

**DETERMINING THE INFLUENCE OF SECONDARY SCHOOLS
LOCATION ON THEIR OPERATIONAL EFFICIENCY: A CASE OF
BUNGOMA SOUTH SUB-COUNTY**

BY

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DECLARATION

DECLARATION BY CANDIDATE

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DEDICATION

To my late father, my sister Mrs. Margret Masifwa and Late father Gerishom Masifwa who nurtured and inspired my academic ambitions. Further, I dedicate this work to my dear wife Mrs. Nakhayo Everlyn and children Selina, Celine, Shirley, Orion and Liz

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ABSTRACT

The rising cost of secondary education in Kenya has been a major cause of concern accounting for a large proportion of the dropout rate at the secondary school level in addition to denying education to many from the low socio-economic status. The purpose of this study was to determine the influence of spatial factors on the operational efficiency of secondary schools in Bungoma South Sub-county. A descriptive survey design was used in the study. The theoretical framework adopted was the Micro-economic cost function model for assessing operational efficiency. The following objectives guided this study; to determine the influences of school size, Average Interschool Distance, Average teacher salary, Student -classroom ratio and Average Non-teacher recurrent expenditure on Unit cost. Stratified proportionate random sampling was used to select 19 secondary schools from a target population of 46 secondary schools area. The respondents were the principals in the sampled schools. The study used a structured questionnaire which was served to the principals. Validity and reliability of the research instrument was established through a pilot study done in two schools in Sirisia Sub-county. Data obtained from the research instruments recoded and keyed in to the SPSS 12.0 computer software. The package enabled the analysis of data with the use of descriptive techniques (percentages, means, and frequency tables) as well as inferential technique of multiple regressions analysis to determine relationships among the variables. All Coefficients in the regression model were tested on a t-test at a confidence level of 0.05. The study established that schools were established within an average of 3.7km which left about 73% of the schools having less than the optimum size of 409 students. Schools located very close to each other experience higher unit costs hence the schools experience difficulties in financial management, underutilization of physical resources and higher recurrent expenditures per student which lead to operational inefficiency and higher direct costs of education to parents. The study recommends that Ministry of Education through Quality Assurance division should carefully assess the enrolments in existing secondary schools to ensure that they attain recommended size of three streamed before registering new ones within similar catchments.

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ABBREVIATIONS AND ACRONYMS

DEO	District Education Officer
EDSAC	Education Sector Adjustment Credit
FDSE	Free Day Secondary Education
GDP	Gross Domestic Product
I.T.R.E.	Institute for Transport Research and Education
IPAR	Institute of Policy Analysis and Research
KCSE	Kenya Certificate of Secondary Education
OECD	Organisation for Economic Co-operation and Development
R.o.K	Republic of Kenya
TTCs	Teacher Training colleges
UNESCO	United Nations Education Scientific and Cultural Organisation

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1. Background to the Study

Society places great value on education because of its power to transform human thought, attitudes and skills into desirable traits for its social and economic welfare (Ayot & Briggs, 1992). The question of the contribution of education to economic development dates back to Adam Smith (Ayot & Briggs, 1992). Adam Smith observed the link between the acquisition of ‘talents’ and the creation of human capital which he regarded as fixed capital. It was T.W. Shultz in 1960 that recognized the distinctiveness of labour as a factor of production that significantly influence economic growth. The quality and quantity of the labour could be enhanced through investment in human beings (education) hence creating a stock of human capital. The human capital theory justified investment in education, with consequent quantitative expansion. In the third world, and specifically the newly independent states, the scarcity of skilled manpower was biting. The desire to create an indigenous pool of educated manpower to provide modern and more productive labour precipitated ambitious investments in the quantitative expansion of education.

The quantitative expansion of school apparently leads to creation of small sized institutions which have low enrolments and hence wasteful of resources. It was through such realisation that consolidation programmes were instituted in the USA and Canada in the 1940s (Duncombe, 2007). In a study of the achievements of the school consolidation program in Maine, Arkansas and Nebraska among other states, the study observed that consolidation, which was carried out amid strong local opposition, led to realization of economies of size with decrease in per pupil spending

where student performance, teacher salaries, student characteristics and efficiency were held constant.

