Analyzing Variables in Wheel of Participation a Synergy in Facilities Management for Enhancing Academic Performance

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Abstract. This study analyzed variables in the wheel of participation advocated by Davidson (1998); in this study, wheel of participation is adopted as synergy in facilities management for the maintenance of university community infrastructure and facilities, to examine the effects of synergy by the local community and the university authority in facilities management for enhancing academic performance in Abubakar Tafawa Balewa University, Bauchi (ATBU). 100 questionnaires composed on 5 level-Linkert scales were randomly distributed, Reliability analysis was conducted to check the level of internal consistency among the measuring items, while Multiple Regression Analysis and Structural Equation Modelling with AMOS simultaneously analyzed the effects of the exogenous variables (information, consultation, participation & empowerment) on the endogenous variable (academic excellence) in ATBU. Estimates of the structural model revealed that information sharing, consultation with stakeholders, participation by local community members and empowering stakeholders do not influence academic excellence. While the regression analysis indicated a weak relationship between all the four predictor variables and the academic excellence; and with R^2 of 0.029 meant that the predictor variables accounted for only 2.9 % of the variance on academic excellence, thus, 97.1 % is accounted for by other variables not covered in this study. Further studies are recommended to supplement more predictor variables like students´ talent, intuition, flair, willingness to learn (zeal), finance and so on; using the inductive approach.

Keywords: Wheel of Participation; Facilities Management; Academic Performance.

INTRODUCTION

A complementary relationship exists between the existing university facilities and quality of academic performance, as in [4] that the physical environment of the academic institution can determine academic success; authors [15] posited that aging building facilities constitute a great hindrance to efficient teaching and learning. This study analyzed variables in the wheel of participation advocated by Davidson in 1998 [9]; in this study, wheel of participation is adopted as synergy in facilities management for the maintenance of university community infrastructure and facilities, to examine the effects of synergy by the local community and the university authority in facilities management for enhancing academic performance in Abubakar Tafawa Balewa University, Bauchi (ATBU). According to Rogers and Robinsons (2004) cited in [14], Community engagement is a holistic approach that establishes a flatform whereby public service providers and community members will partake a roll in decision making on ways to provide optimum services to the community.

The synergy between the university community and the authority in decision making on project construction and system maintenance will integrate users to have facilities at heart; authors [20] outlined that understanding project goals, monitoring, controlling, solving problems and

proper allocation of resources is very crucial, these are necessary to extend the life span of school facilities to support teaching and learning, as students can be seen as customers who receive service in an academic institution, effective provision, and maintenance of facilities in schools can inevitably enhance students´ care and general welfare, thereby boosting students´ performance; this assertion is supported by [3] wherein a proposition, Alexander classified customers as an integral part of an organization whose care and welfare can improve organizational (school) effectiveness.

LITERATURE REVIEW

In the United Kingdom, the Town and Country Planning Act of 1947 has some elements of public participation, it was made official in 1968 mainly in the planning process which entailed the development control process and development plan process [14]. The degree of participation and who should participate should be defined, on the bases of Arnstein's Ladder of participation, author [22] advocates five levels of participation (Figure 1), in the area of sharing information, regular consultation, taking the right decision together, acting together and supports to community initiatives. Low level of participation leads to the poor commitment from the sides of the government as a service and facility provider, and also a poor commitment by other stakeholders.

