). Assessing whether a specified model fits the data is one of the most important steps in structural equation modeling (Yuan, 2005 in Hooper et al., 2008).

The objective of SEM is to explain the system of correlative dependent relations between one or more manifest variables and latent constructs simultaneously. Because there is no single criterion for the theoretical model fit evaluation, a wide array of fit indices was developed (Schermelleh-Engel and Moosbrugger, 2003; Ding et al., 1995; Sugawara and MacCallum, 1993 in Cangur and Ercan, 2015).

The ultimate goal of SEM should be to attain **statistical beauty** (Kline, 2016).

III. RESULTS AND DISCUSSIONS

The hypothesized model **(ML) ←→ (TL) → (P)** failed the exact-fit test, the chi square (χ^2) was significant, however, the researcher still wants to claim that the model is a "good fitting" model, (Kenny, 2015) and the RMSEA = **0.111** indicates poor fit. RMSEA above 0.10 indicated poor fit, (MacCallum et al., 1996 in Hooper, Coughlan, and Mullen, 2008).

Applying all possible covariance modification indices does not improve the hypothesized model; the path Managerial Leadership → Performance (**ML → P)** was still **not significant**.

Tentatively reject the model if it fails the exact-fit test (Kline, 2016). Since the data does not fit the hypothesized model, the researcher conducted model generation. **Model generation** occurs when an initial model does not fit the data and is subsequently modified. The re-specified model is then tested again with the same data (Joreskog, 1993 in Kline, 2016).

Kline (2016) recommended fit indices for the data to fit the model: χ^2(Goodness of Fit**)** with its degrees of freedom and p-value, Standardized Root Mean Square Residual (SRMR). SRMR is an absolute fit index that is a badness-of-fit statistic. It is a standardized version of the Root Mean Square Residual (RMR). Perfect model fit is indicated by RMR = 0 and increasingly higher value indicate worse fit, Bentler Comparative Fit Index (CFI). CFI is an incremental fit index that is a goodness-of-fit statistic. Its values range from 0 to 1.0 where 1.0 is the best result**,** and Root Mean Square Error of Approximation (RMSEA). RMSEA is an absolute fit index scaled as a badness-of-fit index where a value of zero indicates the best result.

Maximum likelihood estimation (MLE) technique is one of the normal theory estimation techniques that provide model parameter estimations simultaneously (Kline, 2011; Chou and Bentler, 1995 in Cangur and Ercan, 2015).

For Maximum Likelihood Estimation (MLE), the Alkaike Information Criterion **(AIC)**, (Alkaike, 1974 in Kline, 2016) is based on an information theory approach to data analysis that combines statistical estimation and model selection in a single framework. A predictive fit index that takes more direct account of sample size is the Bayes Information Criterion **(BIC),** (Raftery, 1995 in Kline, 2016). The AIC and BIC are generally used to select among competing non-hierarchical models; specifically, the model with the ***smallest*** value of the particular predictive fit index is chosen as the one most likely to replicate. This model has relatively **better fit** and fewer free parameters than competing models (Kline, 2016).

When several theoretically competing models exist, researchers must identify which model fits the data better (Shek & Yu, 2014). Ignoring equivalent models is a serious kind of **confirmation bias** whereby researchers test a single model, give an overly positive evaluation of the model and fail to consider other explanation of the data (Shah & Goldstien, 2006 in Kline, 2016).

Eight alternative models were generated. Interestingly, of the eight alternative models, both Model B3 and Model D3 had the same fit indices, $\chi^2(151) = 314.769$, $p < 0.001$, got the smallest ratio of $\frac{x^2}{Df} = 2.085$, SRMR = 0.033, largest CFI = 0.967, RMSEA = 0.069 [0.058, 0.080], got the ***smallest*** AIC = 432.769 and BIC = 635.616 indicating that both models had relatively better fit. Model B3 and Model D3 are equivalent models. **Equivalent models** have the same degrees of freedom (they are equally complex) but feature a different configuration of paths among the same variables. The most general form of equivalent models is **observational equivalence** - one model generates every probability distribution that can be generated by another model (Herseberger & Marcoulides, 2013 in Kline, 2016).

Table 1.0 shows the data.

Table 1.0 Eight Alternative Models with Model B3 and Model D3 as Equivalent Models

Model test statistics N = 230 Approximate fit indices

Model	χ^2	DF	*P*	Ratio of $\frac{x^2}{Df}$	RMSEA [90% CI]	CFI	SRMR	AIC	BIC
Model A3	353.116	148	<0.001	2.386	0.078[0.067,0.088]	0.958	0.046	477.116	690.277
Model B1	368.151	154	<0.001	2.391	0.078[0.068,0.088]	0.956	0.038	480.151	672.683
Model B2	318.617	152	<0.001	2.096	0.069[0.059,0.080]	0.966	0.033	434.617	634.026
Model B3	**314.769**	**151**	**<0.001**	**2.085**	**0.069[0.058,0.080]**	**0.967**	**0.033**	**432.769**	**635.616**

