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SYSTEM ANALYSIS IN EDUCATION: IMPLICATIONS FOR INSTTITUTIONAL EVALUATION IN NIGERIA

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ABSTRACT

This study investigated the implications of system analysis in education for institutional evaluation in Nigeria. It adopted the qualitative techniques, using the secondary data from multiple sources. An in-dept analysis of educational statistics was conducted, using the educational planning methodologies and accreditation approaches of the National Universities Commission, Abuja, Nigeria. The study established that system analysis is also a veritable tool for institutional evaluation, which involves carrying out a comprehensive investigation into the performance of an educational institution. It could be done at institutional, district, regional and national levels. National accreditation authorities also conduct regular system analysis on the basis of programmmes. This will stimulate and even compel managements of educational institutions to address the inadequacy and lopsidedness in the distribution of educational resources for the different programmes in such institutions.

Introduction

There is a worldwide emphasis on the analysis and evaluation of the educational system of each country. The United Nations Children's Fund, which was formerly 'United Nations International Children's Emergency Fund' (UNICEF) initiates the Education Sector Analysis (ESA) of selected countries periodically (UNICEF, 2014, 2021 & 2023). The question that comes to mind is: Why do UNICEF and nations have to devote huge resources to the ESA programmes? It is to correct the lopsidedness in education provision that may arise from time to time. Persistent system inefficiencies, ill-health, death, breakdown and wearing out of capital equipment and infrastructures, lack of transparency in the management and utilisation of educational resources and imbalance in the distribution of these resources often lead to institutional failures. These limiting factors are often recorded in relation to equity, gender inequality and accountability, thus necessitating periodic system analysis (Fabunmi, 2005). Moreover, it is

understood that there is no perfect educational system anywhere in the world, hence the need for periodic system analysis, entailing diagnosis of education systems in every country.

System analysis involves carrying out a comprehensive diagnosis and investigation into the performance of an education system (Fabunmi, 2005). It could be done at different levels, that is, institutional, district, regional and national levels. National accreditation authorities also conduct system analysis on the basis of programmmes of a particular university at a specific period. System analysis entails the use of qualitative and quantitative techniques for data generation; and planning methodologies and statistical methods for data analysis and interpretation. The usual data collection tools include: checklist, observation schedule, interview guide, assessment scale, focus group discussion schedule and questionnaire (Adeleke, 2009). The structure of the ESA report will depend on the terms of reference for the exercise.

A system refers to series of interrelated and interdependent parts (or sub-structure) in which the interactions of the parts affect the whole system (Fabunmi, 2005).

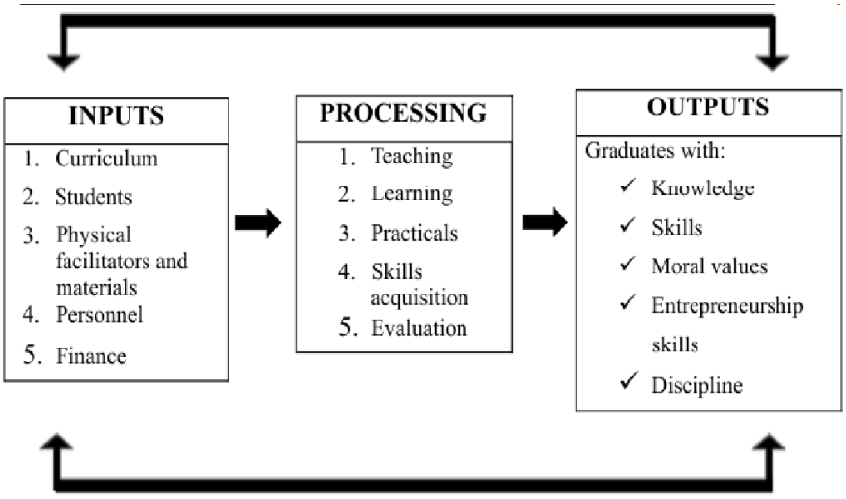


Figure: System Model in Education

The education sector constitutes a system, which can be broken down into sub-systems. The national education system could be broken down into sub-systems on the basis of the levels of education,

regional education systems, district education systems, institutional or school systems, etc. Two forms of system analysis are often done in educational planning: qualitative system analysis and quantitative system analysis.