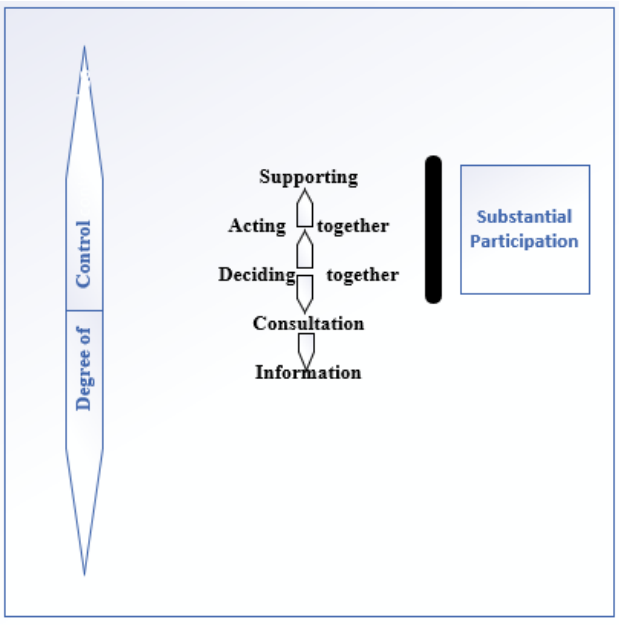

Figure 1 – Level of Participation

Notes: adopted by [22]

The hierarchy of stakeholders usually starts from the politicians who initiate; down to the management bodies at federal, states and municipal levels (these are trained officers that provide and maintains services and facilities); other stakeholders are residents and occupiers of business premises; however, to avoid hierarchical conflicts whereby stakeholders will meddle into the defined line of duty of other stakeholders, level of participation must be spelled out to local community members, as advocated by [22]. Author [14] has advocated for community engagement at the level of the decision-making process, and featured a model of participation developed by Davidson in 1998, which outlined four major headings for community engagement titled the wheel of participation shown in Figure 2.

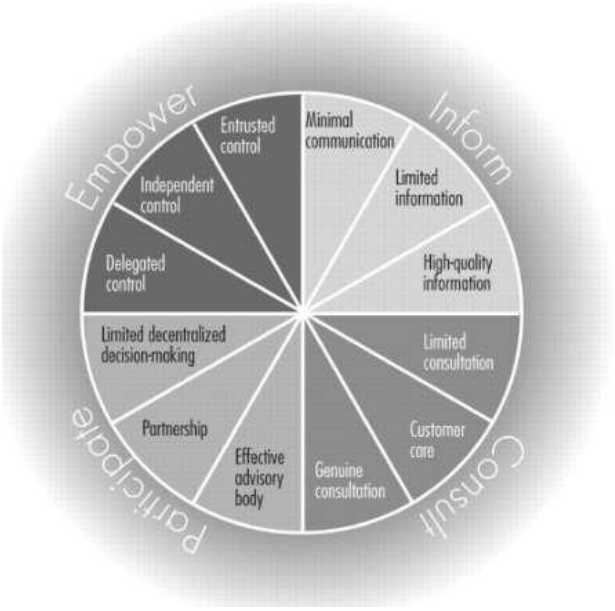

Figure 2 – The wheel of participation [14]

The headings in Figure 2; information, consultation, participation, and empowerment are the exogenous variables, with their corresponding sub-themes illustrated in Table 1. The sub-themes were construed to form the measurement items in the questionnaire.

The endogenous variable (academic performance) has ten (10) measurement items sourced from different articles relevant to facilities management as they relate or play some roles in student's academic performance; these are shown in Table 2 below.

Table 1 – Themes and sub-themes in Davidson's wheel of participation

No	Themes / Main Variables	Sub-themes	Goals
1	Information	Minimal Communication	Make all stakeholders well informed on existing problems & solutions.
2		Limited Information	
3		High-Quality Information	
4	Consultation	Limited Consultation	Envisaged feedback, acknowledge concerns & reciprocate to community on the impact of their inputs.
5		Customer Care	
6		Genuine Consultation	
7	Participation	Limited Decentralized Decision Making	Work with the public groups putting their concerns & aspirations at the fore.
8		Partnership	
9		Effective Advisory Body	
10	Empowerment	Entrusted Control	Acting for the public and implement public decision first
11		Independent Control	
12		Delegated Control	

Table 2 – Sources of Items for the Endogenous Variable (academic performance)

No	Measurement Items	Source
1	Sport	[4]
2	Room space (hostel)	[10]
3	Garden	[4]
4	Healthcare	[10], [4]
5	Sanitation	[6]
6	Streetlight (security)	[6]
7	Security	[10], [6], [4] & [15]
8	Ict	[4]
9	Food (canteen)	[5]
10	Library (Reading space)	[19]

