Causal Modelling of Head Teachers' Leadership Behaviour and Administrative Effectiveness in Public Basic School: Validation of the Measurement Instrument

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ABSTRACT

Educational leadership behaviour and effectiveness instruments available in the literature are primarily outside the African continent. Educational leadership researchers do not consider the cultural context in adopting scale. In Sahara-Africa, where Nigeria is located, researchers have scientific and ethical questions on the validity of the instruments used for data collection. Experience showed that researchers in Sahara Africa tousled for an instrument to conduct their study in leadership and management, resulting in a self-designed instrument without adequate validation. The study, therefore, validated the measurement scale on head teachers' behaviour and administrative effectiveness in public primary schools. A non-experimental design was adopted for the scale development. Parallel analysis was used to establish factors of the scales and construct validity and reliability with the aid of R-programming and Partial Least Square Structural Equation Modelling. The results showed that leadership behaviour has three components (directive, supportive, and consultative) with 29 items. It was in line with the path-goal and situation theories underpinning this study. Also, the average variance extracted for all the components was above the 0.50 cut-off, HTMT values were below 0.90, and composite reliabilities were above 0.70, respectively. Thus, the scales were valid and reliable to use by researchers interested in this area.

Keywords: Administrative effectiveness, composite reliability, hierarchical component model, HTMT, leadership behaviour, parallel analysis, PLS-SEM

INTRODUCTION

In Nigeria, the administrative head of primary school is regarded as the headmaster or headmistress responsible for ensuring primary school policy and programme implementation to attain primary school goals (Arinze & Okonta, 2022; Okonkwo & Ifesiokwu, 2022; Olowonefa, 2022; Yusuf & Adigun, 2012). Thus, to achieve primary school purposes, the curriculum is formulated to suit such aspirations, which are to be executed by the school heads with the assistance of competent and committed teachers (Amanchukwu & Ololube, 2015; Darling-Hammonda et al., 2020; Nwalado 2021; Okonkwo & Ifesiokwu, 2022; Olatunji & Ajero, 2022). Part of the head teachers' duties is the execution of the school programmes, keeping statutory and non-statutory school records, ensuring the supply and maintenance of facilities and equipment, and creating conducive teaching and learning environment (Olujuwon & Perumal, 2017; Whang, 2021). The performance of primary school heads in actualising these primary educational policies is a product of their leadership behaviours, practice, and resource management (Alimi, 2013; Fan & Ekpe, 2006; Olujuwon & Perumal, 2017). Therefore, leadership effectiveness is when individuals in leadership positions can impact the group to perform their roles within a positive organisation atmosphere (Alli, 2018; Madanchian et al., 2017).

An effective leader is a product of his/her actions, measuring the followers' attitude or disposition toward their leader and leaders' behaviour (Leithwood, 2010; Madanchian et al., 2017). Leadership effectiveness has been measured in terms of performance and ability to act innovatively, where subordinates' satisfaction and commitment increased staff performance and commitment, wiliness to take additional responsibilities and improve decision-making and group performance (Alli, 2018; Kwiotkowska et al., 2022; Madanchian et al., 2017; Olofu et al., 2022; Rickley & Stackhouse, 2022). However, the effectiveness of school heads is measured through supervision of teaching and learning, decision-making, motivating educators and pupils, communication, monetary management, plant administration, human capital development, community relations, conflict management/resolution, human relation, disciplinary ability, and adherence to statutory rules.

Study Underpinning Theories

Path-Goal Theory (PGT) and Situational/Contingency Theory by Fred Edward Fiedler (1964) and Robert House (1971) underpinned this study. The theories propose that subject to the employees and circumstances, leadership behaviours will enhance teachers' acceptance of the school head, level of satisfaction, and motivation to high performance. Built on situational elements, PGT proposes four factors: directive, supportive, participative, and task-oriented leader behaviours. In the same vein, the Situational/Contingency theory stipulates that the leadership effectiveness of any system depends upon the suit between character, mission, control, and experiences.

Based on these, Tannenbaum and Schmidts' (1973) situational approach believes that influential education leaders produce forces in the superintendent, situation, and subordinate. The other perspective is the Fielders contingency approach. School heads will achieve better authority over subordinates for effective performance with positive leader-teacher relationships, superior mission formation, and a strong position. Hence, the justification for validating the scale on head-teachers behaviour and administrative effectiveness in primary school.

Many schools' leadership practices and effectiveness scales developed are of foreign nations and continents outside Africa by educational leadership researchers without considering the cultural context. It causes scientific and ethical questions for researchers in Sahara-Africa, where Nigeria is located (Grobler & Flotman, 2020). Among these existing scales are the Leadership practices inventory (LPI) (Posner, 2016), Measuring school leaders' effectiveness (McCullough et al., 2016), Scale development and initial tests of the multidimensional complex adaptive leadership scale for school principals (Özen & Turan, 2017), Educational leadership styles scale (ELSS) (Kareem & Patrick, 2019), democratic school leadership characteristics instrument (Pažur, 2020) and understanding teacher leaders' behaviours inventory (Chen, 2020). In Africa, literature abounds on scales for measuring educational leadership practices and effectiveness. Van der et al. (2014) worked on the validity and reliability

of the caring school leadership questionnaire in South Africa. The study focused on school leaders' caring behaviour as perceived by teachers. Mahembe and Engelbrecht (2013) conducted a confirmatory factor analysis of a servant leadership measure in South African schools to improve team effectiveness, employee engagement, and institutional success. The servant leadership scale used the constructs of altruistic calling, emotional healing, persuasion, organisational stewardship, and wisdom.

