Computer Modeling Approach to Evaluating the Impact of Parents to Public Secondary School Educational System in Nigeria

Iwasokun Babatunde Gabriel*
Alese Boniface Kayode*
Aranuwa Ola Felix**
Adegoke Abejide Michael***

Abstract

This paper proposes nine (9) performance indices of some factors that define parents' contributions to secondary school education in Nigeria and a tool for evaluating them. Four Hundred and Eight Three (483) secondary schools that spread across the six geo-political zones in Nigeria were surveyed by administering questionnaires and holding meetings with their principal officers. The data obtained from the survey were subjected to factor analysis by principal components using Statistical Package for Social Scientists (SPSS). From the analysis, three factors; namely support for school development, support for students' academic development and relationship with teachers and school management were extracted and the percentage contribution of each factor to secondary school system in Nigeria was estimated. It was discovered that the total sum of the percentage contribution of all the factors was less than 100. This showed that some extraneous factors exist whose related performance indices were not considered in the research instrument, which were likely to contribute in no small measure to the current performance of the secondary school system in Nigeria. Such extraneous factors include but not limited to support for school discipline, government policies, custom and tradition and literacy level. Moreover, a factor scores coefficient matrix that can be used for the estimation as well as the ranking of the assessment of each respondent to parents' contribution to the current performance of secondary school system in Nigeria was generated.

Keywords: Factor analysis, performance indices, mathematical model, Nigeria, public secondary school

1. Introduction

Performance according to the Advanced Learner's Dictionary, is defined as an action or achievement considered in relation to how successful it is. It is also the manner, in which a system functions, operates or behaves. The performance of public secondary school systems across the world can therefore be expressed in terms of the manner in which they function, operate or behave towards achieving their predefined goals. According to [1], part of the predefined goals for secondary school system is to help students to be able to obtain and retain knowledge with which they can make positive impact on themselves and the society at large for the rest of their lives. Similarly, it is stated in [2] that the major goals of the secondary education include the following:

a. Attainment of good level of students' performance in major subject such as mathematics.
b. Inculcating the reading culture on students.
c. A level of success defined by a good number of students with ability to complete their secondary school education and participate in higher education.

The resources directed towards the attainment of set goals in secondary school education comprise of those things that are used directly or indirectly for educational development. Such

*Department of Computer Science, Federal University of Technology, Akure, Nigeria
**Department of Computer Science, Adekunle Ajasin University, Akungba, Nigeria
***Department of Computer Science, Bells University of Technology, Ota, Nigeria

resources include money, time and knowledge [3]. It is stated in [4-5] that money could be used for infrastructural procurement and maintenance in schools. Money is also used for the acquisition of utilities, payment of staff salaries and procurement of books. It is also needed for the training and re-training of staff for increased knowledge and productivity, extra curriculum activities and transportation.

According to [3] and [6], the level of the knowledge of teachers in their areas of specializations dictates the extent to which sound teaching is delivered for knowledge buildup on the students. The level of knowledge on its own is functionally dependent on academic qualifications and the experiences acquired over years of service. Other sources of knowledge include seminars and workshop organized by relevant bodies on timely basis as refresher courses for the teachers. Money set aside for schools development could be obtained from complementary efforts of the government at all levels. It could also be obtained through the tax revenues from corporate organizations [4]. In some countries such as Germany, private associations or churches can provide money to fund schools according to their self determined principles, as long as they comply with certain state requirements. When these specific requirements are met, especially in the area of the school curriculum, the schools are then qualified for government funding. They can now be treated financially and for accreditation purposes as part of the state education system, even though they make decisions about hiring and school policy which might not emanate from the state. In countries like Australia, China, Denmark, Ireland, UK and the US, the burden of financing public secondary schools is on government at federal, state or local government levels. In these countries, schools are run through free education programmes (http://en.wikipedia.org/wiki/State_school).

In most other countries, parents are expected to play significant roles in the educational pursuit of their children through strong financial commitments. The report of recent research reported in [7] reveals the great impact of the commitment of parents to financing the education of their children. It is stressed that people with high quality parental contributions to their educational pursuits are more likely to experience the caring promises of safe, reliable and effective education. Also, pupils with high quality parental influence felt safe and had constructive things to do with their time, such as involvement in high-quality after-school programmes.

