

**UNDERSTANDING EDUCATIONAL COSTS FOR POLICY AND DECISIONS
IN PERIODS OF FINANCIAL CONSTRAINTS: A REVIEW OF CONCEPTS,
THEORIES AND STRATEGIES**

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Abstract

This paper examined the importance of educational costs in the determination of the quantity and quality of education service available to the individual institution and the society at large. The paper reviewed the various cost concepts, theories and strategies that are germane in the course of providing educational services to a people or group particularly in periods of financial restrictions. It emphasized the necessity of understanding the implications of these various costs in the educational supply and demand analysis. The essence is to guide educational planners, policy makers and institutional managers to take appropriate decisions that will be most effective and efficient in the delivery of the needed educational services to all eligible citizens in the country.

Introduction

One of the greatest challenges facing various governments today worldwide is the rising cost of providing educational services to the growing number of all eligible people who demand formal education. This is because, in general, educational costs at least in the public sectors that predominate in most countries – have been largely and sometimes entirely dependent on public revenues. According to Johnstone (2006), “even the United States which is thought to have the most privatized public sector in the world, the percentage of instructional costs borne by tax payers still remain in most states in the range of 60 to 70 percent” Thus in the face of these increasing expenses drawn from the public finances, both the individual institutions and the society at large face the challenge of maintaining and sustaining high educational accessibility and quality, especially for the poor, rural

dwellers and the underprivileged population. This challenge is particularly compelling in the light of other pressing macro-economic needs such as infrastructure, industrial growth, and agricultural sustainability etc, that face most countries (particularly the developing nations) (Isuku 2011). These rising educational costs has adverse implication for educational development. Hence, the need to understand the various cost characteristics to improve efficiency in the use of available resources have become a major issue of debate in education literature (Isuku 2011; Hanushek, 2006; Oguntoye, 1999)

The financial challenge of the ever expanding educational system in most countries in contemporary period is large, when compared with the limited resources available. This implies that countries need sustainable and cost-effective options to accommodate the growth in students' enrolment at all levels of schooling. Literature of cost control in education showed that different strategies could be adopted to reduce operational cost of schooling while still providing the needed access to the increasing number of prospecting students. These include: efficient resource utilization (UNESCO, 2010; Ayodele 2001; Mingat and Tan 1988), increasing class size (Johnstone, 2009; Carnoy 1999), increasing teaching load (Johnstone 2009), increasing student-teacher-ratio (Abagi and Odipo, 1997)

Cost Concepts and Cost Analysis in Education

Literature that has grown up around cost-analysis offers alternative and different definitions on the concepts of cost, each of which relates to the different type of decision it is concerned with. As a result, different experts have defined cost in different ways. Owing to these differences and view about cost, considerable confusion has arisen over the methodology of cost analysis. Nevertheless, every type of decision requires different measures of cost and different analytical technique (Woodhall, 1994).

Babalola (2000) defined cost as a measure of what is given up to produce or consume a commodity, while Longe (1981) emphasized that real cost correspond with opportunity cost, which holds that the cost of a good is measured in terms of the unproduced good that could have been produced with the input used to produce the good in question. Rumble (2002) defines cost as the actual or notional expenditure of money incurred on or attributable to a specific thing or

activity. While Adedeji (2003), stated that the cost of a particular activity is the reduction in output caused by not using the resource utilized by the activity in their most profitable alternative use. On the other hand, Ayeni (2003) viewed cost as a sacrifice incurred in the production of an activity, which according to him, could be in monetary term, tangible and psychic. In consideration of this different definition, it could therefore be summarized that the cost of any activity or product is equated to the monetary and non-monetary value of the activity or product that can be measured in terms of their forgone alternatives.

In education, several researches on cost-related issues have been conducted both in developed and developing countries. In Nigeria, however, the concern for cost studies actually began in 1970 (Babalola, 1988). Moreover, according to Babalola (1991) the cost of education refers to what is given up to produce or educate people in schools. In Ayeni's (2003) definition, educational cost refer to what is given up by individual, states, nations and even institutions of learning in educating or producing an individual or individuals. Coombs & Hallack (1987) conceptualized educational cost in terms of the value of educational inputs measured in their most profitable alternative use. The logic underlying this definition is that since economic resources are limited in supply; a decision to use some of these resources for educational purpose will mean sacrificing the resources on something else.