Levels of Education

The National Policy on Education (NPE) published by the Federal Republic of Nigeria (FRN) identified four levels of education. The levels of education that exist in most countries are:

a) Pre-primary education is the form of education which an educational institution gives to children between ages 3 to 5 plus prior to their entering the primary school. The purpose of pre-primary education should be:

1. effecting a smooth transition from the home to the school;
2. preparing the child for the primary level of education:
3. providing adequate care and supervision for the children while their parents are at work (on the farms, in the markets, offices, etc.);
4. inculcating social norms;
5. inculcating in the child the spirit of enquiry and creativity through the exploration of nature and the local environment, playing with toys, artistic and musical activities, etc.;
6. teaching co-operation and team spirit;
7. teaching the rudiments of numbers, letters, colours, shapes, forms, etc through play; and
8. teaching good habits, especially good health habits. (FRN, 2013).

This form of education is usually left in the hands of private individuals and organisations in some countries. In Ghana, the government funds this level of education. The quality control measures are often taken by the State and Federal Ministries of Education.

b) Primary education: Primary education is the form of education provided in an institution for children between the ages of 6 and 11. Since the rest of the education system is built upon it, the primary level is the key to the success or failure of the whole system. The general objectives of primary education are:

a. the inculcation of permanent literacy and numeracy, and the ability to communicate effectively;
b. the laying of a sound basis for scientific and reflective thinking;
c. citizenship education as a basis for effective participation in and contribution to the life of the society;

d. character and moral training and the development of sound 'attitudes;
e. developing in the child the ability to adapt to his changing environment;
f. giving the child opportunities for developing manipulative skills that will enable them to function effectively in the society within the limits of their capacity;
g. providing basic tools for further educational advancement, including preparation for trades and crafts of the locality (FRN, 2013).

c) Secondary education is the form of education which children receive after primary education and before the tertiary stage. The broad aims of secondary education within our overall national objectives should be the preparation of young children for useful social living and for higher education.

In specific terms *the secondary school should:*

i. provide an increasing number of primary school pupils with the opportunity for education of a higher quality, irrespective of sex, social, religious, or ethnic backgrounds;
ii. diversify its curriculum to cater for the differences in talents, opportunities and roles possessed by or open to students after their secondary school course;
iii. equip students to live effectively in our modem age of science and technology,
iv. develop and project culture, art and language as well as the world's cultural heritage;
v. raise a generation of people who exercise independent thinking, respect the views and feelings of others, respect the dignity of labour, and appreciate those values specified in their broad national aims, and live as good citizens;
vi. foster unity with an emphasis on the commonalities that unite us in our diversity;
vii. inspire its students with a desire for achievement and self-improvement both at school and in later life (NP F, 1998).

d) Tertiary/Higher Education covers the post-secondary section of the national education system which is provided in Universities, Polytechnics and Colleges of Technology, including such courses that are offered by the Colleges of Education, the Advanced Teacher Training Colleges, Correspondence Colleges and such institutions; as may be allied to them. The teaching and research functions of the higher educational institutions play an important role in national development, particularly in the

provision of high-level manpower. The aims of higher education are:

1. the acquisition, development and inculcation of the proper value-orientation for the survival of the individual and society;
2. the development of the intellectual capacities of individuals to understand and appreciate their environments;
3. the acquisition of both physical and intellectual skills which will enable individuals to develop into useful members of the community;
4. the acquisition of an objective view of the local and external environment (FRN, 2013).

Higher educational institutions are expected to pursue these goals through:

a. Teaching;
b. Research;
c. The dissemination of existing and new information;
d. The pursuit of service to the community; and
e. Being a storehouse of knowledge

Types of System Analysis

There are two broad types of system analysis in education. These are: qualitative system analysis and quantitative system analysis. Qualitative system analysis is an in-dept reflection or consideration of the aims and objectives of education, and the extent to which the education system (s) meet (s) up the stated aims and objectives (Fabunmi, 2005).

In educational planning, quantitative techniques are also used to determine the extent to which the educational system is functioning well or meet up the aims and objectives (Fabunmi, 2005). The government authorities invest huge amounts of money in schools, hence the necessity to analyse how well those schools are functioning. Two types of analyses are possible. These are (a) inter-level flow analysis (b) intra- level flow analysis. The following student flow rates form the basis for this analysis, (i) Entry rates (ii) Promotion rates (iii) Repetition rates; iv) Drop-out rates (v) Wastage rates and (vi) Transition rates (Fabunmi, 2005). Two of these, that is, entry rates and transition rates will be discussed under inter-level flow analysis, while the remaining four will be discussed under intra-system flow analysis.

Diagnosis of the Schooling Situation

The Management diagnoses the conditions under which students learn in schools under them for the following reasons:

1. Such diagnoses reveal the learning situation of such schools, and form

the basis for decision making. When the situation is worse, there is a need to rectify it.