Model D1	368.151	154	<0.001	2.391	0.078[0.068,0.088]	0.956	0.038	480.151	672.683
Model D2	318.617	152	<0.001	2.096	0.069[0.059,0.080]	0.966	0.033	434.617	634.026
Model D3	**314.769**	**151**	**<0.001**	**2.085**	**0.069[0.058,0.080]**	**0.967**	**0.033**	**432.769**	**635.616**
Model F3	323.797	147	<0.001	2.203	0.072[0.062,0.083]	0.964	0.037	449.797	666.396

Measurement Model

Construct validity. Construct validity involved whether scores measure a target hypothetical latent construct that can be measured only indirectly through its indicators (Kline, 2016).

Construct reliability assessment allows the evaluation of the extent to which a reflective item or set of reflective items is consistent in what it intends to measure (Straub, Boudreau, & Gefen, 2004; Roldan & Sanchez, 2012 in Amora et al., 2016). Construct reliability is usually assessed using composite reliability and Cronbach's alpha (Roldan & Sanchez-Franco, 2012; Kock, 2015 in Amora et al., 2016). Construct reliability is adequate if the composite reliability and Cronbch's alpha are greater than or equal to 0.70 (Fornell & Larcker, 1981; Nunnally, 1978; Nunnally & Bernstien, 1984; Kock, 2015 in Amora et al., 2016). In the present study, managerial leadership (ML), transformational leadership (TL), and performance (P) were reliable.

Discriminant Validity. Discriminant Validity for Model D3:

The square root of the AVE for ML is less than its correlation with TL; the AVE for ML is less than the MSV; the AVE for TL is less than the MSV. Due to discriminant validity concerns (Gaskin & Lim, 2016), model B3 was **rejected**. Table 2.0 shows the data.

Table 2.0 Model Validity Measures for Model B3

	Composite Reliability(CR)	Cronbach's Alpha(α)	AVE	MSV	ML	TL	P
ML	0.935	0.943	0.645	0.842	**0.803**		
TL	0.931	0.920	0.660	0.842	0.918***	**0.813**	
P	0.956	0.954	0.783	0.842	0.809***	0.881***	**0.885**

AVE = average variance extracted; MSV = maximum shared variance; ML = Managerial Leadership; TL = Transformational Leadership; Diagonal elements (bold) are square roots of AVE; Off-diagonal elements are the correlations among constructs. ***For discriminant validity, diagonal (bold) elements should be larger than the off-diagonal elements.***
Significance of correlations: *** p < 0.001

Convergent validity. Convergent validity is a measure of the quality of the measurement instrument. A measurement instrument has a good convergent validity if the items associated with each construct are understood by the respondents in the same way as they were intended by the designers of the items (Kock, 2015 in Amora et al., 2016). Kock (2015) recommends that the item loadings associated with the construct should be statistically significant ($p < 0.05$) and be equal to or greater than **0.50** (Hair et al., 1987; 2009; Kock, 2015 in Amora et al., 2016). Item loading is the correlation between the item and construct. Another approach is the average variance extracted (AVE). AVE quantifies the amount of variance that a construct captures from its items relative to the amount due to measurement error (Chin, 1998 in Amora et al., 2016), which should be greater than **0.50** (Kock, 2015; Hair, Ringle, & Sarstedt, 2011; Fornell & Larcker, 1981, in Amora et al., 2016).

Having no validity concerns and both the item loadings and AVEs are satisfied for all the constructs of model D3, model D3 was **confirmed** and thus **retained**.

Tables 2.1 and 2.2, respectively shows the data.

Table 2.1 Model Validity Measures for Model D3

	Composite Reliability(CR)	Cronbach's Alpha(α)	AVE	MSV	ML
ML	0.947	0.935	0.667		**0.817**

AVE = average variance extracted; MSV = maximum shared variance; ML = Managerial Leadership, No validity concerns (Gaskin, J. & Lim, J., 2016).

Table 2.2 Item loadings and AVE for Model D3

Variables	Loadings	AVE
ML (8 items)	**0.713-0.852**	0.645
ML → MFR	0.775	
ML → MLE	0.782	
ML → MSP	0.823	
ML → MSPR	0.843	
ML → SPDS	0.840	
ML → RSP	0.787	
ML → DPPMS	0.852	
ML → PSBPPSSD	0.713	
TL (6 items)	**0.699-0.943**	0.660
TL → INT_STI	0.792	
TL → IND_SUP	0.699	
TL → FAGG	0.764	
TL → IAV	0.943	
TL → PAAM	0.846	
TL → HPE	0.736	
P (6 items)	**0.756-0.945**	0.783
P → P_O	0.858	
P → C_L	0.886	
P → D_M	0.945	
P → EVAL	0.898	
P → IUI	0.871	
P → TE	0.756	