Authors [11] posited a supplement to the wheel of participation called collaboration, in it, a room for partnership with the public was provided, to work in the area of developing more alternatives and identification of solutions; the collaboration posited here, strengthens a strong synergy of partnership for innovations in addressing community problems and considering local advice at the fore. Table 3 explicitly shows the working tools at every level of community engagement; each of the five levels inevitably has direct interaction with the public, for instance at information level there are information sessions; at consultation level, there are focus group and surveys; at involvement level, there are workshops; while at collaboration level there are citizen committees and at empowerment level, there are citizen juries and delegated decisions.

Table 3 – Identification of Tools for Synergy in Facilities Management

No	Major Variables	Working Tools
1	Inform	Fact sheets. Websites. Information sessions.
2	Consult	Focus group. Surveys.
3	Involve	Workshops. Deliberate polling.
4	Collaborate	Citizen committees. Concensus building. Participatory decision making.
5	Empower	Citizen juries. Ballots. Delegated decisions.

Adapted by [11]

The goal of each level can be achieved by exploring the working tools corresponding to the level so that an individual member is incorporated to express his/her view in facility provision and management. The five levels of participation according to [16] can start from the lowest to the highest degree of participation as shown in Figure 3.

James D. Wolfensohn, (World Bank President) buttressed the notion of participation in his statement in 1996 that working together and empowering stakeholders especially the poor, beyond just sharing information and consultation to decision-making; this was also posited by [19], but J. D. Wolfensohn went further to entrusts the ownership of community facilities in the hands of all stakeholders; thus, this sense of ownership is essential to the goal of sustainable development [17]. Though, public participation in facilities development and maintenance, as well as environmental management, entails political issues with international concern since 1992 when the UNCED enshrined public participation in Agenda

21 as a stride toward sustainable development [17]. The integration of different interests and opinions as well as enhancing development incorporating local knowledge are some of the advantages of participation, however, this is not without corresponding disadvantage, a major risk in participation is that it consumes time and is expensive [17].

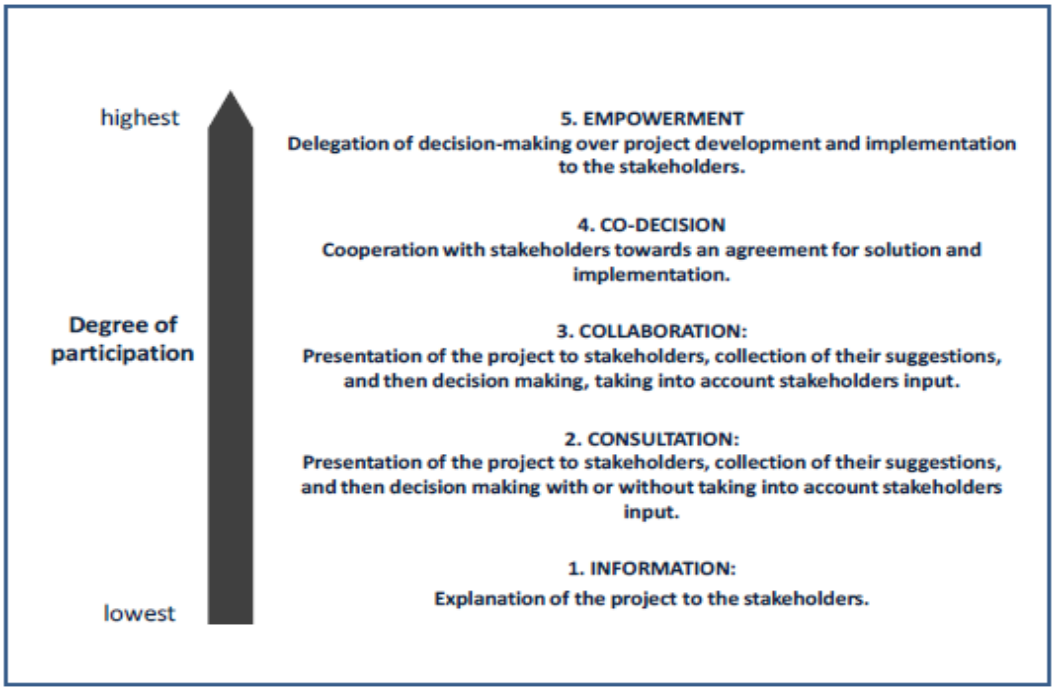

Figure 3 – Degree of Participation [16]