Educational inputs can be expressed in terms of real cost of resources when they are measured in physical units. For example, the number of teachers or teacher hours, number of textbooks etc. Educational inputs can also be measured in terms of their monetary value (the price paid) and expressed in financial or money costs. Both ways of expressing cost in education are however needed in the educational cost analysis (Coombs & Hallak, 1987).

All costs incurred by an institution result from decisions made by individuals in the organization. Cost concepts are therefore relevant as much as they influence decision-making (Alaluusa, 2002). Cost can however, be categorized into total (a combination of fixed and variable costs), which is measured in terms of their behaviour relative to fluctuations in activity (Alaluusa, 2002). Unit cost on its own, represents an important cost measure used to judge the expensiveness or

otherwise of the educational system (Psacharopoulos and Woodall, 1985; Coombs and Hallack, 1987; Longe, 1988). The unit cost is also known as the per-pupil cost or the average cost. It is gotten by dividing the total cost (TC) by the output (enrolment) in the school system

In cost analysis, certain standard components of production are used to express the cost behaviour. They include: total fixed cost, total variable cost and the marginal cost. As in the orthodox cost analysis, total fixed cost in education refers to costs that must be incurred irrespective of the level of output (Ayeni, 2003). According to Babalola (1991), most of the indirect costs fall under fixed costs. For instance, costs incurred on building, equipment, furniture and fittings are fixed because they do not change irrespective of the changes in the number of students produced. Variable cost (VC) on the other hand, refers to cost that change along with output. While marginal cost is the addition to the total cost of education resulting from an extra or additional student enrolled. The marginal cost (MC) is interested in adjusting educational costs to suit a desirable and inevitable change in the level of educational activity (Ayeni, 2003).

The cost function is used to describe the behaviour of the average unit cost in relation to variation in the size (enrolment) of the school. Three types of behaviour however are established to demonstrate the relationship between the average unit and the quantity (number of students) produced. These are the constant returns to scale, a situation where the average unit cost remains the same over a range of productivity irrespective of the changes in the size of the unit (number of students) produced. The second behaviour is that of increasing returns to scale. This is a situation where the average unit cost falls with increase in the size of the unit (students' enrolment) while the third behaviour is that of decreasing returns to scale; a situation where the unit cost tends to rise with increase in the quantity produced (Jhingan, 2002,).

Different costs concepts have been used for different purposes in cost analysis. It has been used by a number of individual institutions in an effort to identify possible cost reductions strategies. Cost concepts in education are of a crucial importance to educational partners and policy makers (Ajayi, 1998). According to Longe (1988), cost information is crucial in decision making as it facilitates efforts to make the best but least costly choice among alternatives. Efforts have

been made to define, and explain the usefulness and application of the different concepts in education.

Recurrent and Capital Costs

Recurrent cost of education refers to cost of personnel services and materials which are consumed by a school within one academic year (Ajayi 1998). Recurrent cost is so referred to because it reoccurs regularly and covers expenditure on goods and services that bring immediate and short lived benefits. It is categorized into staff and non-salaries recurrent costs. It include expenditures on teachers and non-teachers' salaries and allowances, stationeries, repairs, materials and other operational expenses. According to Coombs & Hallak (1987) recurrent cost of education applies to human services and physical supplies that the educational process consumes within a single budget year. It amounts to about 80 to 90 percent of the total educational costs (Ajayi, 2004, Coombs & Hallak 1987; Akangbou, 1986). The part played by recurrent cost in the educational system makes it to merit major attention in educational cost analysis.

Recurrent Costs include many different items, some of which are very large particularly teacher salaries costs, and other relatively small types such as office supplies. The general rule is to allocate recurrent items according to the relative quantitative importance of each item. According to Coombs & Hallak (1987), it is possible to further break down the costs into meaningful subdivision as this will help to give a more useful and accurate analysis. For instance it is possible to breakdown recurrent unit cost into primary, secondary and tertiary units. It is also possible to breakdown recurrent unit cost into urban or rural cost of schooling rather than broader averages for mixed categories. This point was well illustrated by the international institute for educational planning (IIEP 1982) study where it showed that boarding schools recurrent costs was 2.7 times as high as a day school at lower secondary, and 1.9 times as high at upper secondary. Recurrent costs can be classified according to objective and purpose to which the cost is being incurred. The purpose could be due to instruction (teaching) administration, food and lodging, transportation and general maintenance.

