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Traditions and New Beginnings
for Knowledge and Impact

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CHAPTER 7

Exploratory factor analysis of stakeholders' participation in school management and the enhancement of learners' academic achievement in public secondary schools in Uganda

Dorothy Nakiyaga, David Serem, Proscovia Namubiru Ssentamu, John Boit

Introduction

Effective stakeholder participation in school management is crucial for creating a collaborative and inclusive educational environment (Cheng, 2022). When stakeholders, such as parents, teachers, students, administrators, and community members, actively engage in school management, they can contribute valuable insights, diverse perspectives, and support to improve the overall educational experience (Cabardo, 2016; Bandur & Furinto, 2022).

The key strategies to promote effective stakeholder participation in school management include encouraging collaboration in developing school improvement plans, curriculum development, and other strategic initiatives (Zaid et al., 2022). By involving stakeholders in the planning process and regularly seeking their feedback on various aspects of school management, policies, and programmes, one can ensure that decisions align with the needs and aspirations of the entire school community (Cleminski, 2018; Naidoo, 2019).

Moreover, using surveys, focus groups, and other feedback mechanisms to evaluate the effectiveness of implemented changes can produce data-driven improvements, fostering a culture of open and transparent communication where all stakeholders feel comfortable expressing their ideas, concerns, and suggestions (Widodo, 2019); using various communication channels, such as regular meetings, newsletters, emails, and online platforms, to keep everyone informed and involved; actively involving stakeholders in decision-making processes that affect the school by creating committees or advisory groups comprising representatives of various stakeholder groups to participate in discussions and contribute to important decision-making; organizing regular meetings with different stakeholder groups to address pertinent issues, sharing updates, and seeking input on various aspects of school management (Tansiri & Bong, 2019).

The gatherings can include parent-teacher meetings, school board meetings, and student forums. Through participation, the school's stakeholders interact with management in the dimensions of school improvement planning, budgeting process, and coordinating academic activities (Bandur & Furinto, 2022).

However, generally, stakeholder participation in school management has been viewed mostly in terms of financial metrics such as school fee contribution, buying scholastic materials for learners, and providing food (Nakiyaga et al., 2021). Prior scholars focused on strengthening local stakeholders' governance of education and the effects they had on service delivery. Participation in the budgeting process has been reflected in the form of provision of funds, motivation of human resources, and physical infrastructural maintenance. Participation in coordinating the academic activities was reflected in the form of measures of school management quality in terms of student test scores, monitoring, and evaluation deemed as victimization. Scant literature addressed the extent of collective monitoring and evaluation of activities (Agbenyo et al., 2021; Nakiyaga et al., 2021).

However, effective stakeholder participation in school management also involves an oversight role in the strategic planning and implementation process that contributes to educational goals focused on the learner, the school, and the community (Sehrawat & Roy, 2021; Cheng, 2022).

Although stakeholder participation in school management has been proposed through school-based management (SBM) models, according to Ayeni and Ibukun (2013) and Ya et al. (2020), which aim to improve the quality of education by granting greater autonomy and decision-making power to individual schools and their stakeholders. Little is known about the validity and reliability of the underlying structures within each discrete dimension – planning, budgeting and coordinating the academic activities in which the stakeholders participate.

The existing policies in Uganda related to stakeholder participation in education management include:

- Education policy framework that emphasises stakeholder participation in education management. This framework recognises the importance of involving various stakeholders, including parents, teachers, local communities, and civil society organizations, in the planning, monitoring, and evaluation of education programmes (The Republic of Uganda Education Service Commission, 2008; Hassan & Macha, 2020).
- School Management Committees (SMCs) at the school level. SMCs are composed of parents, community members, and school staff. They are responsible for managing the affairs of individual schools, including financial management and decision-making (Serunjogi, 2022).
- Parent-Teacher Associations (PTAs) which play a significant role in Uganda's education system. They are comprised of parents and teachers, and are involved

in various school activities, including fundraising, infrastructure development, and providing feedback to school administrators (Media Officer, 2021).

- District Education Boards are responsible for overseeing and coordinating education activities. These boards are expected to engage with various stakeholders and ensure that education policies are effectively implemented at the local level (Wataba & Naifu, 2018).

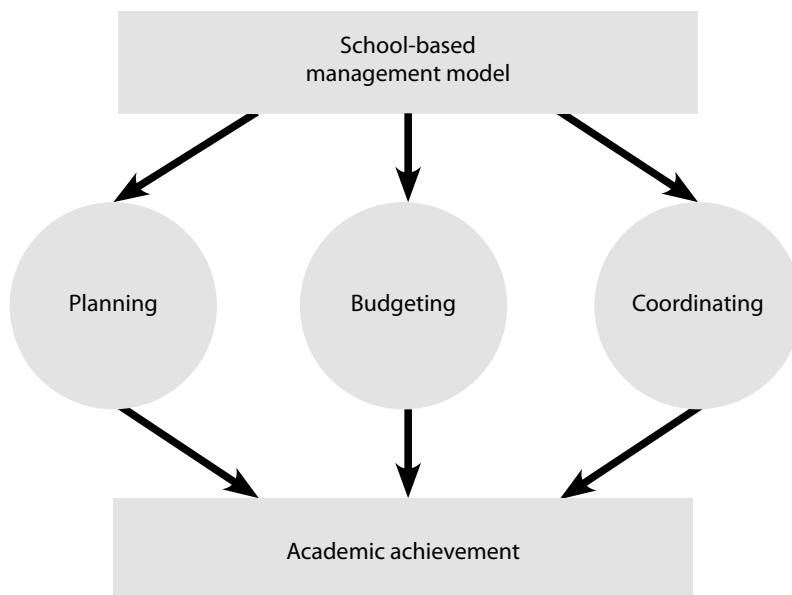
Despite the policies in place to promote stakeholder participation in education management, there have been several perceived inefficiencies and challenges, namely:

- Limited capacity: Many stakeholders, especially at the community level, may lack the necessary knowledge and skills to effectively participate in education management.
- Corruption: There have been reports of corruption and mismanagement of funds at various levels of the education system, which can hinder the efficient utilization of resources.
- Inequality: There are disparities in stakeholder participation between urban and rural areas, with urban schools often having more active and resourceful PTAs.
- Limited resources: Inadequate funding and resources can hinder the ability of schools to implement policies effectively, limiting stakeholder participation opportunities.
- Political interference: Some stakeholders have expressed concerns about political interference in education management, which can impact decision-making processes.

Again, despite the functional policy framework that guides stakeholder participation in school management to enhance learners' academic achievement in public secondary schools, as well as the perceived inefficiencies in effective participation, little is known about the validity and reliability of the dimensions through which stakeholders participate in school management.

The study reported in this chapter aimed to validate three dimensions (school improvement planning, budgeting process, and coordinating the academic activities) of Ayeni & Ibukun's widely used school-based management model (Ayeni & Ibukun, 2013; The Republic of Uganda Education Service Commission, 2008) for the enhancement of learners' academic achievement (Figure 1). Specifically, the study sought to answer the research question, 'What are the underlying structures within each discrete domain – planning, budgeting, and coordinating the academic activities – of the school-based management model that support stakeholders' participation in school management to enhance learners' academic achievement in public secondary schools?'

Figure 1: A Diagram Representing the Intended Granularity of the Exploratory Factor Analysis (EFA) within the Diverse Components of the SBMM



The study was carried out in four public secondary schools that were purposively selected. To compare their performance metrics, of the chosen schools, two were high-performing and the other two were low-performing public secondary schools in the Kampala District.

High-performance education indicators in academic achievement refer to the key measures that demonstrate outstanding educational outcomes and success for students, schools, or educational systems. These indicators can vary based on the level of education. For this study, the indicators were Standardised Test Scores used to assess students' academic performance and compare it to national benchmarks. The quantity grades attained in the Uganda Certificate of Education (UCE) is measured by the percentage of students who complete their educational programme within a specified time frame, usually the four-year academic cycle in ordinary levels based on the national grading system.

On the other hand, the quality of grades attained in UCE is measured by the assessments of students' proficiency in reading, writing, and mathematics, as these are foundational skills critical for academic success. Educational institutions and systems were ranked based on their academic performance in comparison to other institutions in the district. However, it should be noted that high-performance education is not solely measured by a single indicator, but rather by a combination

of multiple factors that contribute to a comprehensive and successful learning environment. On the other hand, low-performing schools are the opposite of the latter, which have a performance percentage of 49%.

Uganda has recognised the importance of stakeholder participation in improving the quality of education and ensuring effective school management. Various policies and guidelines have been put in place to encourage and facilitate stakeholder involvement in education. School Management Committees (SMCs), Parent-Teachers' Associations (PTAs) (enshrined in the Education Act of 2008), District Education Boards, Community Engagement Programs: Training and Capacity Building. The involvement of stakeholders in school management is seen as crucial in fostering a sense of ownership and accountability, as well as promoting community engagement in education. Stakeholders' participation has a legal mandate through the statutory framework of the Education Act (2008). The strategy of participation includes creating a link between the Ministry of Education and Sports, founder members, school administrators, teachers, and parents, having joint decision-making, monitoring the implementation of priorities, and taking corrective measures to attain the set goals of the school. While prior studies show a positive correlation between stakeholders' participation and the development of quality learning outcomes if well set up, (Mahuro & Hungu, 2016), there is scant literature on the prioritization of stakeholders' participation in schools where learners' academic achievement is constantly declining. There are discrepancies in Uganda, whereby stakeholders' participation in school management does not reflect the quality education outcomes of the learners due to the continuous poor academic achievement in public secondary schools. The national trend of academic achievement in UCE examinations between 2015 to 2018 showed a steady decline in the realization of at least division 3 for easy selection and deployment in the next level of education. In 2015 the failure rate was 9.7% compared with 13.2% in 2016. In 2017 the failure rate was 14.2% compared with 2018, during which the failure rate was 15.4% (Uganda National Examinations Board, 2019). Could it be possible that the poor academic achievement among learners is attributed to the non-involvement of the stakeholders in the management of public schools?

The continuity of poor learners' academic achievement influences the attainment of knowledge, skills, and attitudes, which will affect their future academic and work opportunities. Additionally, most learners who drop out of school with low uptake skills affect the contribution to self-reliance and human capital required in the development of innovations for the social and economic growth of the country. Subsequently, this hinders the attainment of Sustainable Development Goals (SDG) which promote a more equitable, prosperous, and sustainable world for all, leaving no one behind (Barbier & Burgess, 2017).