2. Such diagnoses will yield some educational statistics which are very useful while projecting and planning for the future.
3. The statistics generated from such diagnoses are useful for local and international comparison of educational, systems. Enrolment, staffing and school plant situations are regularly diagnosed so as to ensure quality in the school system (Fabunmi, 2005).

Domains of Analysis

UNICEF (2023) identified the following domains for the 2023 Education System Analysis in Ghana:

a) ***Education Opportunities:*** In this domain, consideration is given to gender party index on enrolment, transition and completion rates from pre-primary through to tertiary education. The issue of out of school children, non-attendance and the ages and stages girls and boys drop out; learning outcomes; socioeconomic issues and other exigencies are to be examined.

b) ***Gender norms, values and attitudes:*** This domain entails considering the overall gender context, traditional norms, values and attitudes which have an impact on the educational opportunities and outcomes for girls and boys.

c) ***Institutions, laws and policies:*** The domain deals with the evidence of legal and political commitment to gender equality and equal education in the country (constitution, planning frameworks, local statutes); accountability and monitoring processes; institutional capacity to deliver on gender-focused policies and strategies; and also, government spending on gender.

d) ***Resource distribution (human and material):*** This domain tries to better understand the systemic issues affecting girl's and boys' education, including a gendered analysis of the learning environment, the teaching workforce, and education leadership and management.

e) ***Teaching and learning practices:*** The domain is expected to consider gender biases and stereotypes at all levels as well as subject choice at JHS and SHS and tertiary levels; and the extent *to which the curriculum and pedagogy are gender-responsive.*

Indicators for Analysis

The usual indicators for system analysis include the following:

i. ***Gender representation:*** Gender is often measured by two indicators: gender parity, that is, Female-Male enrolment (or staff) ratio; and the percentages of male and female students or staff.

ii. ***Literacy rate:*** This refers to the proportion of the population that can read and write. It is often measured in percentages.

iii. ***Gender parity:*** This refers to the ratio of females to males, e.g., 1:3. It is otherwise referred to as sex ratio. However, scholars often avoid using the word sex where possible.

iv. ***Average class size:*** It is the number of students that will be in a class if the school population is divided by the number of available furnished classes being used.

v. ***Average school size:*** This refers to the mean of the enrolment figures of schools at a particular level of education in a specific education district, state, region or country.

vi. ***Teacher class ratio:*** This refers to the ratio of teachers to the available classes, that is, number of teachers per class.

vii. ***Student-Teacher Ratio (STR):*** It is the number of students that will be assigned to a teacher if all the students in the school are shared equally among the teachers in the school.

viii. ***Enrolment Growth Rate:*** This the rate at which students' enrolment grows in a particular class, school, district, state or region.

ix. ***Enrolment Grade Ratio:*** This is otherwise referred to as progression ratio. It is the proportion of students in a grade that are able to progress to the next grade. It is just like enrolment growth rate, but it is grade specific.

x. ***Entry rate:*** The entry rate refers to the proportion of the school-age population that are enrolled in the education system. It is usually measured in percentages.

xi. ***Transition rate:*** The transition rate refers to the proportion of the learners that graduate from a specific level of education in a particular school year that got enrolled in the next level of education in the succeeding school year. It is usually measured in percentages.

xii. ***Promotion rate:*** The promotion rate refers to the proportion of learners in a grade in a specific education system that got promoted to the next grade in a particular school year. It is usually measured in percentages.

xiii. ***Repetition rate:*** The repetition rate refers to the proportion of learners in a grade in a specific education system that have to repeat their grades (or stay for another year longer) in a particular school year. It is usually measured in percentages.

xiv. ***Dropout rate:*** The dropout rate refers to the proportion of learners that dropout in a grade in a specific education system in a particular school year on account of academic inability, economic constraints, ill-health or death. It is usually measured in percentages.

xv. ***Wastage rate:*** Wastage rate refers to the degree of inefficiency of an educational system. In every school, some students fail to pass to the next grade, while a few drop out of the school system on account of the following reasons: financial constraints, transfer, death and academic inability. Repetition and dropout are elements of wastages or inefficiency in the school system. The flow rates (promotion, repetition and dropout rates) are good measures for wastages and efficiency. In order to measure the wastage rate, the cohort analysis can be used (Fabunmi, 2005). It is usually measured as coefficients.

xvi. ***Internal efficiency:*** Internal efficiency refers to the extent to which a school or education system uses minimal input of student years to produce maximum output (i.e. graduates). Repetition, dropout and wastage rates are indicators of inefficiency. Internal efficiency is usually measured as coefficients.

xvii. ***External efficiency:*** External efficiency refers to the extent to which the educational system meets up the broad social, economic, cultural and political objectives of the community. It could also be measured by looking at the post-graduation performance of the products of an education system in the labour market relative to the investment in their education. This may be very difficult to measure.