According to [8], public expenditure on education is a matter of great concern given that it is weighing very heavily on the exchequer. The need for the institutions to generate their own income was therefore stressed. In addition, government fees-guidelines which stakeholders have to adhere to and the cost sharing system still leave financial gap in some schools. As a way of finding solution to the fiscal distress, schools managers are being advised to mobilize available institutional resources such as land, physical facilities and equipment to generate income to provide the necessary learning resources to enable the schools to run efficiently.

2. Secondary School Education in Nigeria

Secondary school education in Nigeria is in two phases. Students spend three years of Junior Secondary School (JSS) in the first phase and another three years of Senior Secondary School (SSS) in the second phase. The Federal Republic of Nigeria is made up of thirty-six States and the Federal Capital Territory (FCT) with about two Federal Government Colleges (FGCs) in each state. These schools are funded and managed directly by the Federal Government through the Ministry of Education. According to [9], tuition and fees in FGCs are very low, approximately one hundred dollars ($100.00), because funding comes from the Federal Government. State owned secondary schools are funded by each state government and are not comparable to the Federal government colleges. Although education is supposed to be free in the majority of the state owned institutions, students through support from their parents are required to purchase books and uniforms costing them an average of two hundred dollars ($200.00)(Wikipedia, Accessed 29/06/2011).

According to Nigerian Educational Research Development Council (NERDC), among the several yardsticks for determining the overall performance of the secondary school educational system in Nigeria at any level or time is the overall performances of the students in national examinations such as the West Africa Examinations Council (WAEC) and the National Examinations Council of Nigeria (NECO). WAEC was established in 1952 following the acceptance of the Jeffery Report by the then colonial Government(s) in the Gold Coast (now Ghana), Nigeria, Sierra-Leone and the Gambia, who passed appropriate ordinances in their Legislative Assemblies in 1951. The ordinances charged the Council with the responsibility of determining the examinations required in the public interest in West Africa, and empowered it to conduct such examinations and award appropriate certificates (www.khulafau.org, accessed 11/07/2011). Among the last acts of the Abdulsalam Abubakar military administration was the promulgation of a decree, in April 1999, that created NECO. By its mandate, NECO was to take over the responsibilities of the National Board for Educational Measurement (NBEM) which had been created, in 1992, by the Ibrahim Babangida administration, although its enabling decree was promulgated in 1993. However, the conduct of the Senior School Certificate Examinations (SSCE) which had, hitherto, been the exclusive preserve of WAEC was made an additional responsibility of the new examination outfit. NECO was to take exclusive charge of the conduct of the SSCE for school-based candidates while WAEC was to take charge of the same examination for private candidates.

In recent times, students' performances in national examinations in Nigeria have been poor. According to [10], some of the reasons for these poor performances include lack of adherence to acceptable educational practices, low teachers qualifications, poor working environment, non-availability of basic teaching and learning facilities and very high teacher-pupil ratios. Other reasons proposed in [11] include poor school infrastructure due to poor financing, parents' laxity, corruption on the part of the examination bodies, teachers' failure to impact adequate knowledge as well as lack of seriousness or commitment on the part of the students. These reasons further buttressed the claims in [12-14] that the quality of the educational system and its eventual performance at a given time depend on the quality, quantity and devotion of its major stakeholders.

Parents in Nigeria play complementary roles with government through funding towards providing the right environment and

facilities for learning [10,11,15]. They also compliment school management and teachers through effective home monitoring towards ensuring that students yield to what the school system expects from them during and after the school periods. Parents also provide certain requirements and learning aids, which include the following:

a. School uniforms
b. Books and writing materials
c. Transportation
d. Home study or self leaning tools

Similarly, parents need to participate in the following:

a. Parents-Teachers Association's programmes
b. Developmental programmes

When parents exhibit positive attitude towards the provision of these requirements and aids as well as active involvement in the school programmes, it is expected that the students will be better equipped for their studies. It is also expected that the standard of performance of students in national and international examinations would rise. Towards presenting a vivid view of the extent to which parents in Nigeria contribute their quota to secondary school education, a principal components analysis of some basic indices relating to parents' support to the schools was carried out in this research. Models were formulated for the conceptualization of public secondary school system in Nigeria in terms of some indices or variables. The indices served the basis of the determination of the extent to which some factors affected public secondary schools.