Method

Participation and sampling procedure

The public secondary schools were stratified into five strata that constitute the five divisions of Kampala District. One stratum had no public secondary school, so this left the sample space with 4 strata. Thereafter, schools were ranked according to the national assessment metrics of the UCE. Schools that were considered as high performing had a percentage pass of 89%, while the pass of the low-performing was below 49%. A simple sampling procedure was applied to give equal opportunity to the schools based on the sampling frame. Data were collected using a questionnaire that was physically administered. The sample of 190 consisted of teachers, parents, and the Board of Governors; 139 (73%) were male, and 51 (27%) were female. The respondents' ages varied with 122 (64%) ranging between 45 to 63 years of age, 65 (34%) ranging between 40 to 45 years, and 4 (2%) being 64 years and older. Experience as either a stakeholder, Board of Governor member, or Parent-Teacher Association member ranged between more than 3 years: 103 (54%), between 5 to 8 years: 49 (26%), between 2 to 4 years: 27 (14%), and 1 year or less: 11 (6%).

Measures

As previously noted, the school-based management model proposed dimensions where stakeholders participate in school management. Effective participation refers to a collaborative and inclusive approach involving all relevant parties in the decision-making processes and overall governance of a school. This approach recognises that schools do not operate in isolation but are integral parts of their communities, and as such, they should engage with various stakeholders to ensure the best possible educational outcomes for learners.

Effective participation was measured through school improvement planning (a systematic and collaborative process that educational institutions use to enhance their overall effectiveness and student outcomes). It involves setting goals, identifying areas for improvement, and developing strategies to address those areas. The primary purpose of school improvement planning is to create a roadmap for achieving academic excellence, improving teaching and learning, and ensuring that schools provide a high-quality education to all students); budgeting processes refer to the involvement of individuals, groups, or organizations in the development of a budget. It ensures that a broader range of perspectives and interests are considered when formulating, reviewing, and approving budgets. It can lead to more informed and equitable budget decisions that better serve the needs of communities and society. Coordinating academic activities refers to involving various individuals and groups who have an interest or stake in the educational institution in the decision-making and planning processes related to academic activities. When done effectively, it can lead to improved academic programmes, greater community support, and more

inclusive and accountable educational institutions. The aim was to enhance the learners' academic achievement in public secondary schools.

Participants were asked to indicate the extent to which they agreed with each of the observable items in the survey. The 61 observable items in the survey were measured using a 5-point Likert scale, ranging from (1) 'strongly disagree' to (5) 'strongly agree'. The questionnaire was validated using the Content Validity Index (CVI) to generate the appropriateness and representation of the targeted attributes for the study. The researcher adopted Yusoff's (2019) six steps to calculate the CVI. The steps included preparing the content validation form, selecting the review panel, conducting the content validation, reviewing the domains and items, scoring each item, and calculating CVI. Before the calculation of CVI, the relevant items were rated and recorded as 1 (relevance scale of 3 or 4) or 0 (relevance scale of 1 or 2). The study adopted a Scale-level Content Validity Index based on the average method (S-CVI/Ave). $S-CVI/Ave = (\text{sum of proportion relevance rating}) / (\text{number of items})$. The score for relevant items was 81. The sum of items in the questionnaire = 90. $81/90 = 0.9$. A 0.90 value for two experts was considered evidence of good content validity of an instrument (Yusoff, 2019). Illustrations of items are shown in the results section.

Exploratory factor analysis (EFA)

The objective of this chapter is to examine the nature of EFA as it relates to stakeholders' participation in school management and the enhancement of learners' academic achievement in public secondary schools, a component missing from previous studies. Additionally, the factors and items identified through EFA are used as inputs for testing the outer model (regression model). The scope of this chapter, however, focuses on the inputs required for the outer model in the analysis of stakeholder participation in school management.

This section begins with the introduction to EFA, followed by its rationalization, the research question, the suitability of data required for factor analysis, and the principal component analysis (PCA). It then provides the primary factors for extraction and the specific techniques. The results of EFA with factor rotation, its methods, and labelling of identified factors are described and a comprehensive example of EFA focusing on stakeholders' perspectives on participation in school management is presented. The conclusion and limitations of the study are included at the end of the chapter.

The background of performing the procedures of EFA was that the adopted questionnaire used for the study had not been previously validated as it was developed from the literature reviewed. There was a need to explore the underlying structure of the study variables (Hair et al., 2019). The aim was to identify the patterns and relationships among observable items and group them into dimensions (Watkins, 2018; Hair et al., 2019; Willmer et al., 2019).

In this analysis, two variables were analysed, the exogenous (independent variable) and endogenous (dependent variable) to identify the structural relationships between the dimensions/factors and the latent (unobservable) items (Tavakol & Wetzel, 2020). Two phases are considered when conducting and interpreting EFA. In the first phase, the principal component analysis (PCA) examines the relationship between observed dimensions/factors and latent (unobserved) items to confirm construct validity and reliability (Watkins, 2018; Hair et al., 2019; Tavakol & Wetzel, 2020). The second phase confirmatory factor analysis (CFA) runs a theoretical correlation among the variables (Fan et al., 2016). This study adopted the PCA.

The validity (measuring what it intends to measure) and reliability (internal consistency) of the measurement model were assessed by observing the convergent validity, discriminant validity, individual item reliability, and reliability of the scales (Fan et al., 2016; Tavakol & Wetzel, 2020). To assess the validity and reliability of the outer model, variables that consistently co-varied were considered (Hadi et al., 2019).