Concept of School Heads' Leadership Behaviour

The act of motivating individuals to work toward the attainment of institutional goals is commonly referred to as leadership (Abdullahi, 2021; Gyang, 2021). Every educational system requires leadership, which may be gained through training and development. Educational leaders must be able to convince or persuade school staff and students to collaborate to attain pedagogical best practices. Leadership is described as the process of influencing the behaviours of staff and students to attain instructional objectives (Mestry, 2021; Okorie, 2010; Ramay, 2010). Various leadership models have been produced in the literature, emphasising the importance of transformative, distributive, and instructional methods in leadership (Bush, 2020; Bush et al., 2021). "Leadership is constructing and sustaining a sense of vision, culture, and interpersonal relations" (Khan et al., 2017, p. 249). School heads must be developed to possess the necessary abilities to maintain and realise the core

educational goal. Collaboration and organisational learning have been connected to leadership models in educational settings (Danils et al., 2019; Hallinger, 2003). These models are "*distributed leadership*" (Harris, 2013; Harris & DeFlaminis, 2016; Naicker & Mestry, 2013; Spillane, 2006), *"shared leadership"* (Gronn, 2002; Harris, 2013)*, "team leadership"* (Gupta et al., 2010; Zaccaro et al., 2001), *and "democratic leadership"* (Jones et al., 2016; Terzi & Derin, 2016). Various theories or models abound in school leadership, including Great Man, trait, contingency, style and behaviour, transactional, and transformational theories (Khan et al., 2017). To that purpose, this research focuses on the approach to leadership behaviour and its effectiveness.

An approach to enhance teachers' morale is through the school heads' leadership behaviours (SHLB) (Mbon, 2017). Rad and Yarmohammadi (2006) see leadership as beliefs, traits, and skills used in diverse circumstances towards individual and organisational objectives. The SHLB is conceptualised to initiate action and inspire and direct teachers towards fulfilling a set goal (Ramay, 2010). Leadership behaviour, thus, is whatsoever is done to bring about teachers' happiness, satisfaction, dedication, and commitment in a manner that promotes their best in the school so that both pupils, parents and society will significantly benefit from their services (Rabbani et al., 2015; Somech, 2005). The SHLB was built on PGT proposed by Fiedler (1964) with four models (directive, supportive, participative, and task-oriented) (Kuhn, 2007). However,

based on the factors loaded, this study is limited to three elements (directive, supportive, and consultative).

Directive leadership offers the teachers a standard for action favouring a head's perspective (Rabbani et al., 2015). The directive approach is recognised as project-oriented comportment and a great propensity to take over relationships, direct conversations, and personally coordinate job accomplishment (Bell et al., 2014; Cruz et al., 2009). School heads that provide teachers mandates emphasise less contribution than school managers that focus on staff members' growth as the crucial component of leadership effectiveness (Bell et al., 2018; Fiedler, 2005; Sagie, 2007). Therefore, this leader makes teachers self-reliant and unbending, aiding less initiative (Euwema et al., 2007; Northouse, 2013). Directive leadership behaviour is appropriate when the task is complex or ambiguous, formal authority is strong, and the workgroup provides job satisfaction (Lussier & Achua, 2010; Malik, 2013).

Supportive school heads show concern for subordinates' well-being and personal needs. Supportive leadership behaviour (SLB) involves being responsive and approachable as a leader and attending to subordinates' well-being and human needs (Northouse, 2013). SLB is suitable when the task is simple, formal authority is weak, and the workgroup does not provide job satisfaction (Cansoy, 2019). Thus, the approach is the most suitable when the teachers have low willingness but a high capacity for the work. It is useful

when the staff can do the job but refuses to do it or lacks commitment (Golshani & Rahiminejad, 2018; Wu & Parker, 2014). The school heads need not worry about showing them what to do but instead should be concerned with finding out why the teachers are refusing and working to persuade them to cooperate. The key to supportive leadership is motivating and building confidence in people (Wu & Parker, 2014).

Thus, consultative leadership behaviour (CLB) is appropriate when teachers do not want autocratic leadership, have an internal locus of control, and the follower's ability is high; when the task is complex, authority is either weak or strong, and satisfaction from co-workers is either high or low (Lussier & Achua, 2010). School heads with the CLB approach obtain their opinions and thoughts about fellow teachers and integrate them with their goals (Northouse, 2013). CLB is the process of having a shared impact in decision-making by a school head and their teachers (Koopman & Wierdsma, 2008). It is a relatively equal participation level in an organisation's decision-making (Torres, 2000).

With consultative leadership, head teachers have essential tasks to provide teachers and non-teaching staff with the expertise of inherent inspiration, emotions of identity, and a sense of self-strength of character (Deci et al., 1989). Participation is sensitive if teachers have an attitude of rights in believing that the heads genuinely accept them as critical human assets in the school.

Concept of Schools' Head Administrative Effectiveness

Head administrative effectiveness (HAE) is conceptualised as adequate supervision, human relation, and disciplinary ability in school heads. In school administration, effectiveness has received wide attention in organisational behaviour (Bell et al., 2018). Effectiveness was considered system-oriented; capacity to accomplish the expected result; purpose achievement, input-output ratio, and measurable quantity (Oyedeji, 2012). Therefore, administrative effectiveness is faced with problems in deciding what criteria should be used and what level of specificity would be appropriate for the various constituent groups (April 2018) despite the poor interconnected literature on this concept. Administrative effectiveness is not limited to school heads' performances but actual school effectiveness over time (April 2018; Bhasin, 2020). Administrative effectiveness is the ability of school administrators to maximise school inputs to produce optimum educational services. It concerns the organisation's output to the extent of its environment (Arikewuyo & Onanuga, 2005; Barinua & Ibe, 2022; Prasetyo et al., 2022). Therefore, school heads' administrative effectiveness is the ability to effectively use the available resources via effective supervision and disciplinary ability, human relation, vision, and policy to achieve the educational goals of primary school.