MATERIALS AND METHOD

The study analyzed variables of public participation reported in the wheel of participation, each of the 4 variables (exogenous variables) was accompanied with 3 sub-variables (Figure 2); furthermore, the same wheel of participation adopted by [8] illuminated more on each sub-variable and was further used to develop the measurement items in the questionnaire; the sources of measurement items for the endogenous variable (academic performance) was reported in Table 2. The questionnaire was composed on a 5 level-Linkert scale, randomly distributed. Simple random sampling was adopted because the sample frame was accurate and easily accessible using a random number table, thus, 100 questionnaires were distributed at the ATBU Yelwa campus in Bauchi. Reliability analysis was conducted to check the level of consistency in the measuring items, while Multiple Regression and SEM with AMOS simultaneously analyzed the effects of the exogenous variables (information, consultation, participation & empowerment) on the endogenous variable (academic excellence) in ATBU. The hunch of hypotheses was given in Table 4.

Table 4 – Reliability Analysis

No	Exogenous and Endogenous Constructs	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Measurement Items / Construct
1	Information	0.965	0.968	6
2	Consultation	0.952	0.956	6
3	Participation	0.889	0.890	6
4	Empowerment	0.915	0.925	6
5	Academic Performance	0.880	0.878	10
Total				34

The study consists of four exogenous (independent variables) derived from [9] which was cited in [14]; the aim is to test the derived theories on the endogenous (dependent variable) academic performance, whose notion came as a result of the poor condition of students´ lavatories and other facilities in the university. The analysis involved six items of measurement for each exogenous variable and ten items for the endogenous variable (Table 4), the five constructs were subjected to reliability analysis using Cronbach's Al-

pha. This is necessary to check the level of internal consistency between the items under each variable, in [13, 14, 18] alpha value from 0.7 to 0.95 depicts good internal consistency of items.

The confirmatory factor analysis shown in Figure 4, has partially achieved good fitness indexes given that AGFI and GFI have values as low as 0.671 and 0.728 respectively. In Chau & Hu, 2001; Hair et al., 2010 cited in [1] that for AGFI and GFI value > 0.80 was accepted, these are still lower than the threshold value. CFI at 0.906 has achieved absolute fitness [5]; NFI and TLI with 0.822 and 0.894 respectively are can be acceptable. While RMSEA at 0.091 is acceptable, according to [2] a model could be considered weak when RMSEA was greater than 1.0; also in Browne et al., 1993 cited in [1] that RMSEA at less than 0.10 was acceptable; and Chi/Sq/df at 1.906 < 3.00 is accepted, while in [21] ChiSq/df is required at less than 5.0.