Analytical Framework

The planning methodologies that are usually adopted are discussed in this section. The analytical framework to be used include making comparisons of the following rates on the basis of gender; equity or social inclusiveness; rural-urban locations; and education districts, states or regions. The selected indicators could be measured in the following ways:

1) ***Gender or Female Representation:*** The female enrolment rate is used to measure gender representation in terms of the percentage of females to the entire population, using the formulae below:

$$GR = \frac{F_t^i}{E_t^i} \times \frac{100}{1}$$

Where: GR means Gender Representation;

F_t^i = number of females; and

E_t^i = total enrolment (males and females).

Illustration

Table 1 below illustrates gender parity at the Cape Coast Technical Institute, using hypothetical 2021 -2023 enrolment data.

Table 1: Hypothetical Gender Representation

S/N	Year	Gross Enrolment	Female Enrolment	Female Enrolment Rate (%)	GPI
1	2021	180	72	40	72/102=0.67
2	2022	200	104	52	
3	2023	240	144	60	

Computation Technique

Given,

$$GR = \frac{F_t^i}{E_t^i} \times \frac{100}{1}$$

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.12 (2), May-August, 2024 https://ajemates.org

In this case, $F_t^i = 72$; and $L_t^i = 180$
Therefore, $GR = \frac{72}{180} \times \frac{100}{1} = 40\%$

2) ***Literacy Rate:*** The percentage of the population that can read and write is used for the analysis. It may be expressed mathematically as:

$$LR = \frac{L_t^i}{P_t^i} \times \frac{100}{1}$$

Where LR means Literacy Rate; L_t^i = number of literates in the gross population; and P_t^i = the gross population.
Illustration

Table 2: below illustrates the literacy of the world, using hypothetical census data.

Table 2: Hypothetical Literacy Rates of the World

S/N	Continent	Population (in m)	Literates (in m)	Literacy Rates (%)
1	Africa	1,410	606.3	43
2	Antarctica	-	-	-
3	Asia	4,708	2,354.0	50
	Central America	178	80.1	45
4	Europe	744	312.48	42
5	North America	375	150.0	40
6	Oceania	44	15.84	36
7	South America	435	165.3	38

Computation Technique
Given,

$$LR = \frac{L_t^i}{P_t^i} \times \frac{100}{1}$$

In the hypothetical data above, L_t^i = 606.3 m.; and = P_t^i 1,410 m.

Therefore, $LR = \frac{606,300,000}{1,410,000,000} \times \frac{100}{1} = 43\%$

3) ***Gender Parity/Sex Ratio:*** It is measured in terms of the number of the females to every 100 males in the entire population; hence it is referred to as sex ratio. Mathematically, it could be expressed as:

$$GP = \frac{F_t^i}{M_t^i} \times \frac{100}{1}$$

Where GP means Gender Parity; F_t^i = number of females; and M_t^i = number of males in the grade or school.

Illustration

Table 3: below illustrates Gender Parity at Abura Senior High School, using hypothetical enrolment data.

Table 3: Gender Parity

S/N	Year	Enrolment		
		Male	Female	*GP*
1	2020/2021	600	570	95:100
2	2021/2022	580	522	90:100
3	2022/2023	570	456	80:100

Computation Technique
Given,

$$GP = \frac{F_t^i}{M_t^i} \times \frac{100}{1}$$

In the year 2020/2021, $F_t^i = 570$; and $M_t^i = 600$.

Therefore, $GP = \frac{560}{600} \times \frac{100}{1} = 95\%$, i.e., 95:100

4) ***Average Class Size:*** It is measured by dividing the school population by the number of furnished classrooms that are in the school. It could be expressed as:

$$ACS = E_t^i \div C_t^i$$

Where ACS means Average Class Size; E_t^i = total enrolment of the school or region; and C_t^i =numbers of furnished classes being used.

Illustration

Table 4 below illustrates the average class size of the Comprehensive Senior High School, Ekpedo, using hypothetical 2022 /2023 enrolment data.

Table 4: Average Class Size

S/N	Grade	No of classrooms	Enrolment	ACS
1	SS 1	5	250	50
2	SS 2	4	192	48
3	SS 3	3	108	36

Computation Technique

Given,

$$ACS = E_t^i \div C_t^i$$

In this instant case, for SS 1: $E_t^i = 250$; and $C_t^i = 5$.

Therefore, $ACS = \frac{250}{5} = 50$

5) ***Average School Size:*** Here, the gross enrolment of the district, state, region or country is divided by the number of schools in the area. Mathematically, it could be expressed as:

$$ASS = GE_t^i \div S_t^i$$

Where ASS means Average School Size; GE_t^i = gross enrolment; and S_t^i = number of schools in the district, state, region or country.