3. Model Analysis of Parents' Performance Indices

The degree of which Nigerian parents provide support for the running of secondary school system in Nigeria could be measured by the extent of their contributions in terms of funding and participation in developmental programmes. The following nine (9) indices were formulated and used for the measurement:

a. Provision of school uniforms
b. Provision of books and writing materials
c. Provision of transportation
d. Payment of dues
e. Participation in Parents Teachers Association (PTA) programmes
f. Participation in developmental programmes
g. Provision of study facilities at home
h. Attitude to teachers
i. Attitude to school management

The mathematical model relating these decision variables (indices) to one another for the ith respondent in a general form is formulated as follows:

$$y_n = \sum_{1}^{9} a_{n,m} x_m, \quad m = 1, 2, ..., 9 \qquad (1)$$

where y_n represents the n^{th} respondent, $a_{n,m}$ represents the assessment of the m^{th} variable by n^{th} respondent and x_m represents the m^{th} decision variable. An expressive form of the model is presented as follows:

$$\begin{pmatrix} y_1 \\ y_2 \\ . \\ . \\ . \\ y_m \end{pmatrix} = \begin{pmatrix} a_{1,1}x_1 + a_{1,2}x_2 + a_{1,3}x_3 + ... \ a_{1,9}x_9 \\ a_{2,1}x_1 + a_{2,2}x_2 + a_{2,3}x_3 + ... \ a_{2,9}x_9 \\ . \quad . \quad . \\ . \quad . \\ . \quad . \quad . \\ a_{m,1}x_1 + a_{m,2}x_2 + a_{m,3}x_3 + ... \ a_{m,9}x_9 \end{pmatrix} \qquad ...(2)$$

Based on this model, factor analysis by principal components extracted clusters from the formulated indices. By factor analysis, variability among observed clusters of variables is described in terms of fewer unobserved variables called factors. The observed variables are modeled as linear combinations of the factors. The observed clusters serve as pointers to getting the aggregate percentage contribution of Nigerian parents to public secondary school system. Each cluster also constitutes a factor from which the impact of parents on the secondary school system could be measured based on the selected indices. For the extraction of clusters, the following statistics are generated [16-21]:

a. Descriptive statistics
b. Correlation matrix
c. Bartlett's and Kaiser-Mayer Olkin (KMO) tests
d. Communalities
e. Initial factor loadings
f. Rotated factor loadings
g. Factor score coefficient matrix
h. Eigenvalue

The descriptive statistics define the mean and standard deviation of the scores of each of the decision variable as given by the respondents while the correlation matrix shows the degree of pair-wise relationships of the variables. A positive value in the correlation shows a positive relationship while a negative value dictates a negative relationship. Zero value implies there is no relationship between the variables. The Bartlett's test of sphericity tests the adequacy of the sample from the population. Another adequacy test is the Kaiser-Mayer Olkin (KMO) test. In factor analysis, there is a combination of factors, which is generally referred to as "common factors". Each of the factors loads on some variables. The proportion of the variance of a variable explained by the common factor is the "communality" of the variable.

The factor loading associated with a specific decision variable is the correlations between the factor and the variable's standard scores. Each factor represents an area of generalization that is qualitatively distinct from that represented by another factor. The degree of generalization found between each variable and each factor is the "factor loading". The farther a variable loading is from zero in the positive direction, the more we can conclude the contribution of such variable to a factor. The component matrix is generated and rotated orthogonally by varimax, equamax, quartimax or promax for the purpose of establishing a high correlation between variables and factors. The component score matrix of the factors is generated to evaluate the contribution of a variable to its associative factor while the eigenvalue and percentage variance of the extracted factors are generated for evaluating the contribution of each factor.