Based on the existing literature, six elements were discussed in gauging head teachers' administrative effectiveness:

Concentrate on curricula and instruction. It is the most frequently mentioned feature of good school leadership in the literature studied. It entails devoting time to the creation, oversight, and monitoring of educational programmes (Dös & Savas, 2015; Grissom et al., 2013; Kondakci & Sivri, 2012; Malone & Caddell, 2000; Parylo & Zepeda, 2014; Pashiardis, 1998; Supovitz et al., 2010). Communication and sustaining positive connections are also important (internal or external). As a result, the capacity of leaders to convey the vision, achieve standards, and establish school climate and culture (Dös & Savas, 2015; Grissom & Loeb, 2011; Leithwood & Jantzi, 2005; May et al., 2012) is critical to their administrative effectiveness. It allows teachers and other school stakeholders to participate in the school's administration (Daniels et al., 2019). The school environment influences people's behaviour within a system (Hoy & Miskel, 2013). In contrast, school culture is defined by the beliefs, norms, and values that bind the school and give it a sense of community (Daniëls et al., 2019: Hoy & Miskel, 2013). In several research school leaders have been identified as key shapers of school culture (Dös & Savas, 2015; Supovitz et al., 2010). The organisational culture and climate are discussed, emphasising teacher mutual trust and the head-teacher relationship (Danils et al., 2019; May et al., 2012; Supovitz et al., 2010).

In a similar vein, the capacity of school leaders to develop and maintain the school's vision and mission is a measure of its administrative effectiveness. Administrative performance is enhanced by the ability of school leaders to project and maintain the school vision and mission (Daniels et al., 2019; Grissom et al., 2013; Sahenk, 2010; Supovitz et al., 2010). In addition, the capacity to provide frequent feedback, recognition, and awards for accomplishments is important. Administrative effectiveness will be enhanced by the ability of head teachers to provide feedback and recognise staff and learners' success through word of mouth or prizes (Danils et al., 2019; Dös & Savas, 2015; Sahenk, 2010). Finally, the ability of head teachers to invest resources in staff development and retention is critical to their administrative effectiveness (Danils et al., 2019; Hitt & Tucker, 2016; May et al., 2012). It entails head teachers motivating educators to devote time to ongoing professional development and enabling them to learn by fostering a welcoming learning environment (Awodiji et al., 2022; Danils et al., 2019).

In Nigeria, research on head-teachers leadership behaviour and effectiveness (Akinola, 2013; Alimi, 2013; Apebende & Ushie, 2018; Mbon, 2017; Shamaki, 2015) without evidence of adequate psychometric properties. Few validated instruments exist for these construct variables based on researchers' observations, experiences, and literature. Experience showed that students and researchers scrambled for a tool to conduct their study, resulting in a self-designed instrument without adequate validation. This scientific process contributes to existing literature and provides

a validated scale for scholars to conduct an original and reliable study in Sub-Sahara Africa and Nigeria in particular. Thus, the researchers steered the research to advance a scale for researchers in behavioural and social sciences to assess head teachers' leadership behaviour and effectiveness in the basic level of education, to determine the fundamental feature of the scale, to validate the scale construct, internal consistency and to evaluate whether the empirical data is consistence with the hypothesised model.

METHODOLOGY

Design Participants and Sample

The study adopted a non-experimental design of scale development research. In this paper, the scale development research method was used to develop a valid and reliable measure of a construct to assess an attribute of interest (for example, leadership behaviour and administrative effectiveness). The participants for the study were systematically drawn from five educational districts in Ibadan, Oyo State, Nigeria. A total of 382 (75, 19.6% = men: 307, 80.4% = women) primary school teachers responded to the questionnaires. Of this number, 185 were from urban schools, 111 were semi-urban, and 86 were from rural schools. The researchers and research assistants administered the questionnaire to the participants in their schools.

Item Generation Procedure

Literature was extensively reviewed to pinpoint relevant problems, terminology,

items and scales from the existing studies that might be adopted to assess components of head-teacher leadership behaviour and their effectiveness. Information deduced from the literature was used to structure the interview guide to understanding better issues surrounding the two construct variables (head-teacher leadership behaviour and administrative effectiveness). Focus groups and in-depth interviews were conducted with ten primary school teachers and five head teachers in the Ibadan metropolis of Oyo State, Nigeria to have first-hand information and opinions on the different components of head teacher leadership behaviour and administrative effectiveness baseline for potential scale items. In the literature and qualitative study, three components of leadership behaviour were evident, namely, directive leadership behaviour, supportive leadership behaviour, and consultative leadership behaviour. Three components were identified for administrative effectiveness: effective supervision and disciplinary ability, human relation, and vision and policy.

Thirty-six items related to concepts considered essential by a broad range of stakeholders in the qualitative stage and addressed the theoretical components of leadership behaviour were selected for inclusion in a draft questionnaire. Also, 43 items formed the scale of the administrative effectiveness instrument. The scale contains both positive and negative worded Items. Forty items of leadership behaviour were phrased as statements to which respondents were asked to indicate their level of

agreement, using a five-point Likert scale ('5=Very true', '4=True', ' 3=Somehow true ', '2=Not true', '1=Neutral'). Again, the 33 items statements of administrative effectiveness used a five-point Likert scale ('5=Excellent ', ' 4=Very Good ', '3=Good', '2=Fair', '1=Poor'). In developing new items, the researchers generated statements/arguments that addressed the concept of the two construct variables and sought input from experts in educational management, measurement and evaluation and other researchers to assess the comprehensiveness of items in terms of ambiguity, clarity and wording. In responding to each item under the scale, participants showed their magnitude of support or dispute with the items on the Likert scale of five-continuum. There was a reverse of negatively worded items.

Ethical Consideration

We sought approval from the University of Johannesburg research and ethics committee. More importantly, the researchers also sought permission from the Ministry of Education in Nigeria, through the school heads, to authorise and distribute the Five-Point Likert Scales questionnaire to the teachers. Also, teachers' consent was sought before the administration of questionnaires. The participants responded to the questionnaires on how they agreed or disagreed with each statement. Their responses were assessed and subjected to a statistical process. The University of Johannesburg granted ethical clearance with approval number SEM 1-2022-025.