Illustration
Table 1 below illustrates the average school size by selected regions in Ghana, using 2020 /2021 Junior High School enrolment data.

Table 5: Average School Size

S/N	Regions	No of Schools	Enrolment	ASS
1	Ahafo	446	37,832	85
2	Ashanti	3187	351,168	110
3	Bono	784	73,075	93
4	Bono East	446	62,002	139

Source: The Education Management Information System (EMIS) – 2020 / 2021 Education Profile.

Computation Technique
Given,

$$ASS = GE_t^i \div S_t^i$$

In the case above, for Ahafo Region, $GE_t^i = 37{,}832$; and $S_t^i = 446$.

Therefore, $ASS = \frac{37,832}{446} = 85$

6) ***Teacher Class Ratio:*** It is obtained by dividing the number of teachers in the school or area by the number of furnished classrooms that are available. It could be expressed as:

$$TCS = T_t^i \div C_t^i$$

Where TCS means Teacher Class Size;

T_t^i = number of teachers; and

C_t^i = number of furnished classrooms being used.

Illustration

Table 1 below illustrates the teacher class size, using hypothetical 2022 / 2023 enrolment data selected Junior Secondary Schools in Akoko-Edo Local Government Area of Edo State in Nigeria.

Table 6: Teacher Class Ratio

S/N	Schools	No of classrooms	No of teachers	TCS
1	St. Pauls JSS, Igarra	36	45	1.25
2	Okpameri JSS, Ibillo	34	51	1.50
3	Alloysus JSS, Ososo	28	35	1.25
4	Comprehensive	32	40	1.

JSS, Ekpedo	2 5

Computation Technique
Given,

$$TCS = T_t^i \div C_t^i$$

In the hypothetical 2022 / 2023 enrolment data above,

$T_t^i = 45$; and $C_t^i = 36$.

Therefore, $TCS = \frac{45}{36} = 1.25$

7) ***Students-Teacher Ratio:*** Here, the student population is divided by the number of teachers available in the school or geographical area. Mathematically, it could be expressed as:

$$STR = E_t^i \div T_t^i$$

Where STR means Students-Teacher Ratio;

E_t^i = students' enrolment; and

T_t^i = number of teachers.

Illustration
Table 1 below illustrates the student-teacher ratio, using genuine enrolment data of selected Junior High Schools in selected regions in Ghana.

Table 7: Students-Teacher Ratio

S/N	Regions	Enrolment	Teachers	STR
1	Greater Accra	310,955	22,625	14
2	North East	27,176	1,276	21
3	Northern	103,075	6,662	15

4	Oti	39,155	2,680	15

Source: The Education Management Information System (EMIS) – 2020 / 2021 Education Profile.

Computation Technique
Given,

$$STR = E_t^i \div T_t^i$$

In this instant case, for Greater Accra,

E_t^i = 310,955; and T_t^i = 22,625.

Therefore, $STR = \frac{310,955}{22,625} = 14$, i.e., 14:1

8) Enrolment Growth Rate: The enrolment growth rate is the number of pupils or students who enrolled for an educational programme in a particular session minus those who enrolled for the programme in the previous school year, divided by the enrolment for the previous school year.

$$EGR = \frac{E^i_{t+1} - E_t^i}{E_t^i} \times \frac{100}{1}$$

Where EGR means Enrolment Growth Rate; E^i_{t+1} = enrolment for the upper school year, e.g., 2022 / 2023; and E_t^i = enrolment for the previous school year, e.g., 2021 / 2022.

Illustration
Table 8 below illustrates the basic school enrolment growth rate of selected countries, using hypothetical data.

Table 8: Enrolment Growth Rate

S/N	Country	2021 Enrolment	2022 Enrolment	EGR (%)
1	Chin	120,000,0	150,000,0	2

	a	00,000	00,000	5
2	Egypt	110,000,000	115,000,000	4.55
3	Jamaica	3,800,000	4,100,000	7.89
4	United Kingdom	1,000, 000	1,200, 000	20
5	United States	4,000,000	4,400,000	10

Computation Technique
Given,

$$EGR = \frac{E^i_{t+1} - E_t{}^i}{E_t{}^i} \times \frac{100}{1}$$

In the hypothetical case above, for China, E^i_{t+1} = 150,000,000,000 in 2022; and in 2021, $E_t{}^i$ = 120,000,000,0000
Therefore, $EGR = \left(\frac{150{,}000{,}000{,}000 - 120{,}000{,}000{,}000}{120{,}000{,}000{,}000}\right) \times \frac{100}{1} = 0.025\%$

9) ***Enrolment Grade Ratio:*** This is otherwise referred to as progression ratio. It is the proportion of students in a grade that are able to progress to the next grade. It is just like enrolment growth rate, but it is grade specific. It can be expressed as:

$$EGR = \frac{E^i_{t+1} - E_t{}^i}{E_t{}^i} \times \frac{100}{1}$$

Where EGR means Enrolment Grade Ratio; E_{t+1}^{i} = enrolment for grade i in year t+1, for example, Junior High School 2; and E_{t}^{i} = enrolment for grade i in year t, for example, Junior High School 1.