4. Data Survey and Collection

Data survey and collection were carried out using the questionnaire approach. The questionnaire shown in Appendix I was designed using the formulated indices. Each performance index was offered loose linguistic representation and range of values as shown in Table 1.

Table 1: Matrix of the Weight Attached to Linguistic value

Linguistic Representation	Excellent	Very Good	Good	Average	Poor
Range of Values	4.01-5.0	3.01-4.0	2.01-3.0	1.01-2.0	0.0-1.0

The first part of the questionnaire provides vital information about each respondent while the second part provides five columns where a respondent can rank each of the nine indices as 'Excellent', 'Very Good', "Good', 'Average' or 'Poor'. The questionnaire was administered to four hundred and eighty three (483) public secondary schools selected across the six geo-political zones of Nigeria. Ten (10) staff (including principal, vice-principals and teachers) and fifty (50) students were surveyed in each secondary school. The summary of the number of questionnaires that were duly completed and returned across the thirty-six states and the FCT is presented in Table 2.

A total of twenty eight thousand nine hundred and eighty (28980) copies of the questionnaire were administered through direct and online contacts. In the direct contact, the researchers were physically present in three hundred and forty one (341) of the surveyed schools. With a view to cut the cost associated with transportation over long distances, copies of the questionnaire where administered through third parties in the remaining one hundred and forty two (142) schools. The third parties received copies of the questionnaire through online (internet) service. Duly completed and returned questionnaires were sent back to the researchers through postal service. In all, twenty six thousand, one hundred and twenty four (26124) respondents (which include both staff and students) returned duly completed questionnaires from the surveyed schools.

5. Results and Interpretations

Factor analysis by principal components was performed with SPSS on the raw (collected) data using the formulated model of Equation 1. The descriptive statistics of the raw data is shown in Table 3.

Table 3 presents the means and standard deviation of the rating of the performance of public secondary schools on each of the indices by the respondents. For example, the mean and standard deviation of the rating on 'provision of school uniform (UNI)' are 3.4571 (69.14%) and 0.9185 respectively while the mean and standard deviation of the rating on 'provision of books and writing materials (BMW)' are 2.6000 (52.00%) and 1.0059 respectively.

These mean values reveal that on the average, the respondents rated the parents to have rendered 'very good' and 'good' support for provision of school uniform and provision of books and writing materials respectively. This interpretation is based on the matrix of the weight attached to the linguistic values presented in Table 1. Similarly, standard deviation of 0.9185 and 1.0059 represent the statistical measure of dispersion from the mean for the response values for provision of school uniform and provision of books and writing materials respectively. Table 4 presents the analysis of the correlation matrix of variables. It is shown in Table 4 that the highest correlation of 0.766 exists between 'attitude to teachers (ATE)' and 'attitude to school management (ASM)'. The next highest correlation of 0.677 exists between 'provision of study facilities at home (SFH)' and 'provision of books and writing materials (BMW)'. The implication of the former is that 'attitude to teachers' is very likely to same factor with 'attitude to school management'. Similarly, in the later, 'provision of study facilities at home (SFH)' is very likely to share same factor with 'provision of books and writing materials (BMW)'. The least correlation of -.036 exists between 'attitude to school management (ASM)' and 'provision of school uniform (UNI)'. This means that 'attitude to school management' and 'provision of school uniform' are not likely to share same factor.

In factor analysis by principal components, the Bartlett's test of sphericity is used to confirm the adequacy of the sample population by testing the null hypothesis that the variables in the population correlation matrix are uncorrelated and inadequate. The observed significance level of .0000 is used to reject this hypothesis. For this analysis, the Bartlett's test of sphericity produces a χ^2 of 154.411 with a significance level of 0.0000, which indicates that the sample population is adequate. Another adequacy test is the KMO test. It is used to confirm if the sampling adequacy value is greater than 0.5 for a satisfactory factor analysis to proceeds.