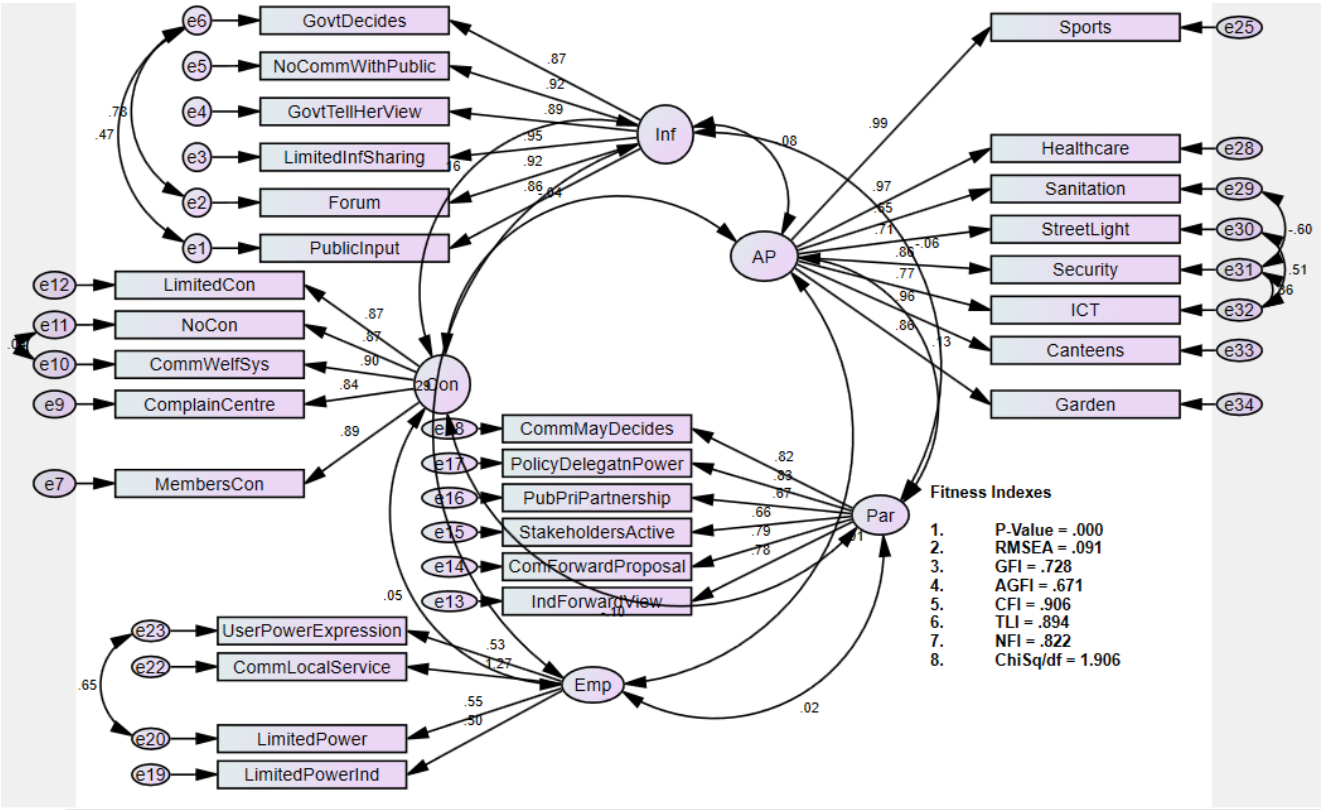

Figure 4 – The Confirmatory Factor Analysis (Measurement Model)

The structural model. The structural model indicates the extent to which a given variable influence another variable [7]. The structural model in Figure 5 below is an improvement from the measurement model in Figure 4. The model on Figure 5 indicated how the predictor variables influenced the dependent variable, the links between the latent unobserved variables are single-headed arrows pointing towards the dependent variable [7, 5]; and provided a means for testing the hunch of the hypotheses formulated according to the latent unobserved constructs. The factor loadings for each measurement item under each variable are well above 0.60 as required in the rule of thumb [5]; in the fitness indexes, GFI and AGFI have not satisfied the basic level of 0.90; RMSEA is slightly above 0.08 as required but according to [2] a model could be considered weak if RMSEA is greater than 1.0; also in (Browne et al., 1993 cited in [1] that RMSEA at less than 0.10 is acceptable; NFI > 0.80 could be accepted as a recommended value for a good fit, as in Chau & Hu, 2001; Hair et al., 2010 cited in [1]; CFI and TLI are already well above 0.90 (Figure 5), and with good factor loadings the model can be upheld.