Statistical Analysis

Participants' demographic profiles were summarised descriptively. The exploratory factor analysis (EFA) was used for item reduction and determination of underlying factors of the scales implemented in R programming language for statistical computing software, version 4.1.1 (R Core Team, 2011). Also, the construct validity (that is, convergent and discriminant) of the instrument was established using Partial Least Square Structural Equation Modeling (PLS-SEM) implemented in SmartPLS version 3.3.3 software (Ringle et al., 2005). PLS-SEM estimates the parameters of a set of equations in a structural equation model by combining principal component analysis with regression-based path analysis (Hair et al., 2011). The PLS-SEM analyses recognise critical achievement elements and causes of benefit (Albers, 2010) for essential target elements like leadership behaviour and administrative effectiveness. In addition, PLS-SEM has gained extensive acceptance in social and behavioural sciences for generating and estimating multifaceted path models with latent variables and their associations. This paper adopted this technique to predict a specific set of hypothesised interactions that maximises the described divergence in the endogenous construct variable. Consequently, the measurement model, an ingredient of PLS-SEM, was established.

RESULTS

Participants' responses to the scale items of leadership behaviour and administrative

effectiveness were subjected to parallel analysis implemented in psych and GPArotation packages of R programming language software to establish the number of elements underlying the scale. Humphreys and Montanelli (1975) described parallel analysis as an optional procedure that evaluates the eigenvalues of factors of the examined data along with a random data matrix of a similar range as the original. The outcome is described in Table 1.

A factor is retained if its eigenvalue is greater than the mean of the eigenvalues from its randomly generated counterpart (Horn, 1965). Based on this premise, Table 1 suggested five factors for the leadership behaviour scale. The extracted factor(s) provide evidence for evaluating the number of factors underlying the scale under study. Also, the pattern of factor structure is presented in Table 2.

As shown in Table 2, only three factors reasonably underlie the scale since two identified factors did not have substantial item loadings of at least three, so they were not viable to be part of evident factors. More so, examining item loadings for each component depicts that items from LB1 to LB11 measured consultative leadership behaviour, and items from LB16 to LB28 measured directive leadership behaviour. In contrast, items between LB29 to LB36 measured supportive leadership behaviour. Therefore, this made three factors interpretable for the leadership behaviour scale, with 32 items measuring different components. Also, the result of the parallel analysis of the administrative effectiveness scale is presented in Table 3.

Table 3 suggested six factors for the administrative effectiveness scale. The extracted factor(s) provide evidence for evaluating the number of factors underlying the scale under study. Also, the pattern of factor structure is presented in Table 4.

Table 4 shows that three factors are tenable for the scale. The remaining three factors did not have substantial item loadings of at least three, so they were not viable. In addition, item loadings under each factor remarked that items from AE1 to AE12 measured effective supervision and disciplinary ability, items from AE16 to AE28 measured human relations, and items from AE34 to AE43 measured vision and policy, respectively. Succinctly, three factors are interpretable for the administrative effectiveness scale, with 35 items measuring various components. The two scales' survival items from the parallel analysis were further analysed to establish construct validity (convergent and discriminant) and reliability. Thus, it demonstrated using PLS-SEM implemented in SmartPLS version 3.3.3 software.

Measurement Model Assessment

The hierarchical component model hypothesised (See Figure 1) in this study consisted of three sub-constructs of leadership behaviour (directive, supportive and consultative) and three sub-constructs of administrative effectiveness (effective supervision and disciplinary ability, human relation and vision and policy). This hierarchical latent variable accounts for the measurement error of the

Table 1

Several factors underlie the leadership behaviour construct

SN	Eigen Values of Observed Factors													
[1]	16.5	2.20	0.96	0.63	0.50	0.36	0.31	0.24	0.20	0.13	0.09	0.07	0.03	-0.01
[15]	-0.02	-0.03	-0.05	-0.11	-0.13	-0.15	-0.17	-0.20	-0.21	-0.22	-0.24	-0.27	-0.30	-0.31
[29]	-0.33	-0.36	-0.37	-0.39	-0.41	-0.43	-0.49	-0.51						
SN	Eigen Values of Simulated Factors													
[1]	0.68	0.56	0.51	0.46	0.42	0.37	0.34	0.30	0.26	0.23	0.21	0.18	0.14	0.12
[15]	0.08	0.06	0.03	0.00	-0.02	-0.05	-0.07	-0.10	-0.12	-0.15	-0.17	-0.20	-0.22	-0.24
[29]	-0.27	-0.30	-0.32	-0.35	-0.38	-0.40	-0.43	-0.48						

Table 2

Pattern matrix for leadership behaviour scale

Statements on Leadership Behaviour: My head-teacher	Label	F1	F2	F4	F3	F5
Provides guidance, advice and instructions as necessary and monitors teachers' performance.	LB1		0.76			
Sets performance and rewards norms	LB2		0.68			
Gives directives when there is a serious issue or with drastic consequences if not successful	LB3		0.73			
Is approachable and friendly as a manager	LB4		0.80			
Is willing to collaborate with staff members continually	LB5		0.52			
Makes sure that everyone is accountable for their task	LB6		0.64			
Establishes warm interpersonal relationships with the staff members and students	LB7		0.56			

Table 2 *(Continue)*

Statements on Leadership Behaviour: My head-teacher	Label	F1	F2	F4	F3	F5
Considers the well-being of participants	LB8		0.76			
Keeps staff informed on relevant tasks, goals, and situations	LB9		0.87			
Asks staff for their opinions on decisions	LB10		0.75			
Considers suggestions from staff on school improvement	LB11		0.68			
Involves staff members in planning the school programmes	LB12			0.42		
Consults teachers on the issues affecting school activities	LB13			0.41		
Provides structure in situations that lack direction	LB14					0.41
Shows concern for teachers' well-being and personal needs	LB15					0.36
Treats staff and students fairly	LB16	0.50				
Encourages when teachers have a low willingness to work	LB17	0.35				
Motivates and builds confidence in teachers	LB18	0.47				
Gives room for listening, praising, and making teachers sense great when they show the required commitment to the teaching job	LB19	0.36				
Shows concern for their welfare and promotes staff cohesiveness	LB20	0.55				
Provides a comfortable environment and work climate for members of the staff and students	LB21	0.38				
Consults with teachers about decision-making	LB22	0.41				
Consults teachers to obtain their ideas and opinions and integrate their suggestions into decision-making	LB23	0.49				
Has an essential task of providing teachers with the experience of intrinsic motivation	LB24	0.87				
Considers ideas, differences, and opinions of fellow teachers	LB25	0.50				
welcomes and deliberates with the teachers before any decisions are made	LB26	0.87				