ML = Managerial Leadership: MFR = Manage financial resources, MLE = Manage learning environment, MSP = Manage systems and procedure, MSPR = Manage school personnel requirements, SPDS = Support professional development of staff, RSP = Recognize staff performance, DPPMS = Demonstrate program and project management skills, and PSBPPSSD = Promote school-based programs and projects that support sustainable development

TL = Transformational Leadership: HPE = Performance Expectation, PAAM = Provide an Appropriate Model, IAV = Identifying and Articulating a Vision, FAGG = Fostering Acceptance of Group Goals, Ind_Sup = Individual Support, and Int_Sti = Intellectual Stimulation

P = Performance: P_O = Planning and Organizing, C_L = Communicating/Leading, D_M = Decision-making, EVAL = Evaluating, IUI = Improving the Unit and the Instruction, TE = Total Effectiveness, AVE = average variance extracted

Hypothesized and Retained Models

Table 3.0 shows the values of model test statistics and approximate fit indices of the hypothesized model which failed the model test statistics and the improved, confirmed and retained model D3.

Table 3.0 Model test statistics and approximate fit indices of the hypothesized model and the improved, confirmed and retained model D3.

	Model test statistics				N = 230	Approximate fit indices			
	x^2	DF	*P*	Ratio of $\frac{x^2}{Df}$	RMSEA[90% CI]	CFI	SRMR	AIC	BIC
Hypothesized Model	637.769	167	<0.001	3.819	0.111[0.102,0.120]	0.904	0.052		
Model D3	314.769	151	<0.001	2.085	0.069[0.058,0.080]	0.967	0.033	432.769	635.616

IV. CONCLUSSION

Of the two equivalent models, model B3 was rejected due to discriminant validity concerns while model D3 passed both measurement model and structural model, model D3 was confirmed and retained.

Managerial Leadership and Performance as Fully Mediated by Transformational Leadership through Structural Equation Modeling

It was found out that in path model D3, transformational leadership was the mediator of managerial leadership and performance. Thus, the hypothesis, H_1: Managerial leadership of school administrators is directly related to their performance, **(ML) → (P)** was rejected. However, transformational leadership of school administrators is directly related to their performance, **(TL) → (P),** thus, the researcher failed to reject H_2: Transformational leadership (TL) was directly related to Performance (P) of school administrators. Finally, managerial leadership and transformational leadership were both not directly related to performance. Therefore, the hypothesis, H_3 : Managerial Leadership and transformational leadership of school administrators are both directly related to their performance, **(ML) ←→ (TL) → (P)** was rejected.

To establish mediation, the following conditions must hold: First, the independent variable must affect the mediator in the first equation; second, the independent variable must be shown to affect the dependent variable in the second equation; and third, the mediator must affect the dependent variable in the third equation. If these conditions all hold in the predicted direction, then the effect of the independent variable on the dependent variable must be less in the third equation than in the second. Perfect (full) mediation holds if the independent variable has no effect when the mediator is controlled, Baron & Kenny in Newsom, (2018).

Estimating mediation typically relies on very strong assumptions, but it is better to be aware of all that is assumed in mediational analyses (Bullock et al. 2010 in Kline, 2016).

Transformational leadership fully mediates managerial leadership and performance of school administrators.

V. RECOMMENDATIONS

Replication of the study is recommended to enhance researches, and future researchers are encouraged to work into some other factors that might help improve the result of this investigation.

As contribution to the fields of education, leadership and management, the researcher confirmed and recommends, through Covariance-Based Structural Equation Modelling (CB-SEM) using Confirmatory Factor Analysis (CFA), the Managerial Leadership (ML) and Performance (P) as fully mediated by Transformational Leadership (TL) Model.

Figure 2 shows the model.

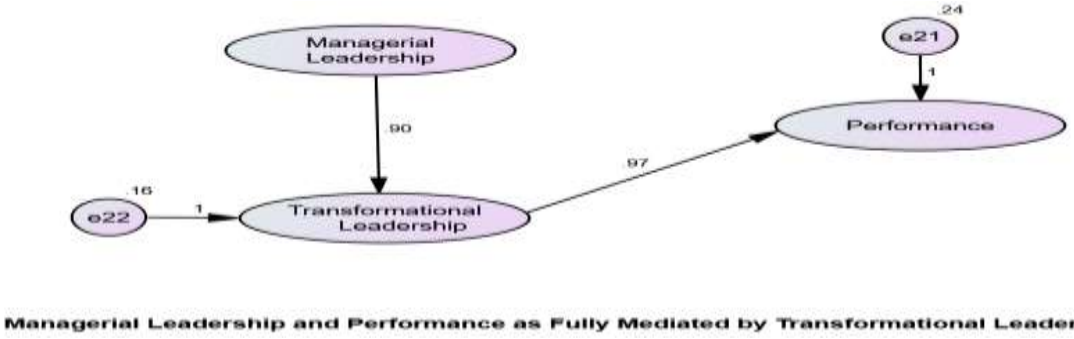

Figure 2 ML → TL → P Model

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