The rationale for exploratory factor analysis

Dimension reduction: This simplifies complex data, helps identify latent variables, enhances interpretability, reduces data redundancy, facilitates hypothesis testing, improves visualization, and aids in model selection. It is a critical step in the process of uncovering the underlying structure of multivariate data and making it more meaningful and usable for further analysis and interpretation (Watkins, 2018).

Identifying hidden structure: EFA aims to uncover the hidden structure or shared variance among observed items. It is often used when there is a suspicion that the unobservable items influence the observed items, and there is a need to identify and name these dimensions/factors (Hair et al., 2019).

Construct validity: By identifying underlying factors, EFA provides evidence of construct validity as it helps to assess whether the observed variables indeed measure the intended constructs. If certain items within a construct do not load well on any factors or load on unexpected factors, it may suggest that these items are not contributing to the measurement of the construct effectively. Removing or revising such items can improve the construct's measurement. If the factor structure aligns with theoretical expectations (e.g. items related to budgeting load heavily on one factor), it provides support for the validity of the construct (Nakiyaga et al., 2021).

Simplification and interpretation: EFA transforms complex interrelationships between observable items into a smaller number of dimensions/factors, making it easier to understand and interpret the data. These factors often have clear meanings that can be labelled based on the items with high loadings. The correlation amongst a set of observed items is recognised and changed into small quantities of related factors (Hair et al., 2010; Willmer et al., 2019).

Data reduction: When working with a large number of observable items, EFA can reduce the dimensionality of the data, making it easier to work with and interpret

the results. The data is reduced through either summated scales or factor scores and joins the items within each factor into a single score (Hair et al., 2019; Tavakol & Wetzel, 2020).

Model assessment: EFA allows researchers to assess the adequacy of the model fit to the data. Various fit indices and techniques can help in determining whether the identified factors adequately explain the correlations among the independent and dependent variables. In this process, the consistent movement of observed items is identified through factor extraction and factor rotation (Nakiyaga et al., 2021).

It is important to note that EFA is an exploratory technique, used when researchers do not have a pre-specified hypothesis about the number or nature of underlying factors, providing insights and generating hypotheses for further research. However, it neither confirms causal relationships nor establishes a definitive model. Nonetheless, it is an interdependency method whose primary aim is to define the underlying structure among the dimensions within the analysis.

Research question

‘What are the underlying structures within each discrete domain – planning, budgeting, coordinating, and academic achievement – of the school-based management model that supports stakeholders’ participation in school management to enhance learners’ academic achievement in public secondary schools?’

The methodology for conducting EFA

Step 1: Checking the suitability of data for EFA

The vital assumptions for conducting EFA are more conceptual than statistical. The predominant concern focuses on the character and composition of the dimensions. The conceptual assumption states that there ought to be some underlying structure existing within the set of selected dimensions. In addition, the sample should be homogeneous to the underlying dimension or factor structure. This study focused on the conceptual composition of the stakeholders’ participation in school management and the enhancement of the learners’ academic achievement in public secondary schools in Uganda. The independent variable focused on school improvement planning, budgeting process, and coordinating the academic activities dimension, while the dependent variable dimension was academic achievement.

Step 2: Checking the reliability of the data

EFA requires a relatively large sample size to produce stable and reliable results. As a rule of thumb, a sample size of at least 200 observations is often recommended. However, the specific requirements can vary based on the complexity of one’s data and the number of variables one is analysing (Watkins, 2018). The adequacy of the

sampling size was tested through the Kaiser-Meyer-Olkin (KMO) test (Kaiser, 1970, 1974), while the strength of the relationship among variables was assessed through Bartlett's Test of Sphericity (Hadi et al., 2016). These tests assessed the adequacy of the data for factor extraction. It is worth noting that the items were measured at the interval level (Likert scale), and the level of significance, $p < 0.05$. Bartlett's test was applied to assess the factorability of the overall set of variables and individual variables. The null hypothesis of this test is that the variables are orthogonal (not correlated). In this study, the independent variables had to be orthogonal, implying that the correlation matrix had to be an identity matrix. An identity matrix is a matrix in which all of the diagonal values are one (1) and all off-diagonal elements are zero (0). The null hypothesis, 'The correlation matrix is not an identity matrix', ought to be rejected.

A rule of thumb for the sample size requirement is a bare minimum of 10 observations per variable (10:1) to avoid computational issues (Hair et al., 2019). The sample size obtained in this study was 190 observable items which exceeded the minimum requirement. This implied that the ratio of 63 per variable (63:1) was above the threshold to conduct EFA. KMO assessed the overall significance of the correlation matrix. This measure varies between 0 and 1, and values closer to 1 are better. According to Revelle (2022), the value of KMO which is above 0.6 is a suggested minimum. In this study, the KMO threshold was 0.6 (Table 1).

Table 1: The KMO and Bartlett Test Results

Variables	Kaiser-Meyer-Olkin of sampling adequacy	Barlett's Test of Sphericity approx. Chi-square	df	Sig.
Planning	0.638	1164.40	91	0.001
Budgeting	0.723	964.46	66	0.001
Coordinating	0.652	1417.64	91	0.000
Academic achievement	0.600	2901.48	703	0.000

Source: Primary data 2021

As shown in Table 1, the KMO of sampling adequacy and Bartlett's Test of Sphericity tests were appropriate and feasible for all the variables.