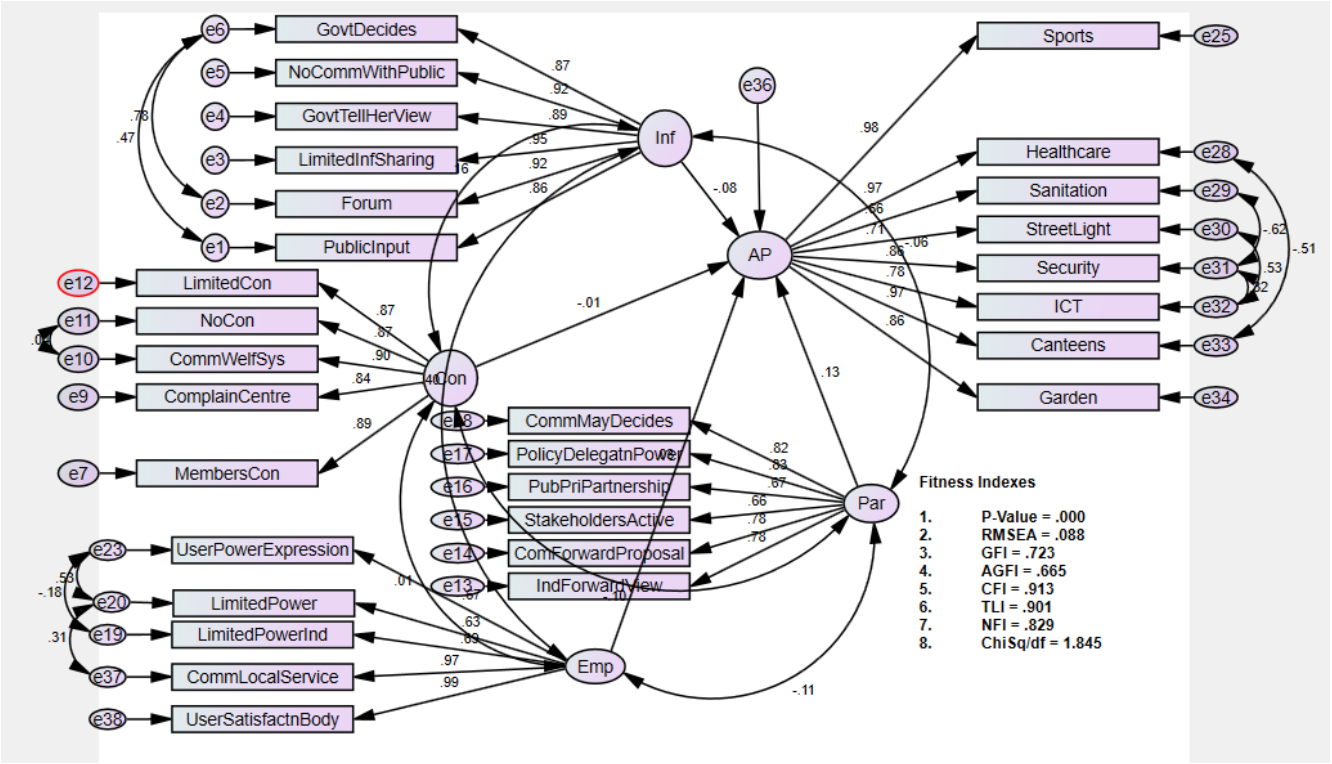

Figure 5 – Structural Model

The analysis of the influence of the exogenous variables against the endogenous variable in Figure 5 above paved the way to reject or fail to reject the statement of hypotheses formulated between the variables. In Table 5 below, the P-Values are above 0.05 which is at 95% confidence interval and reveals that the four exogenous variables do not influence the endogenous variable based on the empirical data collected and analyzed in the study area.

Table 5 – Estimates for the Structural Model

Path	Unstandardized Estimates	Standard Error	Critical Ratio	P-Value	Remark
Inf Inf AP	-0.077	0.104	-0.740	0.459	Rejected
Con AP	-0.006	0.098	-0.059	0.953	Rejected
Emp AP	0.029	0.107	0.266	0.790	Rejected
Par AP	0.129	0.100	1.288	0.198	Rejected

The estimates from the results, therefore, answered the hypotheses. H1 in Table 5 provides an answer to the proposition that assumes information sharing with students on school facilities management can enhance students´ academic performance in ATBU Bauchi; with P-Value 0.459 > 0.05 means the hypothesis is not supported.