Table 2: Summary of the survey across the geo-political zones

Zone	State	No of Schools Surveyed	Total Questionnaire Retuned by staff	Total Questionnaire Returned by students	Total Returned	Total not returned
North East	Adamawa	10	87	423	510	90
	Bauchi	10	100	456	556	44
	Borno	10	98	444	542	58
	Gombe	10	75	359	434	166
	Taraba	10	89	459	548	52
	Yobe	10	100	465	565	35
North West	Kaduna	12	104	567	671	49
	Katsina	11	98	445	543	117
	Kano	13	119	529	648	132
	Kebbi	18	159	749	908	172

	Sokoto	17	159	741	900	120
	Jigawa	15	150	721	871	29
	Zamfara	10	71	458	529	71
North Central	Benue	12	113	528	641	79
	Kogi	12	115	547	662	58
	Kwara	12	95	534	629	91
	Nasarawa	19	188	842	1030	110
	Niger	18	162	835	997	83
	Plateau	10	93	436	529	71
	FCT	15	139	728	867	33
South East	Anambra	10	100	445	545	55
	Enugu	11	90	527	617	43
	Imo	18	164	835	999	81
	Abia	11	105	543	648	12
	Ebonyi	12	93	542	635	85
South South	Akwa Ibom	13	111	432	543	237
	Bayelsa	12	97	552	649	71
	Cross River	12	112	536	648	72
	Edo	12	99	542	641	79
	Delta	12	109	535	644	76
	Rivers	12	111	579	690	30
South West	Ekiti	14	131	651	782	58
	Lagos	17	127	823	950	70
	Ogun	14	121	697	818	22
	Ondo	20	176	991	1167	33
	Osun	14	131	676	807	33
	Oyo	15	140	621	761	139
	Total	483	4331	21793	26124	2856

The KMO test produces a measure of 0.753, which further confirms the adequacy of the sample population. These adequacy results are good indicators of the suitability of the application of factor analysis as well.

The communalities of the decision variables are presented in Table 5. The Table shows that the communalities of 'provision of school uniform (UNI)' and 'provision of books and writing materials (BMW)' are 0.771 and 0.874 respectively. These imply that 77.1% of the variance in 'provision of school uniform' can be explained by the extracted factors while the remaining 22.9% is attributed to extraneous factors. Similarly, 87.4% of the variance in 'provision of books and writing materials' can be explained by the extracted factors, while the remaining 12.6% is attributed to extraneous factors.

Table 3: Descriptive Statistics of Raw Scores

Variables	Mean	Std. Deviation
UNI	3.4571	0.9185
BWM	2.6000	1.0059
TRA	2.4286	0.8840
PDU	3.0286	0.7554
PTA	3.2286	0.9727
DEV	2.9429	0.7648
SFH	2.1471	0.9255
ATE	3.3429	0.8382
ASM	3.5714	0.7391

Table 4: Correlation Matrix of Variables

Variable	UNI	BMW	TRA	PDU	PTA	DEV	SFH	ATE	ASM
UNI	1.000	.615	.352	.105	.247	.105	.381	-0.088	-.036
BMW	.615	1.000	.642	.501	.461	.259	.677	.349	.330
TRA	.352	.642	1.000	.555	.468	.431	.395	.136	.362
PDU	.105	.501	.555	1.000	.569	.603	.405	.477	.584
PTA	.247	.461	.468	.569	1.000	.536	.293	.441	.508
DEV	.105	.259	.431	.603	.536	1.000	.222	.299	.516
SFH	.381	.677	.395	.405	.293	.222	1.000	.511	.399
ATE	-.088	.349	.136	.477	.441	.299	.511	1.000	.766
ASM	-.036	.330	.362	.584	.508	.516	.399	.766	1.000

Table 5: Communalities of Variables

Variable	Initial	Extraction
UNI	1.000	.771
BMW	1.000	.874
TRA	1.000	.703
PDU	1.000	.729
PTA	1.000	.632
DEV	1.000	.743
SFH	1.000	.806
ATE	1.000	.913
ASM	1.000	.818

There are two methods for the initial factor extractions. In the first method, the number of factors to be extracted is predetermined while in the second method, the number of factors to be extracted is based on the Social Science rule. The rule states that only variables with loadings equal to or greater than 0.4 should be considered meaningful and extracted for factor analysis [16, 21]. Applying the Social Science rule on the initial component matrix generated, the extracted factor loadings obtained is presented in Table 6.