In recurrent cost analysis, experts have suggested that teacher' salaries cost should be the most focused item if the interest is towards

reducing cost of education (Psacharopoulos & Woodhall; 1985, Zymelman 1982). According to Zymelman, considerable savings may be made in the medium term by marginally changing teachers' pay scale. Although this may have implication on the willingness of teachers to make serious commitment to their employment, it nevertheless suggests an important cost-reduction strategy in the school system.

Capital costs on the other hand, are expenditures incurred from the purchase of durable assets such as buildings and equipment, which have long life span and are expected to yield benefits over a longer period of time (Ajayi, 1998). At the institutional level, capital cost include the costs of school landed property upon which the building is erected, the cost of the buildings, furniture, equipments, vehicles, computers and other related items. Amortization and depreciation are used to calculate the annual value of capital cost (Ajayi 1998; Psacharopoulos & Woodhall, 1985). When capital costs are spread over a period of years, they typically account for a modest fraction of the total unit cost per students. When they are incurred, it will certainly result to the introduction of recurrent cost in the future. For instance, when capital costs are incurred, recurrent expenditure in the form of teachers' salaries, materials, maintenance and repairs of buildings and equipment are automatically generated (Psacharopoulos & Woodhall 1985). However, the addition of capital and recurrent elements of costs creates the problem of how to allow for the differences in time scale. In other words it is difficult to aggregate a stock of capital that is purchased at one point of time (but from which services are consumed over a period of time) and flow of services that are consumed as they are produced (Coombs & Hallak 1987). In education capital cost declines relatively as more and more output (educated individuals) are produced.

Unit or Average Cost of Education

Unit or average cost of education refers to the cost of educating one student at a point in time. Unit cost can be measured in different ways. If for instance, the total expenditure is divided by the total number of students enrolled, then we have unit or average cost per student. If on the other hand, the total expenditure incurred is divided by the total number of graduates, then it is the unit cost per graduate. According to

Babalola, (1995), it is also possible to have unit cost per teacher, unit cost per class etc.

In many developing countries like Nigeria, unit cost with GNP per capital represents a much heavier economic burden when compared with developed countries. For instance, the work of Zynelman in Psacharopoulos & Woodhall (1985) showed that developed countries spent 55 percent of their GNP per capital on each student at the higher education level, whereas developing countries spent five times the level of GNP per capital income on each student. Although these heavy cost burden have been somewhat reduced, unit costs particularly at the secondary level still represent a much heavier burden (with respect to GNP per capital) in Africa countries than in developed countries or even in Asia or Latin America (Psacharopoulos & Woodhall 1985). Whereas, unit costs are half the annual GNP in OECD countries, one-and-a-half times in Middle East and North Africa, it is eight to nine times that in West Africa (Psacharopoulos & Woodhall, 1985).

Because of the important role played by unit cost as an index for determining the expensiveness or otherwise of the school system, it is ideal to pay serious attention to its growth. Moreover, unit cost analysis is needed for cost comparisons or projection as it helps the educational planner to make proper planning decisions to lessen the cost burden of education on the government. Decisions about alternative educational technologies for instance require information on unit costs (such as cost per hour) and a full understanding of the cost implications of alternative technologies (such as radio or television) which require analysis of both fixed and variable costs. According to Psacharopoulos (1992) one of the very reasons for a high unit cost in most developing countries such as Nigeria is the very low enrolment. Thus, expansion in secondary or any form of education through increased enrolment may enable the country to reduce cost per student. However, some authorities in the field of cost analysis have argued that the very low level of enrolment in schools may not be the single factor for a high unit cost in most of the developing countries. The assertion is that since teachers' salaries is an important determinant of the total recurrent cost of schools, the question to ask is whether the student teacher-ratio is high enough to effect a positive change in the unit cost of education (Miugat & Tan, 1988; Haddad

1994; Bray 1998; Abagi & Odipo, 1999) Moreover, units cost of education has been influenced by certain factors among which are the average-class size, average school size and teachers salaries (Longe as cited in Isuku, 2011). Coombs & Hallak (1987), Psacharopoulos & Woodhall (1985); Mingat & Tan (1988) emphasized the type of curriculum, teachers' salaries and quality of teachers as additional factors influencing unit cost in schools. This implied that in an attempt to cut down unit cost and give greater opportunity for access, effort should be directed towards the control of school related factors.