Step 3: Determine the technique for extraction

Once the conditions for performing FA were satisfied the subsequent step was to determine the technique for extracting the factors (either common factor analysis or principal components analysis) and the number of factors selected to represent the underlying structure in the data (Revelle, 2022).

Common factor analysis (CFA) focuses on understanding the common underlying factors that contribute to the observed correlations or covariances among a set of measured variables. These common factors are latent (hidden) variables that cannot be directly measured but are inferred from the observed variables. The goal is to explain the observed correlations or covariances between variables in terms of a smaller number of common factors, which can provide insights into the underlying structure or dimensions of the data (Hair et al., 2019).

Principal component analysis (PCA) analyses and explores complex datasets to extract important features from data, and to identify patterns and relationships that might not be immediately evident in the original high-dimensional space. All the variance of a score or variable is analysed, including its unique variance (Hair et al., 2010, 2019). It is assumed that the test used to assess the variable is reliable and error-free (Nakiyaga et al., 2021). The data obtained in this study were explored with Principal Components Analysis (PCA).

Step 4: Principal component analysis

The procedures for PCA included:

Data preparation: The dataset had three dimensions (variables) that describe each data point (school improvement planning, budgeting process, and coordinating the academic activities).

Standardisation: Data were standardised so that each feature had a mean of 0 and a standard deviation of 1. This step ensured that no single feature dominated the analysis solely due to its scale. The covariance matrix of the standardised data was computed to give an idea of how each dimension varied from the others. This showed the relationships between different pairs of features and helped in understanding how the matrix varied together.

Eigenvalue decomposition: The covariance matrix was decomposed into eigenvectors and eigenvalues. Eigenvectors represented directions in the original feature space, and eigenvalues quantified the amount of variance along those directions.

Selection of principal components: The eigenvectors were organized by their corresponding eigenvalues in decreasing order. The eigenvector with the highest eigenvalue is the first principal component; the one with the second-highest eigenvalue is the second principal component, and so on.

Factor rotation: Factor rotation involves applying a mathematical transformation to the original loadings (weights) of the variables on the extracted components or factors through PCA (Hair et al., 2019; Field, 2013; Warner, 2013). The goal of the rotation was to achieve a simpler and more interpretable structure that corresponded to the underlying theoretical or practical concepts of the data. The study applied the orthogonal rotation to acquire a simpler and theoretically more important factor solution since the goal was to reduce the data to a smaller number of observable items that were tapping into the generated factors. The VARIMAX approach, which focuses on simplifying the columns of the factor matrix was adopted since it maximizes the sum of the variance of the required loadings (IBM Corporation, 2021). Some high loadings (close to -1 or +1) indicated a clear positive or negative association between the variable and the factor. A factor loading of .40 was considered a significant threshold for interpretation purposes since the sample size for the study was 190 (Hair et al., 2010). This is indicated in Table 2.

Labelling of factors/components

The process of labelling components requires a combination of statistical analysis, domain expertise, and intuition to make sense of the underlying patterns in the data. Factors are labelled based on the factor loadings. Factor loadings represent the correlation between the item and the factor. The higher the loading, the stronger the relationship between the item and the factor. Items with the highest loadings on each factor are the most representative of the underlying factor. The content of these items represents a common theme or concept that ties them together. Based on the interpretation of the items with high loadings, each factor is given a meaningful and descriptive label. The label should reflect the common theme or concept that the items represent. The chosen labels should be clear and concise (Hair et al., 2019).

This study adopted a .40 threshold for retaining the items since the sample size needed for significance is 200. Since the sample size of the study was 190, it was deemed to use the approximation of 200 which is .40 the factor loading.

Projection: The final step involved projecting the original data onto the selected principal components to obtain the transformed data in the new coordinate system. Each new data point (dimension) represented was a combination of the selected principal components (Izquierdo et al., 2014).

Table 2: Guidelines for Factor Loadings Based on the Sample Size

Guidelines needed for identifying significant factor loadings based on the sample size	
Factor loading	The sample size needed for significance.
.30	350
.35	250
.40	200
.45	150
.50	120
.55	100
.60	85
.65	70
.70	60
.75	50

Note: Significance is based on a .05 significance level (α) at 80% and standard error assumed to be twice those of conventional correlation coefficients.

Practical example

Exploratory factor analysis for stakeholder participation in school management and the enhancement of learners' academic achievement in public secondary schools.

Participation in school management was conceptualised into three variables: participation in school improvement planning (had fourteen items) from the original questionnaire, participation in the budgeting process (had twelve items), and participation in coordinating the academic activities (had sixteen items). These were subjected to principal component analysis using SPSS.

Given that a minimum of three items is needed to reliably define a factor (Hair et al., 2019), the items for factors that had fewer than 3 items were not retained for further analysis. Similarly, items that had loadings < 0.4 or that were cross loaded across factors > 0.4 were not retained for subsequent analyses (Hair et al., 2019).

The subsequent tables show that after deleting three item factors, items loading lower than 0.4, and three cross-loading items, a subsequent EFA yielded relatively clean factors, with no cross-loading items, explaining 81% of the variance. The 5-factor solutions consisted of performance indicators; school culture, budgeting, monitoring; and evaluation, as visually illustrated in Figure 2.

The factor loadings of the three respective dimensions after orthogonal rotation are illustrated in the tables below.