The following emerge from Table 6:
a. Three factors were extracted,
b. Eight variables load on factor 1,
c. Four variables load on factor 2, and
d. Three variables load on factor 3

In order to obtain meaningful representation of variables and factor mapping along principal axis, the resulted principal component is rotated by orthogonal transformation by varimax, promax, equamax and quartimax. However, the result obtained from the rotation by promax presented in Table 7 appears to be most realistic and meaningful for interpretation among all others.

As shown in Table 7, the three factors with their corresponding loadings are as follows:

Factor 1- Support for school development, loads on
a. Participation in developmental programmes (DEV)
b. Provision of transport (TRA)
c. Participation in PTA programmes (PTA)
d. Payment of dues (PDU)

Table 6: Extracted Initial Factor Loadings

Variable	Component		
	1	2	3
UNI		.795	
BMW	.768	.504	
TRA	.705		
PDU	.804		
PTA	.743		
DEV	.653		-.502
SFH	.685		.524
ATE	.653	-.488	.498
ASM	.743	-.493	

Table 7: Extracted Factor Loadings by Promax

Variable	Component		
	1	2	3
DEV	.917		
TRA	.745		
PTA	.658		
PDU	.643		
ATE		.998	
ASM		.731	
UNI			.910
BWM			.822
SFH			.661

Factor 2 - Relationship with teachers and school management, loads on
a. Attitude to teachers (ATE)
b. Attitude to school management (ASM)

Factor 3 - Support for students' academic development, loads on
a. Provision of school uniform (UNI)
b. Provision of books and writing materials (BWM)
c. Provision of study facilities at home (SFH)

The results placed high premium on the financial commitment of parents towards the development of schools and students. This corroborated the position held in [7] that parents need to be greatly committed to financing the educational development of their children. The adequate financial support of parents to the school and students will complement government efforts and help to provide enabling study environment and facilities. It will also help to cater for the staff welfare. The results also emphasized the importance of good relationship with the school officers. This also corroborated the view presented in [1] that parents need to maintain good relationship with other stakeholders for the predefined goals for secondary school system to be attained. The existence of sound and smooth relationship between parents and the school officers will bankroll a positive attitude on major issues. This will lead to effective communication and cooperation on matters affecting the school and the students. This will in turn leads to achieving the preset goals including good performance of students in academic works.

Factor score generated by SPSS for the research variables produced a coefficient matrix shown in Table 8.

Table 8: Factors Scores Coefficient Matrix

	Component		
	1	2	3
UNI	.087	.486	.007
BMW	.179	.308	.166
TRA	.164	.190	-.312
PDU	.187	-.115	-.205
PTA	.173	-.059	-.254
DEV	.152	-.156	-.476
SFH	.159	.153	.497
ATE	.152	-.296	.473
ASM	.173	-.302	.142

The coefficient matrix is used for the estimation of the contribution of parents from the view of each respondent to each of the extracted factors. This is done by forming a linear equation of the weighted standard scores of each respondent on the variables as follows:

$$M_{b,c} = \sum_{m=1}^{9} d_{a,c} W_{b,a} \quad b = 1, 2, ..., x; \; m = 1, 2 \qquad (3)$$

where $M_{b,c}$ represents the contribution of b^{th} Respondent to c^{th} factor, $d_{a,c}$ represents the factor score coefficient of a^{th} performance index for c^{th} factor, $W_{b,a}$ represents the standard score of b^{th} Respondent for a^{th} performance index and x represents the population of the sampled Respondents. $W_{b,a}$ is estimated from:

$$W_{b,a} = X + Y \qquad (4)$$

$$Y = \frac{(S_b - T_b)}{u_b} \qquad (5)$$

where X represents the allowable minimum raw score for the performance index; in this instance, it is 1; S_b represents the raw score of bth performance index; Tb represents the mean of the raw scores of b^{th} performance index by the sampled Respondents; u_b represents the standard deviation of the raw scores of b^{th} performance index by the sampled Respondents.