Marginal Cost of Education

Marginal cost of education refers to the additional cost that is attributable to one extra student in the school system. It is the increase in total cost that is due to an increase in the number of students enrolled in school. Mathematically, it is represented as:

$$MC = TC_{x+1} - TC_x$$

Where MC = Marginal Cost

TC_{x+1} = Total cost of increasing enrolment by one more student and

TC_x = Initial total cost of x students

Marginal cost of education is associated with decisions to change the level of education outputs. Babalola (1995) relate marginal cost in education to include all the cost incurred to acquire additional skills, attitudes and knowledge which students imbibed from the educational system beyond what they brought into the system initially. Thus, the marginal cost is the change in total cost of education associated with a unit change in educational output. For example, the marginal cost of extending education to an extra unit of successful student per session would be the cost of equipment, teachers, non-teaching staff, goods and services directly associated with that one additional graduate. Marginal cost is always defined in term of a unit change in output and it varies with changes in output whenever there is a decision to change the level of output.

Marginal cost distinguishes between variable and fixed costs of education. This is because it is necessary to identify those costs of education which vary as the level of educational activity is varied. Variable costs are those that go up or down according to educational

services rendered. Thus the cost analyst is to supply information on the cost of extending education to additional unit of student if the goal is that of expansion. The analyst must therefore find both the short and long-run cost implications of a decision to change a particular level of production rather than the cost implication of increasing student's places in response to an increase in enrolment demand. According to Babalola (1995), there are three levels of analysis required in marginal costing. These are analysis based on: analysis of the total costs of education, analysis of average costs of education and analysis of the marginal cost of education.

In the first case, the initial level of educational production, both variable and total cost of education increase at a decreasing rate (+ve, -ve). After a point, they both increase at a decreasing rate (+ve, +ve) (Babalola 1995). The second level of analysis is that of the average cost of education. In this case, the average or per unit cost functions are often more useful for decision making than total cost function. Its schedule is easily derived by dividing the total cost by the number of students. The third level is the marginal cost analysis in education which indicates that educational cost analysis does not end with average and total cost analysis but with the analysis of marginal costs. In this instance, it is possible for the cost analyst to know the additional unit of output which is the change in total cost brought about by a unit change in educational output. Marginal cost can be determined through the first order derivative of the total cost function.

Fixed and Variable Costs

Cost of production can be classified into fixed cost (FC) and variable cost (VC). Thus, $TC = FC + VC$. Fixed costs do not vary or change with the level of output. Thus whether there is output or not, such costs would always be incurred. Examples of fixed costs are those expenditures incurred in the provision of fixed items such as buildings, equipment, vehicles machineries and other physical facilities. Costs that are invariant with respect to output (enrolment growth) therefore constitute fixed costs. Also included in the fixed cost concept are interest's payments on borrowed capital, rental expenses, plant and equipment, depreciation charges which are associated with ware and tare etc (Isuku, 2011; Jhigan,2002)

Costs which vary directly with the size of school or students enrolment such as expenditure on books, stationeries, electricity, fuel, instructional materials, laboratory and consumables are variable costs. The extent to which expenditure is classified as fixed or variable depend on the extent of the time scale involved. In the short term however, a wide range of educational expenditure may come within the classification of fixed costs but in the long term, many of the cost could be re-categorized or even entirely eliminated. For instance, the cost of school building may be fixed in the short-run, but may vary in the long-run when it becomes necessary to expand or provide additional buildings due to increase enrolment so as to cater for the addition number of students (Ajayi, 1998).

Theoretical Framework

Costs are derived functions. They are derived from the technological relationships implied by the production function. In the economic meaning, cost includes first of all, opportunity costs and secondly the minimum costs necessary to produce a given level of output. Cohn (1979) remarked that the cost function theory is perhaps more important in relation to the production process. As applied to the educational system (local schools), the term costs refer to the amount of expenditure or outlay needed to produce a given number of students (Duncombe, Miner and Ruggiero, 1994). In other words costs are the value of the resources consumed in the production of a given number of students or level of achievement.