A study of Ireland by the OECD (1966) revealed that village schools had substantially higher costs per student though performance was poorer than larger schools. Consequently, a consolidation program was initiated which led to low costs of running schools. A study done in Nigeria's Ogun States by Oguntonye (1982) cited in Kosgei (2001) found that economies of scale existed in secondary education in the states. The optimal size of the schools was found to be 1133 students. This is one of the studies on economies of scale in secondary schools done in Africa.

At the early stage, a commission of inquiry into the education system of Kenya (Republic of Kenya, 1964) foresaw a trend of undue proliferation of secondary schools and the wasteful competition that would result. It emphasized planning and control in the establishment of the Harambee schools, which drew support from the government in the form of teachers. The commission noted that if 'Harambee,' schools constituted a small element in the total secondary provision, they could be disregarded for planning purposes. In fact, however, they amounted to about a third of the secondary schools of Kenya. Consequently, the government's plan for education could be seriously disorganized by this uncontrolled and unregulated activity" (Republic of Kenya. 1964: 22)

The need for rational allocation and utilisation of the available scarce resources in such a way as to maximize educational outcomes under a strained government budget and poor economy is inevitably urgent. Such concern has been raised by Muyia (1992), who noted, that efforts to look for alternative sources of funds to run our secondary schools, alone were not enough. There was need for our schools to

efficiently utilize what they have. One way in which this can be achieved is through coherent regional distribution of secondary schools, through coordinated planning of their locations. This would eliminate anomalies like the existence of over enrolled and under enrolled schools in close proximity (Republic of Kenya, 1999)

The establishment of secondary schools appears more likely to be motivated by ethnic, political or religious passions than consideration of economic laws, which guide production units. Consequently, there is a manifestation of duplication of secondary schools in some regions with unviable enrolments (Muyia, 2000). The outcome is inefficiency in their operation, and further waste of scarce resources of uninformed parents and the government. Suggestions have been made to the effect that some secondary schools be merged to raise enrolments to optimality. This would be in line with the third development plan which underscored the need to lower cost of education by expanding existing institutions rather than building new ones (Republic of Kenya, 1974). Such a background thus necessitates an investigation into fundamental factors that influence operational efficiency of education institutions and more so, secondary schools. Incidentally, western province exhibits a trend of proliferation of under-enrolled secondary schools (Muyia, 2000). Bungoma South Sub-county alone has 46 secondary schools, with four new schools destined for registration this year (2008).

1.2. Statement of the Problem

The escalation of costs of education at secondary level has been the immediate consequence of cost sharing policy in Kenya, the lack of fee guidelines and other school levies, other related direct costs can be attributed to existence of many under enrolled secondary schools (Republic of Kenya, 1988). Unregulated establishment of

secondary schools has led to units whose operations are barely sustainable is an unnecessary economic burden to the government as well as households since they lead to escalation of operational costs.

Concern about the need to regulate planning of secondary schools in such a way as to enhance their sustainability and reduce the tendency to set up unviable schools in close proximity, has manifested in Republic of Kenya (2012) and Okwany (2014) which has raised concern about uneconomical secondary school units whose enrolments need to be raised to three streamed sizes if they have to be sustainable.

Bungoma South Sub-county is a glaring manifestation of the scenario. According to the Sub County Education office (District Inspectorate report, 2006), with an area of 664.3 Km², the district has a total of 46 secondary schools with 12 other schools lined up for registration, some which reveal a pattern of location very close to each other within same catchment areas proximity within.

1.3 Purpose of the Study

The study set to determine the influence of spatial factors on operational efficiency of secondary schools in Bungoma South Sub-county.

1.4 Objectives of Study

The current study set to achieve the following objectives:

1. To determine the influence of School location on financial resource management in secondary schools in Bungoma South Sub-county.
2. To establish the influence of school size on total expenditure per student in secondary schools in Bungoma South Sub-county.
3. To determine the influence of average interschool distance on total expenditure per student in secondary schools in Bungoma South Sub-county.