In H2 measures whether Consultation with students on school facilities management can enhance students´ academic performance in ATBU Bauchi; but with P-Value 0.953 > 0.05 means the hypothesis is not supported.

The third hypothesis that empowering students some control on school facilities management can enhance academic performance, the estimates in Table 5 reports a P-Value of 0.790 thus, not supported.

The fourth hypothesis that engaging students to participate in school facilities management can enhance their academic performance is equally repudiated with P-Value 0.198 > 0.05 (Table 5). The result of the hypothesis testing was given in Table 6.

The Model Summary on Table 7 shows that R with a value of 0.170 (17 %) indicated a weak correlation between all the exogenous variables and the endogenous variable, and the R^2 of 0.029 meant that the exogenous variables explained or predicted just 2.9 % of the variance in the endogenous variable (Table 7). In other words, all the predictors could only account for 2.9 % of the variance in academic performance, and 97.1 % might be predicted by other variables not covered in this study.

Table 6 – Hypothesis Testing

No	Hypothesis	Results
H1	Information sharing with students on school facilities management can enhance Academic Performance	Not supported
H2	Consultation with students on school facilities management can enhance Academic Performance	Not supported
H3	Empowering students some control on school facilities management can enhance Academic Performance	Not supported
H4	Engaging students to participate in school facilities management can enhance Academic Performance.	Not supported

The model summary in Table 8 reports the individual effect of each exogenous (predictor) variable on the endogenous variable. On the R column, it can be discerned that all the predictors depict weak correlation with the dependent variable (academic performance); only participation correlates with 11.8 % which is very weak. The R Square column depicts very insignificant influence by each predictor (Table 8), and apparently, the last column testified to that. These results reflect the structural equation modeling analysis presented in Tables 5 and 6 above.

Table 7 – Cumulative Model Summary showing effects on the Endogenous variable

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.170a	.029	-.008	.84967	.029	.779	4	105	.541

Notes: a) Predictors: (Constant), Empowerment, Consultation, Participation, Information

Table 8 – Model Summary of Individual Predictor Variables

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1 Information	.078a	.006	-.003	.84752	.006	.668	1	108	.415
Consultation	.003a	.000	-.009	.85013	.000	.001	1	108	.976
Participation	.118a	.014	.005	.84421	.014	1.522	1	108	.220
Empowerment	.055a	.003	-.006	.84886	.003	.324	1	108	.570

CONCLUSIONS

The estimates of the structural model revealed that the exogenous variables (information, consultation, participation, and empowerment) do not influence the endogenous variable (academic excellence) based on the empirical data collected and analyzed in the study area, as none of the P-values falls within the acceptable region of less than 0.05. In the regression analysis, the R column with a value of 0.170 (17 %) indicated a weak correlation between all the predictor variables and the dependent variable; and the R^2 of 0.029 meant that the predictor variables explained or accounted for only 2.9% of the variance in the dependent variable. In other words, all the predictors could only account for 2.9% of the variance in academic performance, and 97.1 % is predicted or accounted for by other variables not covered in this study. The individual effect of each exogenous (predictor) variables on academic excellence (Table 8) shows in the R column all the predictors depicts weak correlation with the dependent variable (academic performance); while the R Square and the P-value both depict very insignificant influence by each predictor. Further studies are recommended to supplement more predictor variables like students´ talent, intuition, flair, willingness to learn (zeal), finance and so on; using the inductive approach.