Figure 2: Diagram Representing the Factor Solutions after EFA within the Diverse Components of the SBMM

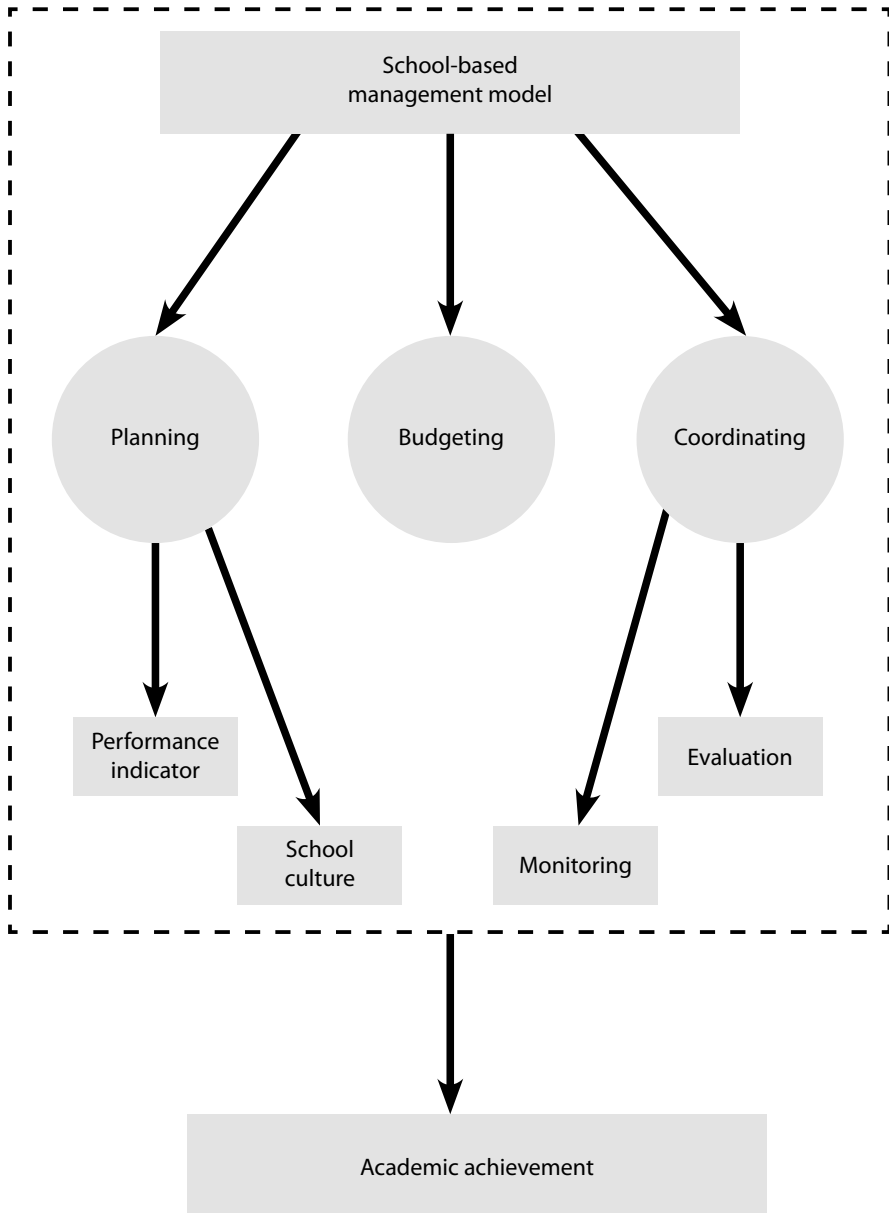


Table 3: Factor Loadings of the School Improvement Planning Dimension

Performance Indicator	Factor Loading	
	1	2
Performance indicators are realistic	0.850	
Performance indicators are attached to each target	0.824	
Performance indicators are achievable	0.816	
Learners actively participate in decision-making that improves their academic achievement.	0.666	
Standards of achievement are attached for each measurable indicator	0.485	
The academic targets to be achieved are well documented	0.438	
School Culture Predictor		
All stakeholders actively participate in developing goals that improve academic achievement		0.764
This school has a culture of shared responsibility among stakeholders to improve academic achievement		0.724
Stakeholders are given the responsibility to achieve the goals of the school		0.724
There is mutual support from the stakeholders to improve academic achievement		0.720
Parents/guardians check on the academic progress of the learners.		0.638
Parents actively participate in decision-making that improves academic achievement		0.602

Note: Extraction method: principal component analysis; rotational method: VARIMAX with Kaiser Normalization. Rotation converged in 3 iterations.

Source: Field data (2020)

Factor loadings for the budgeting process dimension. The dimension had twelve (12) items from the original questionnaire, these items were subjected to rotation and four (4) items were dropped as they did not meet the recommended threshold of 0.4 and above, according to Hair et al. (2010). The eight items that were retained had a loading ranging between .539 and .860. The factor was labelled 'budgeting' as indicated in Table 4.

Factor loadings for the coordinating academic activities dimension. The dimension had sixteen (16) items from the original questionnaire, these items were subjected to orthogonal rotation using the VARIMAX approach and four (4) items were dropped as they did not meet the recommended threshold of 0.4 and above (Hair et al., 2010). Two (2) factors were extracted resulting in two-factor solutions. Factor one (1) was labelled 'monitoring' using the highest loading item of .826 and the low loading item of .490. The second factor was labelled 'evaluation' with high loading item .765 and low loading item .612 whose findings are indicated in Table 5.