Illustration
Table 9 below illustrates the enrolment grade ratio of Biriwa Technical Institute, Cape Coast, using hypothetical data.

Table 9: Enrolment Grade Ratio

S/N	Grade	2022 Enrolment	2023 Enrolment	GR (%)
1	1	50	52	4.0
2	2	40	45	12.5
3	3	36	32	-11.11

Computation Technique
Given,

$$EGR = \frac{E^{i}_{t+1} - E_{t}^{i}}{E_{t}^{i}} \times \frac{100}{1}$$

In this instant case, for Grade 1; $E_{t+1}^{i} = 52$ and $E_{t}^{i} = 50$
Therefore, $EGR = \frac{52-50}{50} = 4\%$

10) ***Entry Rate:*** This is the admission or intake rate to the first grade of the school system. The entry rate is measured in percentages, using the formulae below:

$$ER = \frac{N_{t}^{i}}{P_{t}^{i}} \times \frac{100}{1}$$

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
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Where ER means Entry Rate; N_t^i = number of new entrants to the first grade of the school system; and P_t^i = school-age population for that level of education.

Illustration
Table 1 below illustrates the entry rates among three communities in Ghana, using hypothetical data.

Table 10: Entry Rate

S/N	Community	School-age Population: 4 yrs.	KG 1 Enrolment	ER (%)
1	Aflao	200	184	92
2	New Ebu	180	171	95
3	Elmina	240	216	90

Computation Technique
Given,

$$ER = \frac{N_t^i}{P_t^i} \times \frac{100}{1}$$

In the hypothetical data above, for Aflao, N_t^i = 184; and P_t^i = 200.
Therefore, $ER = \frac{184}{200} \times \frac{100}{1} = 92\%$

11) ***Transition Rate:*** The transition rate is measured in percentages. It could be expressed as:

$$TR = \frac{N_t^i}{G_{t-1}^i} \times \frac{100}{1}$$

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.12 (2), May-August, 2024 https://ajemates.org

Where TR means Transition Rate; N_t^i = number of graduates in level i in year t that got enrolled in the next level of education in a particular school year; and G_{t-1}^i = number of graduates in level i in year t-1, that is, the previous school year.

Illustration

Table 1 below illustrates the transition rates from Junior Secondary School to Senior Secondary School at Okpe community, Akoko-Edo Local Government Area, Nigeria from 2020 to 2023, using hypothetical data.

Table 11: Transition Rate

S/N	Session	JSS 3	SSS 1	TR (%)
1	2022	100	80	80
2	2023	120	95	79

Computation Technique

Given,

$$TR = \frac{N_t^i}{G_{t-1}^i} \times \frac{100}{1}$$

In this instant case, for 2022, new entrants to SSS 1, that is, N_t^i = 80; and the graduates of JSS 1, that is, G_{t-1}^i = 100.

Therefore, $TR = \frac{80}{200} \times \frac{100}{1} = 80\%$

12) ***Promotion Rate:*** The promotion rate is measured in percentages, using the formulae below:

$$PR = \frac{P_{t+1}^i}{E_t^i} \times \frac{100}{1}$$

Where PR means Promotion Rate;

P_{t+1}^i = promotees in grade i in year t+1; and

E_t^i = enrolment in grade i in year t.

Illustration
Table 1 below illustrates the promotion rate at Egbe-Oba Senior High School, Ikole, Ekiti State, Nigeria, using hypothetical data.

Table 12: Promotion Rate

S/N	School	2022 SSS 2Enrolment	Students Promoted to SSS 3 in 2023	PR (%)
1	A	200	180	90
2	B	50	47	94

Computation Technique
Given,

$$PR = \frac{P_{t+1}^{i}}{E_{t}^{i}} \times \frac{100}{1}$$

In the case above, for School A, $P_{t+1}^{i} = 180$; and $E_{t}^{i} = 200$.
Therefore, $PR = \frac{180}{200} \times \frac{100}{1} = 90\%$

13) ***Repetition Rate:*** The repetition rate is measured in percentages. It could be expressed as:

$$RR = \frac{R_{t+1}^{i}}{E_{t}^{i}} \times \frac{100}{1}$$

Where RR means Repetition Rate; R_{t+1}^{i} = repeaters in grade i in year t+1; and E_{t}^{i} = enrolment in grade i in year t.