Table 2 (*Continue*)

Statements on Leadership Behaviour: My head-teacher	Label	F1	F2	F3	F4	F5
Involves staff in decision-making	LB27	0.54				
Solicits for teachers' ideas and consults them often	LB28	0.43				
Often dominates all school programmes	LB29				0.72	
Takes a highly directive role when teachers cannot do the job well	LB30				0.59	
Understands and shares staff aspirations and feelings	LB31				0.37	
Considers the opinion of others	LB32				0.34	
Asks all staff for their point of view	LB33				0.41	
Encourages creativity among staff members and students	LB34				0.33	
Accepts whatever plan the member of staff initiates.	LB35				0.50	
Gives teachers a free hand to decide and carry out their own decisions without his approval	LB36				0.69	

Table 3

Several factors underlie the administrative effectiveness construct

SN	Eigen Values of factors													
[1]	21.74	2.05	0.82	0.77	0.58	0.47	0.38	0.32	0.29	0.22	0.22	0.19	0.12	0.1
[15]	0.04	0.04	-0.01	-0.02	-0.04	-0.06	-0.09	-0.12	-0.13	-0.16	-0.18	-0.19	-0.21	-0.22
[29]	-0.23	-0.25	-0.26	-0.28	-0.29	-0.3	-0.31	-0.35	-0.37	-0.38	-0.39	-0.4	-0.43	-0.46
[43]	-0.5	-0.51												

SN	Eigen Values of Simulated factors													
[1]	**0.76**	**0.65**	**0.59**	**0.54**	**0.49**	**0.45**	0.41	0.37	0.33	0.3	0.27	0.24	0.21	0.18
[15]	0.15	0.13	0.1	0.08	0.05	0.03	0.01	-0.02	-0.04	-0.07	-0.09	-0.11	-0.13	-0.16
[29]	-0.18	-0.2	-0.22	-0.25	-0.27	-0.28	-0.3	-0.32	-0.35	-0.38	-0.4	-0.42	-0.45	-0.47
[43]	-0.51													

Table 4

Pattern matrix for administrative effectiveness scale

Statements on Administrative Effectiveness: My head-teacher	Label	F1	F2	F3	F4	F5	F6
Ensures that teachers are doing their jobs from time to time	AE1	0.76					
Shows concern to teachers towards good job performance and pupils' achievement	AE2	0.86					
Ensures that teachers' job commitment is highly improved	AE3	0.80					
Readily direct and assist the activities of staff and students	AE4	0.61					
Distributes materials equally among different units without prejudice or favouritism	AE5	0.35					
Have concerns and skills in unravelling an array of challenges	AE6	0.54					
Takes teachers' absence from work seriously	AE7	0.34					
Does not encourage examination malpractices	AE8	0.34					
Courageous and firm	AE9	0.64					
Is constantly reliable, honest, and steadfast by a high standard of "right" and "wrong"	AE10	0.57					
Has good presentation skills	AE11	0.71					
Collaborate with staff by means of leadership by example	AE12	0.68					
Very knowledgeable on contemporary issues concerning schools and students	AE13						0.35
Commitment to spending long hours	AE14					0.41	
Prioritise projects and make sure the essential functions are performed before the less essential ones	AE15					0.37	
Has excellent hearing skills	AE16			0.45			
Listen cautiously, without bias, empathise with others and fairly attempt to comprehend the presenter's viewpoint	AE17			0.48			
excellent communication skills	AE18			0.55			
Concern in seeking and utilising others' input in decision-making	AE19			0.43			
Knows how the school system work	AE20			0.49			
Enhances the cordial relationship with teachers	AE21			0.56			

Table 4 *(Continue)*

Statements on Administrative Effectiveness: My head-teacher	Label	F1	F2	F3	F4	F5	F6
Creates an atmosphere that encourages good teaching and learning process	AE22			0.62			
Has good interpersonal skills	AE23			0.39			
Provides a conducive setting in which staff and students are cheerful and willing to work	AE24			0.46			
Helps staff and students flourish and prosper in their aspirations	AE25			0.48			
Evaluates teachers while teaching pupils	AE26			0.35			
Does not allow indecent dressing	AE27			0.43			
Let go, as well as aid others in resolving crises.	AE28			0.39			
ready for innovative means of accomplishing things	AE29						
Ensures discipline among teachers and pupils	AE30				0.451		
Does not allow private business in the school environment	AE31				0.552		
Is highly approachable to teachers	AE32						
Willing to make tough and unpopular but necessary decisions and stick to them	AE33						
Persevering over the best reasonable attempts to achieve objectives efficiently and effectively	AE34		0.51				
Cares about issues concerning school programmes	AE35		0.50				
Uses new philosophies to do things differently	AE36		0.72				
Has knowledge of the "hows" and "whys" of the instructional curriculum	AE37		0.60				
Behaves in such a way that makes every teacher loves the teaching profession	AE38		0.54				
Treats people equally	AE39		0.66				
Share beliefs, targets and intentions for the prospect of the school with staff and learners	AE40		0.68				
To make long-range planning to meet school goals and objectives	AE41		0.62				
Possesses the capability to take on the current demands of the school	AE42		0.69				
Has the skill to prepare reasonable financial budgets and spend wisely	AE43		0.61				

indicators of a typical formative construct: the arrows are operationalised as reflective constructs to model their measurement error (Edwards, 2001) explicitly. Consequently, the reflective-formative type of hierarchical latent variable model was used. The constructs reflect (multidimensional) the criticism by Becker et al. (2012) as the six factors are distinct and not interchangeable. In PLS-SEM, two approaches are generally suggested in the literature to estimate the parameters in a hierarchical latent variable model: the repeated indicator approach and the two-stage approach (Ringle et al., 2012; Wetzels et al., 2009). Standard assessment always depends on composites; irrespective of the measurement model requirement, the technique can process meditatively and formatively specified weight models without classification issues (Hair et al., 2011). Thus, the continual value was used to assess the model's factors.