For the estimation of the contributions of parents from the view of each respondent to each of the extracted factors, a linear equation of the weighted standard scores of each respondent on the variables is formulated. Given that the standard scores by the b^{th} respondent in the nine variables under consideration are:

$$S_{i,1}, \; S_{i,2}, \; ..., \; S_{i,9}$$

then the contributions of parents based on the view of each respondent to support for school development, relationship with staff and management as well as support for students academic development are denoted by C_1, C_2 and C_3 respectively and defined by:

$$C_1 = 0.087S_{i,1} + 0.179S_{i,2} + \ldots + 0.173S_{i,9} \qquad (6)$$
$$C_2 = 0.486S_{i,1} + 0.308S_{i,2} + \ldots + -0.302S_{i,9} \qquad (7)$$
$$C_3 = 0.007S_{i,1} + 0.166S_{i,2} + \ldots + 0.142S_{i,9} \qquad (8)$$

Based on the matrix presented in Table 1, the standard scores by eight randomly selected respondents to each of the nine variables under consideration are presented in Table 9.

Table 9: Standard scores by eight sample respondents

Respondent	UNI	BMW	TRA	PDU	PTA	DEV	SFH	ATE	ASM
ResA	4	3	5	4	2	1	2	5	3
ResB	2	5	4	3	2	3	4	3	2
ResC	2	3	4	3	2	1	4	3	2
ResD	4	3	5	1	3	2	4	3	2
ResE	4	3	2	3	4	5	5	3	4
ResF	3	5	2	4	5	2	4	2	4
ResG	3	5	5	4	3	2	1	3	4
ResH	1	1	1	4	4	2	5	5	2

The results obtained from the use of Equations 6 to 8 to calculate the percentage contributions of each of the eight sampled respondents to each of the three extracted factors based on the scores shown in Table 9 are presented in Table 10. From Table 10, it is shown that the sampled respondent with identity ResE has the highest contributions of 5.169 (14.27%) to 'support for school development' while respondent ResD has the highest contribution of 2.334 (23.26%) to 'relationship with teachers and management'. Similarly, respondent ResH has the highest contribution of 2.207 (28.32%) to 'support for academic performance of students'.

Table 10: Aggregate Factor Scores with Percentage Contributions

	Factor Score	% Contribution	Factor Score	% Contribution	Factor Score	% Contribution
ResA	4.548	12.56	1.004	10.01	0.947	12.15
ResB	4.526	12.5	1.461	14.56	0.736	9.44
ResC	3.864	10.67	1.157	11.53	1.356	17.4
ResD	4.153	11.46	2.334	23.26	0.738	9.47
ResE	5.169	14.27	0.556	5.54	0.363	4.66
ResF	5.033	13.89	1.123	11.19	0.687	8.82
ResG	4.854	13.4	1.056	10.53	0.759	9.74
ResH	4.075	11.25	1.343	13.38	2.207	28.32
Total	36.222	100.00	10.034	100.00	7.793	100.00

In a bid to evaluate the percentage aggregate contributions of Nigerian parents to the overall performance of public secondary schools, the eigenvalues and percentage variance of each factor are generated. The eigenvalues represent the sums of squares of factor loadings and they indicate how well each of the extracted factors fits the data from the sample. The percentage contribution of Nigerian parents denoted by PC and based on each factor to the overall performance of public secondary schools is defined by:

$$PC = \frac{A}{N} * 100 \qquad (9)$$

$$A = \sum_{p=1}^{9} L_{s,t}^{2} \; ; \; s = 1, 2, \; \ldots., \; 9; \; t = 1, 2, 3 \qquad (10)$$

where N is the number of performance indices, A is the eigenvalues and $L_{s,t}$ represents the loading of t^{th} factor on s^{th} performance index.