Illustration
Table 1 below illustrates the repetition rate, using hypothetical data.

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.12 (2), May-August, 2024 https://ajemates.org

Table 13: Repetition Rate

S/N	School	2022 SSS 2 Enrolment	Students Repeaters of SSS 2 in 2023	RR (%)
1	A	200	10	5
2	B	50	2	4

Computation Technique
Given,

$$RR = \frac{R_{t+1}^{i}}{E_{t}^{i}} \times \frac{100}{1}$$

Here, for School A, $R_{t+1}^{i} = 10$; and $E_{t}^{i} = 200$.
Therefore, $RR = \frac{10}{200} \times \frac{100}{1} = 5\%$

14) ***Dropout Rate:*** The dropout rate is measured in percentages, using the formulae below:

$$DR = \frac{D_{t+1}^{i}}{E_{t}^{i}} \times \frac{100}{1}$$

Where DR means Dropout Rate; D_{t+1}^{i} dropouts in grade i in year t; and E_{t}^{i} = enrolment in grade i in year t.
Illustration
Table 1 below illustrates the dropout rate, using hypothetical data.

Table 14: Dropout Rate

S/N	School	2022 SSS 2 Enrolment	Students Promoted to SSS 3 in 2023	DR (%)

1	A	200	2	1
2	B	50	1	2

Computation Technique
Given,

$$DR = \frac{D_{t+1}^{i}}{E_{t}^{i}} \times \frac{100}{1}$$

In this instant case, for School A, $D_{t+1}^{i} = 2$; and $E_{t}^{i} = 200$.
Therefore, $DR = \frac{2}{200} \times \frac{100}{1} = 1\%$

15) ***Wastage Rate:*** The following computational steps may be employed while computing the wastage rate (Fabunmi, 2005): This entails the construction of the cohort progression using the derived flow rates as done below.

Table 15: Cohort Progression

Students'	Students' Flow along Grades 1 - 3		
Flow	1	2	3
Promotions	100	90	80
Repetitions	8	6	2
Dropouts	2	4	-

Table 15 can be illustrated with a cohort chart as done below.

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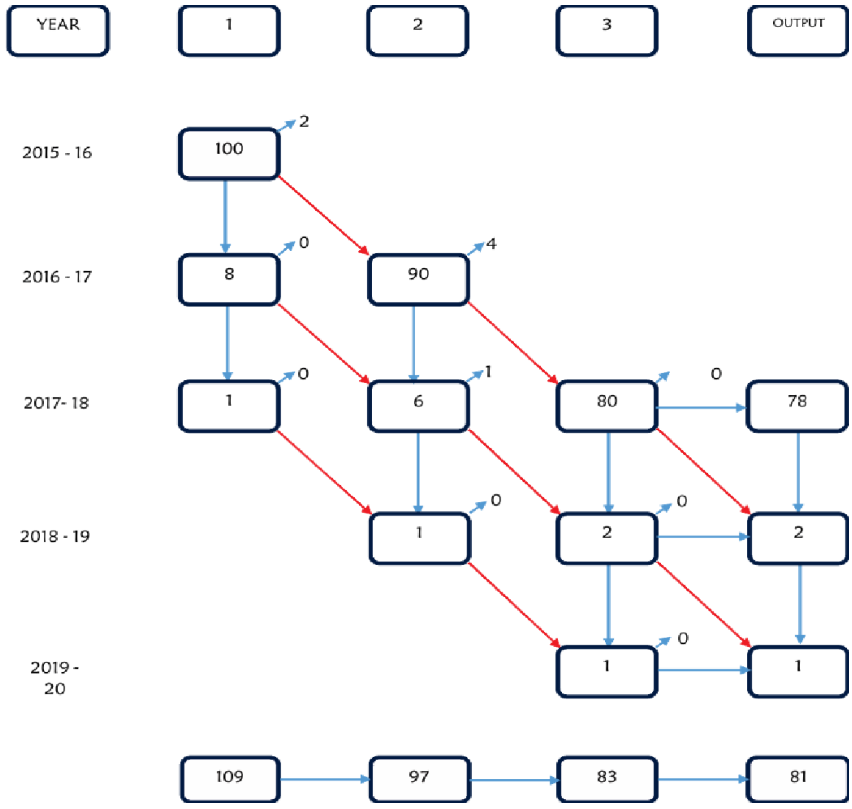


Figure 2: Evolution of a hypothetical cohort

Computation of the total inputs from the cohort chart
The data in the cohort chart can be illustrated in a tabular form as done below.