The loading of each value on its concomitant latent variable must be estimated and compared with the cut-off to assess the model's consistency. Hair et al. (2011) suggested that outer loadings should be greater than 0.60 for indicator reliability to be sufficient. A loading below 0.60 indicates that an item should be considered for removal. Such will reduce the composite reliability values and average variance extracted from the constructs if not expunged from the rest of the items (Chin, 2010). Also, higher values indicate higher reliability levels for the composite reliability criterion. According to Hair et al. (2022), values between 0.60 and 0.70

are acceptable in exploratory research, whereas results between 0.70 and 0.95 represent satisfactory reliability. Although, incredibly high estimates (say, higher than 0.95) are challenging and indicate that the items are virtually identical and redundant. The explanation could be a similar item in an assessment or unwanted response forms such as straight-lining (Diamantopoulos et al., 2012). Cronbach's alpha is another standard of internal consistency that accepts identical thresholds but produces lower rates than the composite trustworthiness. The results of repeated indicator model estimation are presented in Figure 2.

Figure 2 remarks that most indicator loadings on their concomitant latent variables exceeded the 0.60 benchmarks. However, indicators such as CLB1, CLB2, CLB8, ESDA5, HR6, HR13, and VP1, respectively loaded (outer loadings) below 0.60, were deleted based on the low estimates of composite reliability average variance extracted. More so, the composite reliability coefficient was adopted for establishing construct consistency and should be greater than 0.70 to be appropriate (Ayanwale et al., 2023; Hair et al., 2011). In Table 5, composite reliability for all the constructs in the measurement model was higher than 0.70. Therefore, show that the measurement model possesses standard dependability. To establish the convergent validity of the measurement model, the average variance extracted from the constructs must be above 0.50 for their convergent validity to be considered suitable (Chin, 2010; Hair et al., 2011). Table 5 marks that the average
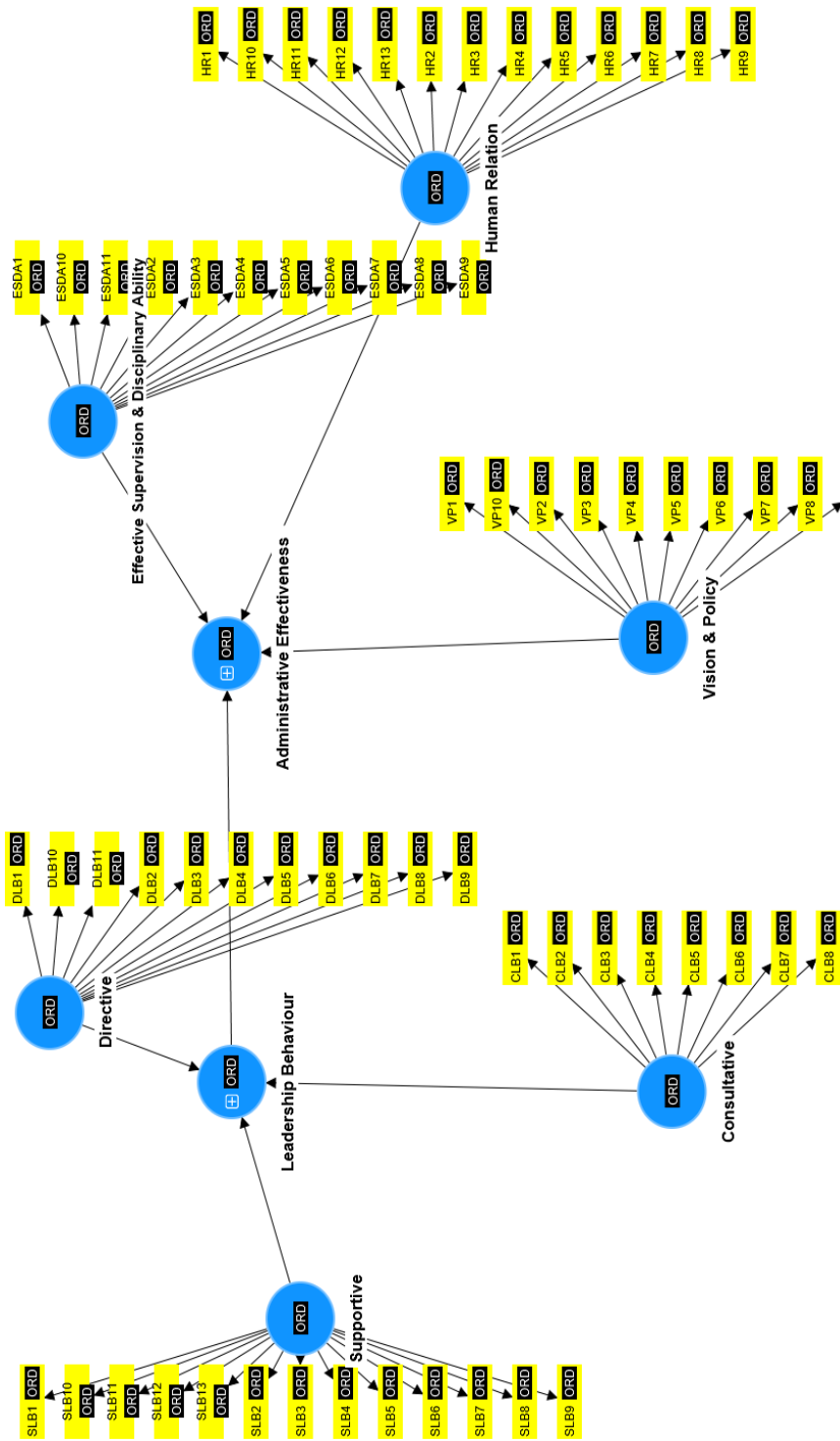
Figure 1. Hierarchical latent variables of leadership behaviour and administrative effectiveness
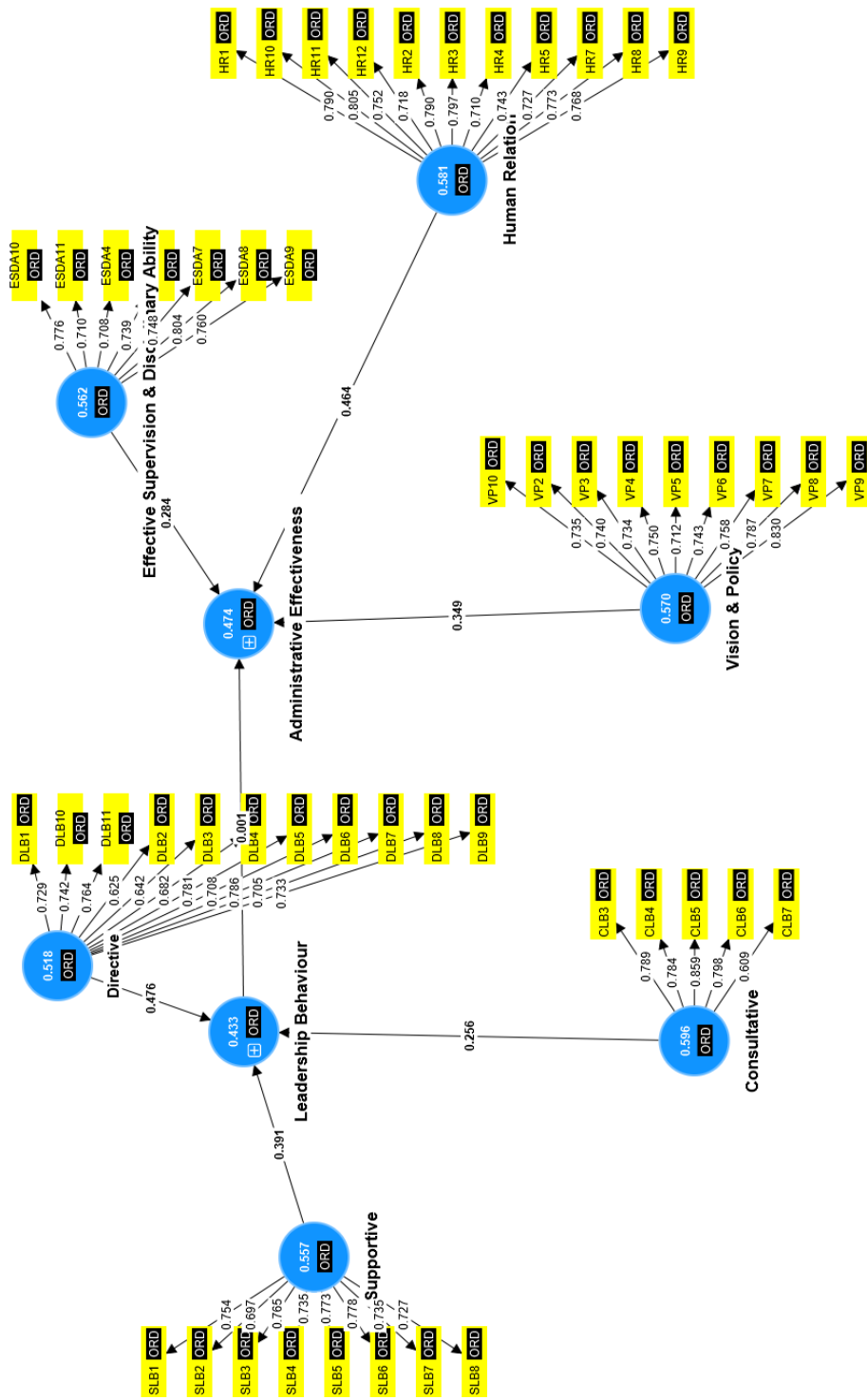
Figure 2. Validated repeated indicator estimation of hierarchical latent variables