Table 4: Rotated Component Matrix

Budgeting	Factor Loading	
	1	
Academic activity inventory is done by the teaching staff as a basis for resource allocation and mobilization	0.860	
An established system of monitoring and evaluation of the implementation of the budget is in place	0.779	
Monitoring and evaluation of the budgeting process are jointly done by the stakeholders	0.736	
Stakeholders use the accounted and audited reports as a basis to adjust resource allocations	0.715	
Stakeholders are aware that regular academic inventory is used as a basis for resource allocation	0.711	
Stakeholders participate in joint decision-making on resource allocation and mobilization	0.635	
Academic inventory is communicated to the stakeholders and is used as a basis for resource allocation and mobilization	0.546	
There are accounting and auditing systems that drive the effective use of resources	0.539	

Note: Extraction method: principal component analysis; rotational method: VARIMAX with Kaiser Normalization. Rotation converged in 2 iterations.

Source: Field data (2020)

Table 5: Rotated Component Matrix

Monitoring	Factor Loading	
	1	2
There are monitoring systems to check on the implementation of academic interventions	0.826	
There are academic interventions to improve the learners' academic achievement	0.820	
Reports on the implementation of the intervention are periodically generated	0.803	
I am held accountable for the learner's performance	0.695	
Recommendations at points of action to improve performance are made	0.681	
The reports on the implementation of the intervention are jointly shared with all school stakeholders periodically	0.639	
The majority of stakeholders visit the school to ensure quality performance is achieved	0.586	
It is good practice to involve external stakeholders to improve the quality of academic performance in my school	0.49	

Evaluation	
The stakeholders use these reports to inform decision-making on the intervention	0.765
A formative evaluation of the implementation of the intervention is done against the performance indicators	0.753
A summative evaluation of the implementation of the intervention is done against the performance indicators	0.681
There are tools with indicators used to monitor the intervention implementation.	0.612

Note: Extraction method: principal component analysis; rotational method: VARIMAX with Kaiser Normalization. Rotation converged in 2 iterations.

Source: Field data (2020)

Factor loadings for the academic achievement dimension. The dependent variable had nineteen (19) items from the original questionnaire, these items were subjected to extraction, and six (6) items were dropped and deleted as they did not meet the recommended threshold of 0.4 and above (Hair et al., 2010). A unidimensional factor was derived comprising thirteen (13) items with loading ranging between 0.440 and 0.839 as indicated in Table 6.

Table 6: *Rotated Component Matrix*

Academic Achievement	Factor Loadings
	1
Adequate exercises are given to the learners	0.839
Performance targets are realistic	0.810
Performance targets are achievable	0.789
Parents/guardians regularly check on their children's academic progress	0.779
Timely feedback is given after the assessment of learners' performance	0.747
Action points for academic improvement are made	0.736
Parents/guardians participate in joint decision-making toward academic improvement	0.726
I check regularly on the notes written by the learners	0.672
Parents/guardians participate in allocating financial resources that influence academic achievement	0.662
Parents/guardians assist their children with school work whenever possible	0.592
Performance targets are set by the school administration	0.526
Adequate equipment and learning materials are provided at school	0.472
Learners are held accountable for their performance	0.440

Note: Extraction method: principal component analysis. 1 component was extracted.

Source: Field data (2020)

Construct reliability using Cronbach's alpha

The composite dimensions generated after EFA were tested for internal consistency using the Cronbach's alpha coefficient, this being the most widely used measure (Hair et al., 2019). The reliability coefficient was computed to test the internal consistency among the variables in a summated scale and select how the variables correlated among themselves. A high Cronbach's alpha (usually above 0.70) suggests good internal consistency, indicating that the items in the questionnaire after EFA were measuring the same underlying construct reliably. The results of Cronbach's alpha for the extracted variables are indicated in Table 7.

Table 7: *The Reliability Coefficient for the Extracted Variables*

	Item-Total Statistics				
	Scale Mean Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlated	Square Multiple Correlation	Cronbach's Alpha if Item Deleted Vari.
Performance Indicator	13.56	16.45	.734	.638	.814
School Culture	13.54	17.01	.694	.618	.825
Budgeting	13.40	16.81	.724	.549	.827
Monitoring	13.52	16.78	.681	.534	.834
Evaluation	13.44	16.83	.687	.508	.856
Academic Achievement	14.23	17.60	.553	.347	.867

Note: After the deletion of some items from the scale that had cross-loading or were below the threshold of 0.4, Cronbach's alpha was recalculated to assess the impact of the remaining items on the scale's internal reliability. Results are presented in Table 8.

Table 8: *The Reliability Coefficient after Extraction*

Variables	Cronbach's Alpha	Number of Items After Elimination
Performance Indicator	0.814	6
School Culture	0.825	6
Budgeting	0.827	8
Monitoring	0.834	8
Evaluation	0.856	4
Academic Achievement	0.867	13

Source: Field data (2020)

Discussion

The theoretical underpinnings for stakeholders' participation in school management to enhance learner' academic achievement were based on the stakeholder theory and school-based management model in school management. The theoretical framework recognises the various individuals and groups who have a vested interest in the operation and outcomes of a school. The primary goal of the theory in school management is to ensure that the school operates in a way that serves the best interests of all its stakeholders, rather than just focusing on the interests of one group, such as the administration or teachers. Through collaborative decision-making, emphasis is placed on transparency, accountability, and open communication between the school administration and the various stakeholder groups.