Table 16: Computations of student-years

Grade	Computations of student-years	Total
SSS 1	100 + 8 + 1 = 109	109 years
SSS 2	90 + 6 + 1 = 97	97 years
SSS 3	80 + 2 + 1 = 83	83 years
Total		289 years

AJEMATES
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The data provided in this table can be used to determine the Actual Input-Output Ratio in the manner below:

Step 1: Calculation of the ideal Input-output ratio:

The ideal Input-output ratio $= \frac{\text{Number of student-years invested}}{\text{Expected input-output ratio}}$

That is, $\frac{100\times3}{100} = 3$

Step 2: Calculation of the wastage rate:

It is good to note that the *actual input-output ratio* $= \frac{\text{Actual input of studnet-years}}{\text{Actual output}}$

While the expected input-output ratio $= \frac{\text{Expected input of student-years}}{\text{Expected output}}$

Wastage Rate $= \frac{\text{Actual input-output ratio}}{\text{Expected input-output ratio}} = \frac{289}{81} = 3.6\frac{0.6}{3} = 0.2$

This implies that the school has used an average of 3.6 student-years to produce a graduate instead of the ideal, which is 3 student-years. The extra 0.6 student-years spent constitutes a waste. The wastage rate for the cohort is: $\frac{0.6}{3} = 0.2$

It could be expressed in percentage instead of the coefficient of 0.2, that is as: $\frac{0.6}{3} \times \frac{100}{1} = 20\%$

16) ***Internal efficiency:*** The wastage rate could be used to determine the internal efficiency of a school system. In the example above, the coefficient for wastage is 0.2. The optimum efficiency is 1.0. We can subtract 0.2 from 1.0 to obtain the internal coefficient. That is, 1.0 – 0.2 = 0.8. To express it in percentage, it is: $\frac{0.1-0.2}{1} \times \frac{100}{1} = 80\%$

17) ***External efficiency:*** A tracer study could be conducted to determine the degree of the external efficiency of the education system.

Implications for Institutional Evaluation

The discussion thus far revealed the following implications of system analysis in education for institutional evaluation:

1) There is a need to make a periodic investigation of the quality of instructional programmes in an educational institution. This will enable the management to address the issues of inadequacy and lopsidedness of educational resources for each of the programmes in the educational institution.
2) Most educational institutions devised methods of self-evaluation to ensure their qualities meet up the national and global standards. This is very essential and has to be done regularly. It is a way of knowing the lapses in resource provision that should be addressed before the upcoming accreditation exercises.
3) The national educational authorities also conduct regular checks in form of resource verification and accreditation exercises. These exercises stimulate and even compel institutional managements to address the inadequacy and lopsidedness in resource situations in schools. Otherwise, these shortcomings might not be addressed and the quality of education may be declining.
4) System analysis or planning for institutional evaluation is otherwise referred to as accreditation and it is done on the basis of programmes, that is, programme by programme. There are two types of institutional evaluation, namely, internal and external. It is done at two levels, resource verification and accreditation exercises. In Nigeria, the result for the overall assessment for each programme is classified into: (i) Full Accreditation; (ii) Interim Accreditation; and (iii) Not Accredited. This form of system analysis for institutional evaluation is done periodically.

5) Consideration must be given to the following ethical considerations while conducting either internal or external institutional evaluations: (i) Avoiding conflicts of interest; (ii) Maintaining independence of judgement; (iii) Ensuring fairness; (iv) Transparency during the exercise; (v) Full disclosure of report or findings; (vi) Privacy of those interacted with; (vii) Confidentiality for participants; (viii) Respect for staff and students during interactions; (ix) Responsibility for the judgments made; (x) Accountability over findings; (xi) Empowerment for improvement; and (xii) Sustainability of the exercise and programme.

Conclusion

System analysis involves carrying out a comprehensive diagnosis and investigation into the performance of an education system. It is also a tool for institutional evaluation, which involves carrying out a comprehensive investigation into the performance of an educational institution. Hence, system analysis could be done at institutional, district, regional and national levels. National accreditation authorities also conduct system analysis on the basis of programmmes. System analysis entails the use of qualitative and quantitative techniques for data generation; and planning methodologies and statistical methods for data analysis and interpretation. The usual data collection tools include: checklist, observation schedule, interview guide, assessment scale, focus group discussion schedule and questionnaire. A tracer study could be conducted to determine the degree of the external efficiency of the education system.

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