Table 5

Validity and reliability of the measurement model

Construct	Indicators	Outer Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Consultative Leadership Behaviour. My school head:			0.83	0.88	0.60
understands and shares staff aspirations and feelings	CLB3	0.79			
considers the opinion of others	CLB4	0.79			
asks all staff for their point of view	CLB5	0.86			
encourages creativity among staff members and students	CLB6	0.80			
accepts whatever plan the member of staff initiates	CLB7	0.60			
Directive Leadership Behaviour			0.91	0.92	0.52
provides guidance, advice and instructions as necessary and monitor teachers' performance	DLB1	0.73			
sets performance and rewards norms	DLB2	0.74			
gives directives when there is a serious issue or with drastic consequences if not successful	DLB3	0.76			
is approachable and friendly as a manager	DLB4	0.63			
is willing to collaborate with staff members continually	DLB5	0.64			
makes sure that everyone is accountable for their task	DLB6	0.68			

Table 5 *(Continue)*

Construct	Indicators	Outer Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
establishes warm interpersonal relationships with the staff members and students	DLB7	0.78			
considers the well-being of participants	DLB8	0.71			
keeps staff informed on relevant tasks, goals and situations	DLB9	0.79			
asks staff for their opinions on decisions	DLB10	0.71			
considers suggestions from staff on school improvement	DLB11	0.73			
Supportive Leadership Behaviour			0.92	0.93	0.52
treats staff and students fairly	SLB1	0.72			
encourages when teachers have a low willingness to work	SLB2	0.71			
motivates and builds confidence in teachers	SLB3	0.77			
gives room for listening, praising and making teachers sense great when they show the required commitment to the teaching job	SLB4	0.73			
shows concern for their welfare and promotes staff cohesiveness	SLB5	0.63			
provides a comfortable environment and work climate for members of the staff and students	SLB6	0.66			
consults with teachers about decision making	SLB7	0.73			