The production function theory is however faced with the problem of measuring the school inputs and output variables appropriately probably due to the intangible nature of school services (Cohn, 1979; Matthew, 2003). Owing to this difficulty, researchers have employed cost function as an alternative means of measuring educational services. In practice, actual expenditures have substituted for the cost variables because they (expenditures) are readily available and quantifiable. Expenditures are usually expressed in per pupil terms with teachers' salaries as the most commonly used factor price in these cost models. This is because teachers' salary cost constitutes about 80 to 90 percent of the school total expenditure particularly at the secondary school level (Ajayi, 2004; Akangbou, 1989). Therefore, drawing from the generalized production function framework, we then

have:

$$f(Q, X/S) = 0$$

Where Q is the output vector, X, the school related (manipulative) variables, such as teachers and materials; and S the non-school related (non-manipulative) variables. It will therefore be appropriate to include a school size variable denoted by E (Enrolment). The square of the enrolment will allow for a U-shaped cost function that is, to capture the non-linearity, and estimate is then provided to determine the minimum cost enrolment level. With the inclusion of the size variable (E), the previous production function translates to:

$$f(Q, X, E/S) = 0$$

Where E, represents the school size measured by the number of students. The non-school variables 'S' are not accounted for in the model owing to their non-manipulative nature. For instance, the influence of parents, the student's personal IQ and other behavioural changes that are due to schooling which cannot be subjected to in-school factors.

Therefore using the real financial outlay (accounting costs), prices can then be estimated for the X_i variable inputs represented by $P_1, P_2, P_3 \dots P_n$. Where X_i is the quantity of input variable which has unit price p_i . Thus, the cost of X_i inputs will now be given as:

$$C = \sum_{i=1}^n P_i X_i = P_1 X_1 + P_2 X_2 + P_3 X_3 \dots P_n X_n$$

The minimum cost for each level of output can therefore be obtained by examining the different combinations of X_i which provides the same quantity of output. After some manipulation, the optimal input level for which the economic cost (minimum cost level) of producing a given level of output can then be obtained. This economic cost level is then given by the equation below.

$$C = \sum_{i=1}^n P_i X_i^*$$

Where X^* is dependent on both the Q (output) Vector and the enrolment E (Cohn 1979). The theory therefore argued that the cost-size relationship is U-shaped. In other words, other things being equal,

as the school size (enrolment) increases, the per-pupil cost will decrease up to a point and then begin to increase at any other point beyond the optimum level (see Cohn, 1979). For instance, if it can be shown that per-student cost is minimum when enrolment was 2000, then, it can be clear that considerable savings can be reaped when smaller or larger schools other the optimum size are restructured to the optimum enrolment size level of 2000. However, though this may be a strong argument for the cost theory framework in education, its policy decision and implementation may depend on the political wiliness the existing government to restructure the school system in line with theoretical postulation.

Determinants of Educational Costs

The study by Longe (1981) examined some the determinants of costs in some selected secondary education in Nigeria. Using the quadratic model to analyse the cost and size data of 60 secondary schools, the author found that average cost curve changed its direction upward at a certain school size with a corresponding unit cost. Both linear and multiple regression analysis were employed to identify those factors that bring about variations in the unit cost. Although the size and unit cost relationship could not be shown in clear terms, the result however shows a U-shaped cost curve implying that size is a strong factor in determining educational cost. However, Callaway and Musone in Adepoju, (2002) showed that increase in the number of students in the University of Ibadan for instance did not bring about a reduction in the recurrent unit cost as it was offset by increases in prices during the period.

Babara in (Badalona; 1988) compared unit cost with size of schools so as to analyse the factors that have influenced unit cost variation. The researcher identified teacher cost as reflection of pupil teacher ratio (PTR), the class-size and differences in average teacher cost. Coombs & Hallak (1987) in another research work made an international comparison on the management of educational costs. The authors using regression analytical technique revealed various factors influencing educational costs among which the greater factor was the teacher salary costs.