Table 11 also presents the eigenvalues (total contribution), percentage contributions and cumulative percentage contributions of the three factors. Thus, parents through the three factors contribute a total of 77.66% to public secondary school system in Nigeria according to the view of the respondents. A highest contribution of 34.37% is from Factor 1 described as 'Support for school development'. This substantial contribution indicates that Nigerian parents show appreciable level of commitment to schools development and PTA programmes. They are also committed to payment of dues and putting in place a reliable transportation system for the students. This contribution equally reveals that presently, the secondary school system in Nigeria may not perform optimally without support from the parents. Factor 2 described as 'Relationship with staff and students' made a contribution of 23.85%. This emphasized the importance of goods relationship between parents and the other stakeholders as panacea for the success of the secondary school system. Factor 3 named 'Support for students' academic development' contributes 19.75% out of 77.66%.

This equally shows the importance of the active participation of parents in the academic development of the students. It is observed that the contribution of this factor is less compared to other factors. This is because in Nigeria, government, religious bodies and Non-Governmental Organizations (NGO) majorly finance the provision of some of the basic needs of students including books, furniture and kits. This leaves less burden on the parents.

Table 11: Percentage Contributions of Factors

Component	Rotation Sum of Squared Loadings		
	Total	% Contribution	Cumulative %
Factor 1	3.093	34.372	34.372
Factor 2	2.147	23.854	58.226
Factor 3	1.749	19.438	77.663

The remaining 22.34% is considered as the expected contributions of some extraneous factors that are important but their related performance indices were not considered in the research. Such extraneous factors include but not limited to literacy level, government policies, custom and tradition. The following are typical performances indices that were not considered:

a. Parent support for staff training
b. Parent support for staff recruitment
c. Parents' approval of the school curriculum
d. Parents' approval of government policies on the school system
e. Parents' attitude to good morals and discipline
f. Impact of custom and tradition of parents on the school

6. Conclusion

Public secondary schools in Nigeria have continued to witness unimpressive performance of students in both internal and external examinations. One of the reasons attributed to this is the not too impressive financing of the different levels of the education by successive government or administration. As a results of this, most public schools in Nigeria lack conducive environments, modern structure classrooms and teaching aids. Another reason is the shortage of qualified teachers in most schools. A good number of the available teachers are non-professionals who lack basic teaching skills because they were not trained to teach pupils or students in primary or secondary schools. The inability of this category of teachers to secure gainful employment in other places where their professional skills are required often made them to result to teaching as alternative employment. Another reason for the poor performance is that large numbers of parents have not contributed enough support for the educational need of their children.

Factor analysis by principal components has been used for the evaluation of the contributions of parent to secondary schools in Nigeria. Three factors were extracted and each of them loaded on some related performance indices. The initial component matrix generated was subjected to orthogonal transformation with a view to discover reasonable factorization of the performance indices. Factor score coefficient matrix was also generated to serve as basis for determining the degree or extent of soundness of the assessment of every respondent. The eigenvalue of each factor was calculated and used for the evaluation of the percentage contribution of parents to the schools. The percentage contribution of the three extracted factors was less than 100. This shows that the related performance indices of some extraneous (latent) factors that play significant roles where left out in the administered questionnaire. The results obtained placed high premium on the active financial support of parents for school and academic development. This corroborated the positions held in [3-5] that parents and other stakeholders of secondary schools must be financially committed for the schools to show appreciable development and attainment of set goals. The results also emphasized the importance of sound relationship with teachers and school management as bedrock for the academic excellence of the students. This also corroborated the conclusion drawn in [8] that every stakeholder of public secondary schools need to display good and mutual relationship with others for joint expenditure and collective participation where necessary.

For the improvement of these results, active, adequate and continuous funding and monitoring of secondary school by parents is presently important.

In principle, government, corporate organizations and parents in Nigeria should put resources together to adequately finance the secondary school system. The above enumerated reasons for the poor performance of students should also be jointly addressed. A very strong monitoring, control and policing system could be put in place to ensure that the system performs optimally. When these are vigorously pursued, students will continue to experience the caring promise of safe, reliable and effective education as claimed in [7]. They will also have constructive things to do with their time, such as involvement in high-quality after-school programmes. These benefits will help them to grow in terms of learning and greater development of the schools. The focus of the future research is to increase the number of the performance indices so as to extract more factors and perhaps increasing the contributions of the factors extracted in this work.

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