The findings indicate that by involving all relevant stakeholders in school improvement planning, budgeting processes, and coordinating academic activities, schools can work toward creating a more inclusive, responsive, and effective educational environment that better serves the needs of the entire school community. Decentralising decision-making and empowering stakeholders to have more control over their operations and resources in the respective schools would improve the quality of education.

The study aimed to validate the three dimensions of the widely used school-based management model in the enhancement of learners' academic achievement. Given that there has been limited empirical validation of measures of stakeholder participation in school management, the research contributes insights into the dimensions by which stakeholder participation can reliably be measured and therefore monitored, managed, and improved.

The measures were validated on a large scale using EFA analytical procedures. The results identified 5 dimensions and as such support the arguments that stakeholder participation is complex and multifaceted (UNESCO Education Sector, 2020). In support of their content validity, the 5 dimensions largely correspond to those previously identified by academics (Ayeni & Ibukun, 2013).

The results of the current study suggest a revised, more differentiated, and statistically defensible framework for evaluating the extent of stakeholder participation in school management to enhance learners' academic achievement. As previously noted, the current findings to a large extent confirm the existing conceptualisation of stakeholder participation in school management in relation to the enhancement of learners' academic achievement. Several factors were overlapping, hence alignment was expected, and cross-validation of the importance and generalisability of the 5 dimensions identified.

Practical implications

The development of a valid measure of stakeholder participation has clear practical implications.

- A valid and reliable measure can be used with confidence internally by school management to help them assess and improve their management effectiveness. The use of a reliable measure enables a confident assessment of whether stakeholder participation evaluations in school management change over time and identifies the directions in which they change.
- Similarly, school inspectors can use these dimensions to audit school management on the extent of collaborations as well as propose changes that can be adapted to contribute to the educational goals.
- Valid measures of stakeholder participation help school administrators and policymakers make more informed and inclusive decisions. When various stakeholders, such as parents, teachers, students, and community members, are actively involved in decision-making processes, the resulting decisions are likely to be more well-rounded and reflective of the needs and concerns of all parties.
- When stakeholders are actively engaged in school management, there is a higher degree of accountability. This accountability extends to school leaders, teachers, and even parents or community members who are involved. Knowing that their decisions and actions are subject to scrutiny encourages responsible behaviour and better governance.
- A valid measure can guide stakeholder participation in the identification of educational needs and priorities that might otherwise be overlooked. This can result in the allocation of resources and the implementation of policies and practices that directly benefit students and improve the overall quality of education.

Limitations of the study

While the current study has provided new insights into important elements contributing to stakeholder participation in school management to enhance learners' academic achievement, some limitations need to be acknowledged. The results relied on self-report measures and as such are subject to the threat of common method variance (CMV). This refers to the variance in data that is attributable to the measurement method itself rather than to the constructs being studied and it affects participants' responses across multiple items or measures (Kock et al., 2021). However, given that the measurement model demonstrated an acceptable fit to the

data, given that the correlations between the measured constructs were moderate and varied quite considerably, given the very modest average reduction in the standardised loadings after a common methods factor was included, and given that all the factor loadings remained statistically significant after the common methods factor was modelled, the issue of CMV does not appear to be a significant concern. Nevertheless, future research could incorporate multi-rater or longitudinal data points to help address the risk of CMV.

In addition, no objective data were collected concerning the organizing and directing functions of the management of the schools sampled. Therefore, although the current model and measure suggest a range of dimensions that are important for effective stakeholder participation in school management to enhance learners' academic achievement, their impact or success in enhancing the learners' academic achievement or educational goals could not be determined. Furthermore, to answer the research question, 'What are the underlying structures within each discrete domain – planning, budgeting, coordinating, and academic achievement – of the school-based management model that support stakeholders' participation in school management to enhance learners' academic achievement in public secondary schools?', this study considered only EFA and found the involvement of 5 factor solutions from the 3 original constructs with 42 items.

Future research

Future research should employ confirmatory factor analysis (CFA) to validate the dimensions identified in this study. Such an approach would provide a more robust empirical basis for the constructs within the school-based management model (SBMM), thereby enhancing the generalisability and validity of these findings. It would perhaps be more expressive if the chapter confirmed the findings using oblique rotation.

The present results suggest that if reliable outcome measures can be accessed using the dimensions and measures described, then such future research can be conducted and interpreted with confidence.

Conclusion

This study aimed to validate the underlying structure of observed dimensions that support stakeholders' participation in school management to enhance learners' academic achievement in public secondary schools. Considering the total variance there was a need to reduce the linear correlated observed items of the dimensions to a smaller set of important independent composite dimensions. The EFA technique condensed the data into a smaller set of summary dimensions that were used to explore the underlying theoretical structures that enhance learners' academic achievement through stakeholder participation in school management. In totality,

the findings make significant contributions to the literature on the multifaceted conceptualisation of the SBMM, which supports stakeholder participation in school management. The study presents empirically validated dimensions for the SBMM model that can be used with confidence in support of stakeholder participation in school management. This can lead to more informed decision-making, increased accountability, improved educational quality, greater community support, enhanced inclusivity and equity, better teacher and staff morale, effective conflict resolution, long-term sustainability, and alignment with democratic values. These practical implications contribute to the overall success and effectiveness of the education system.

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