Apart from student-teacher-ratio, and average teacher salary as major determinants of educational costs, some researchers have

identified the type of curriculum being operated as one of the determinant of unit cost of education (Babalola, Okunola, Adeyemi & Ibekwe, 1996, Akangbou, 1986 and Kumar, 1981). Bartholomew, Batha, and Babalola as cited in Isuku, (2003) posited that the various policies designed to increase qualification of teachers and raise the real level of teachers' salaries, and increase in the teacher-student ratio can push-up cost sharply. While Adedeji (1994) stated that such factors as age of students, enrolment, class size, student-teacher ratio, qualification of teachers and average teachers' salaries were major determinants of educational cost. Greville (1997) argued that the number of students and trainees enrolled in schools to a large extent determine the total level of recurrent expenditure to be incurred. Other determinants of recurrent costs include the number of classrooms, number of teachers and non-teaching staff, equipment, maintenance and other material need which Greville (1997) referred to as the "number variables." In a similar study, Coombs & Hallak (1987), argued that the unprecedented growth of educational demand throughout the world since the end of World-War II, combined with the powerful political pressures to meet this demand, has unquestionably been the greatest single cause of increased cost and expenditures. Several well-known factors have fuelled this burgeoning demand, including the "revolution of rising expectations" which has swept across developed and developing countries; the increase recognition of education as a vital tool for economic and social development among other factors has led to this growth in educational demand and consequently high educational expenditure.

Cost Reduction Strategies in Education

Cost analysts have discussed different strategies of cost control in educational institutions. Researchers have shown, that effective control of recurrent expenditure will impact more positively on the institution since it constitute about 80 percent of schools total cost (Ajayi, 2004; Adedeji, 1994 and Coombs & Hallak, 1987). According to Adedeji (1994), in reducing education cost, emphasis must be shifted to the control of the recurrent expenditure, which constitutes the most significant item of the total expenditure of any investment with about 80 to 90 percent of the total expenditure of an institution. Psacharopoulos & Woodhall, (1985) explained that the teacher salary

as a major determinant of recurrent cost should be the main focus in attempting to reduce the high recurrent cost of education. However, Oladejo (2001) suggested the following options:

- (i) The elimination of expenses not concerned with direct instruction of students.
- (ii) Increase in the load of the faculties (in the case of higher institutions).
- (iii) Rearranging the class-size in such a way as to enlarge the size of classes.

Other cost control strategies that are suggested include: increase in enrolment size, lower administrative expenditure per student, increase in the junior/senior staff ratio. Student (Babalola et al 1996). While Carnoy (1999) suggested an increase in the class size.

According to Psacharopoulos & Woodhall (1985), one of the method of cost control in education in the face of stagnant government support, is by reducing the unit cost of education through greater efficiency. They opined that class-size has a considerable effect on cost because of the additional expenditure on teachers, classroom equipment, materials and administration. Thus, it is better to allow a modest increase in the average-class-size. In the opinion of Alaluusa (2002), efficient cost management can be achieved through proper cost allocation or cost assignment, which should include the determination of unit cost for products and services. While Longe, Adedeji and Osasona (2000) maintained that cost information is crucial in decision making as it facilitate efforts to make the best but least costly choice among alternatives. Awopegba (1986), Mingat and Tan, (1988) opined that efficiency in the use of resources available will be reflected in the enrolment pattern of the institution, the student-teacher-ratio and hence the higher the student-teacher-ratio, the more efficient the system. Babalola (1985) and Babalola, *et al.*, (1996) therefore remarked that a number of cost-saving potentials resides in school exploring economies of scale.

Conclusion

High cost of education service delivery constitutes a serious threat to the goal of achieving educational development. Although the rising cost of education is present in both high and low-income countries, it is

especially more pronounced in countries with high enrolment pressure (such as Nigeria and other countries in Sub-Sahara Africa) due to increase in population growth resulting into widespread school-age group. This problem of high educational costs is also exacerbated by the low per-capital gross domestic product in these countries coupled with the inability and or unwillingness of government to raise additional revenue for the educational system in the face of other socio-economic challenges facing most of these countries. The implications and consequences of all the above reasons, is the question of the viability and ability of the educational system (both individual institutions and the whole system) to accommodate the increasing enrolment demand as well as maintain accessibility and quality of educational outputs. Thus, an understanding of educational costs in periods of financial diminution is important for educational planners, managers and policy makers in order to achieve an effective educational system.

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