REFERENCES

1. Akinyode, B. F. (2016). The Use of Structural Equation Modelling (SEM) in Built Environment Disciplines. *Research on Humanities and Social Sciences, 6*(6), 109–120.
2. Alavifar, A., Karimimalayer, M., & Anuar, M. (2012). Structural Equation Modeling Vs Multiple Regression. *Engineering Science and Technology, 2*(2), 326–329.
3. Alexander, K. (2016). *Facilities Management: Theory and Practice*. London: Routledge.
4. Asiabaka, I. P. (2008). The Need for Effective facility Management in Schools in Nigeria. *New New York Science Journal, 4*(8), 10–21.
5. Awang, Z. (2014). *A handbook on Structural Equation Modeling*. Selangor, MPWS Rich Resources.
6. Booty, F. (2009). *Facilities Management Handbook* (4th ed.). Oxford: Butterworth-Heinemann.
7. Byrne, B. M. (2010). *Structural Equation Modeling with Amos: Basic Concepts, Applications, and Programming* (2nd ed.). New York: Routledge.
8. Carter, C. (2006). *Environmental Governance: The Power and Pitfalls of Participatory Processes*. Retrieved from https://www.semanticscholar.org/paper/Environmental-Governance-%3A-The-Power-and-Pitfalls-Carter/47f808d142bcab669b1fb516baa2fb97dcbcfcd3
9. Davidson, S. (1998). Spinning the Wheel of Empowerment. *Planning, 3*, 14–15.
10. Douglas Omoregie, A., Oluwaseyi Alabi, A., Ayodeji Emmanuel, O., … Emmanuel Imuetinyan, A. (2018). Stakeholders' Perception of Sustainability in Educational Buildings in Nigeria. *International Journal of Sustainable Construction Engineering Technology, 9*(1). doi: 10.30880/ijscet.2018.09.01.001
11. Facility Management Association of Australia. (2012). *Facilities Management Good Practice Guide*. Retrieved from https://www.ocn.org.au/sites/default/files/documents/Facilities%20Management%20Good%20Practice%20Guide%202012.pdf
12. Gençtürk, E., Gökçek, T., & Güneş, G. (2010). Reliability and validity study of the technology proficiency self-assessment scale. *Procedia - Social and Behavioral Sciences, 2*(2), 2863–2867. doi: 10.1016/j.sbspro.2010.03.429
13. Gliem, J. A., & Gliem, R. R. (2003). *Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type Scales*. Retrieved from https://scholarworks.iupui.edu/bitstream/handle/1805/344/Gliem%20%26%20Gliem.pdf?sequence=1&isAllowed=y
14. Kasim, R. (2011). *Community- based Facilities management: Theory and Practice*. Batu Pahat: Penerbit UTHM.
15. Lunenburg, F. C. (2010). *School Facilities Management. National Forum of Educational Administration & Supervision Journal, 27*(4), 1–7.
16. Luyet, V., Schlaepfer, R., Parlange, M. B., & Buttler, A. (2012). A framework to implement Stakeholder participation in environmental projects. *Journal of Environmental Management, 111*, 213–219. doi: 10.1016/j.jenvman.2012.06.026
17. Schroeder, P.M. (2013, October). *Specific Operational Mechanisms and Practices for Public Participation in Environmental Planning and Assessments*. Retrieved from http://en.chinagate.cn/archives/egp/2015-07/28/content_36168098.htm
18. Tavakol, M. & Dennick, R. (2011). Making Sense of Cronbach's Alpha. *International Journal of Medical Education, 2*, 53–55. doi: 10.5116/ijme.4dfb.8dfd
19. Then, D. S., Jones, K. & Hinks, J. (Eds.). (2004). *Facilities Management and Maintenance. Human Elements in Facilities Management*. Proceedings of the CIBW70 2004 Hong Kong International Symposium. Retrieved from https://www.irbnet.de/daten/iconda/cib294.pdf

20. Wai, S. H., Yusof, A. M., Ismail, S., & Tey, K. H. (2012). *Critical Success Factors for Sustainable Building in Malaysia*. Retrieved from http://www.ipedr.com/vol45/025-ICMTS2012-M00025.pdf

21. Wan Afthanorhan, W. (2014). Modeling the Multiple Indirect Effects among Latent Constructs by using Structural Equation Modeling: Volunteerism Program. *International Journal of Advances in Applied Sciences, 3*(1), 25–32.

22. Wilcox, D. (1994). *The Guide to Effective Participation Book*. Retrieved from http://www.partnerships.org.uk/guide/main1.html