Table 5 *(Continue)*

Construct	Indicators	Outer Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
consults teachers to obtain their ideas and opinions and integrate their suggestions into decision-making	SLB8	0.69			
readily direct and assist the activities of staff and students	ESDA4	0.70			
have concerns and skills in unravelling an array of challenges	ESDA6	0.66			
takes teachers' absence from work seriously	ESDA7	0.71			
does not encourage examination malpractices	ESDA8	0.72			
courageous and firm	ESDA9	0.73			
is constantly reliable, honest, and steadfast by a high standard of "right" and "wrong."	ESDA10	0.78			
has good presentation skills	ESDA11	0.74			
Human Relation			0.93	0.94	0.58
has good presentation skills	HR1	0.79			
has excellent hearing skills	HR2	0.81			
listen cautiously, without bias, empathise with others and fairly attempt to comprehend the presenter's viewpoint	HR3	0.75			
excellent communication skills	HR4	0.72			
knows how the school system work	HR5	0.79			
creates an atmosphere that encourages good teaching and learning process	HR7	0.80			

Table 5 *(Continue)*

Construct	Indicators	Outer Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
has good interpersonal skills	HR8	0.71			
provides a conducive setting in which staff and students are cheerful and willing to work	HR9	0.74			
helps staff and students flourish and prosper in their aspirations	HR10	0.73			
evaluates teachers while teaching pupils	HR11	0.77			
does not allow indecent dressing	HR12	0.77			
Vision and Policy			0.91	0.92	0.57
cares about issues concerning school programmes	VP2	0.74			
uses new ideas to do things differently	VP3	0.74			
has knowledge of the "hows" and "whys" of the instructional curriculum	VP4	0.73			
behaves in such a way that makes every teacher loves the teaching profession	VP5	0.75			
treats people equally	VP6	0.71			
share beliefs, targets and intentions for the prospect of the school with staff and learners	VP7	0.74			
to make long-range planning to meet school goals and objectives	VP8	0.76			
possesses the capability to take on the current demands of the school	VP9	0.79			
has the skill to prepare reasonable financial budgets and spend wisely	VP10	0.83			

variance extracted from the constructs was above the cut-off of 0.50. Therefore, convergent validity was evident.

Furthermore, discriminant validity was assessed.) Molefi and Ayanwale (2023) explained how each construct is unique from other constructs in the model. To achieve discriminant validity of the constructs, the heterotrait–monotrait (HTMT) ratio has recently been established as a better criterion than traditional assessment methods, such as the cross-loadings and Fornell–Larcker criterion (Henseler et al., 2015). More

importantly, Henseler et al. (2015) suggested that a factor with 0.85 and 0.90 for HTMT is sufficient to establish discriminant validity (DV). This study used an HTMT value of 0.90 as a cut-off to assess DV. Table 6 presents the outcomes of the DV estimation of the measurement model using the HTMT ratio.

Table 6 shows that the constructs are not correlated since their values were below the cut-off of 0.90. Thus, the two scales can have both convergent and discriminant validity and are adequately reliable.

Table 6

Discriminant validity assessment of the measurement model

Construct	Consultative	Directive	Effective Supervision and Disciplinary Ability	Human Relation	Supportive	Vision and Policy
Consultative						
Directive	0.72					
Effective Supervision and Disciplinary Ability	0.65	0.65				
Human Relation	0.61	0.62	0.87			
Supportive	0.88	0.71	0.66	0.67		
Vision and Policy	0.61	0.59	0.76	0.77	0.62	

DISCUSSION

This study constructed and validated a measurement instrument for leadership behaviour and administrative effectiveness in primary public schools. Teachers'

responses to the scales were analysed using parallel analysis to determine the number of dimensions. The results remarked that three factors are viable for leadership behaviour: directive, supportive, and

consultative (Kuhn, 2007; Mbon, 2017). Meanwhile, administrative effectiveness has three tenable sub-dimension: effective supervision and disciplinary ability, human relation, vision, and policy (Apebende & Ushie, 2018; Mbon, 2017; Shamaki, 2015). These evident constructs were aligned with what has been documented in the literature as dimensions of the latent variables. Indeed, five items were loaded under consultative leadership behaviour, 11 under directive leadership behaviour, and 13 under supportive leadership behaviour. While ten items were loaded under effective supervision and disciplinary ability, 11 were loaded under human relations, and nine were loaded under vision and policy. Also, survived items from the parallel analysis were subjected to PLS-SEM to establish construct validity (convergent and discriminant) and scale reliability.

The results remarked acceptable outer loadings values ranging from 0.63 to 0.86, average variance extracted value between 0.52 to 0.60 and composite reliability of 0.88 to 0.94 for all the constructs. The average variance extracted (AVEs') value was used to determine the convergent validity for the scale. Values above 0.50 cut-off were evident for all the constructs, greater than 50% of the items' variance explaining the underlying latent construct (Chin, 2010). In addition, the findings agree with the submission of Ayanwale and Oladele (2021) that using average variance extracted (AVEs'> 0.40) shows convergent validity of the instrument used since the current CV is greater than 0.40. Furthermore, the constructs are distinctive, showing the discriminant validity and reliability of the scale. It is consistent with Henseler et al. (2015) and Voorhees et al. (2016) that AVE should be higher than its relationship with other factors, otherwise known as the uniqueness of the constructs.

CONCLUSION

In Sahara Africa, researchers struggled to find an instrument to conduct their leadership and management study, resulting in unvalidated, self-designed instruments. In conclusion, the study validated the scale for measuring head teachers' behaviour and their administrative effectiveness in public primary schools. Scale development was conducted using a non-experimental design. R-programming and Partial Least Square Structural Equation Modeling were used to establish factors of the scales and construct validity and reliability. The 29 items of leadership behaviour fall into three categories (directive, supportive, and consultative). All the components' average variances were above the 0.50 threshold, HTMT values were below 0.90, and composite reliability values were above 0.70. Therefore, the scales were valid and reliable. Consequently, the researchers concluded that considering the robust psychometric and statistical process the scales were subjected to, it is valid and reliable for researchers and policymakers to use to measure the school leadership behaviour and administrative effectiveness.

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