4. To determine the influence of student-classroom ratio on total expenditure per student in secondary schools in Bungoma South Sub-county.
5. To establish the influence of total non-teacher recurrent expenditure per student on total expenditure per student in secondary schools Bungoma South Sub-county.
6. To determine the influence of average teacher salary on total expenditure per student in secondary schools in Bungoma South Sub-county.

1.5 Research Questions

The study was guided by the following research questions

1. What is the influence of school location on financial resource management in secondary schools in Bungoma South Sub-county?
2. In which way does school size influence the total expenditure per student in secondary schools in Bungoma South Sub-county?
3. In which way does the average interschool distance influence the total expenditure per student in secondary schools in Bungoma South Sub-county?
4. In which way does the Student-Classroom ratio influence the total expenditure per student in secondary schools in Bungoma South Sub-county?
5. In which way does the total non-teacher recurrent expenditure per student influence the total expenditure per student in secondary schools Bungoma South Sub-county?
6. In which way does the average teacher salary influence the total expenditure per student in secondary schools in Bungoma South Sub-county?

1.6 Hypotheses of the Study

The study aimed at verifying the following hypotheses:

H_01 : School size(X_2) does not significantly influence total expenditure per student (X_1) in secondary schools in Bungoma South Sub-county.

H_02 : The average interschool distance (X_3) does not significantly influence total expenditure per student(X_1) in secondary schools in Bungoma South Sub-county.

H_03 : The student-Classroom ratio (X_4) does not significantly influence the Total Expenditure per Student (X_1) in secondary schools in Bungoma South Sub-county.

H_04 : Non-teacher recurrent expenditure per student(X_5) does not significantly Influence the Total Expenditure per student (X_1) in secondary schools in Bungoma South Sub-county.

H_05 : The average expenditure on teacher salary(X_6) does not significantly Influence the Total Expenditure per student (X_1) in secondary schools in Bungoma South Sub-county.

1.7 Justification for the Study

The study on factors influencing the operational efficiency of secondary schools is necessitated by the growing need to rationalize investments in education by minimizing wasteful undertakings while pursuing quantitative expansion (Muya, 2001). The ultimate gain is to reduce the cost of education borne by parents as well as the government.

Apparently, a policy guiding the establishment of new secondary schools based on sound planning theory such as social demand for education is virtually lacking in Bungoma South Sub-county and Kenya as a country (R.O.K, 1999).

While studies like that of Muya (2001) and Kosgei (2001) were concerned with determining operational efficiency in Kakamega and Nandi, this study focuses on determining the factors especially locational factors that influence the operational efficiency. As a result, the study will inform spatial planning for establishment of new schools.

1.8 Significance of the Study

The study on factors that influence the operational efficiency of secondary schools was necessitated by the growing need to rationalize investments in education by minimizing wasteful undertakings while pursuing quantitative expansion (Muyia 2001). Apparently, a policy guiding the establishment of new secondary schools based on sound education planning theory such as social demand is virtually lacking in Kenya (Republic of Kenya, 1999) and particularly in Bungoma South Sub-county. This study will hence be a yardstick, which can guide future establishment of public secondary school institutions in terms of assessing their locational viability so that only sustainable ones should attract government funding. The study will also provide insight into the viability of secondary school consolidation as a policy measure as has been suggested by authorities at the ministry as well as scholars.

The study will be a precursor to studies in spatial planning of educational institutions. It will not only sensitize the Ministry of Education about need for coherent planning but also provide basis for future planning of location of secondary schools. The study provides an insight into resource utilization at the institutional level. The findings of

this research will guide the ministry of education in determining the level of wastage that is inherent in poorly planned locations, hence provide practical solutions. This will help to directly minimize costs of education.

This study will enable stakeholders in secondary school institutions to determine the efficiency of institutions and hence seek ways of enhancing the efficiency for instance through consolidation of schools and sharing of resources between schools.

1.9 Assumptions of the Study

This study was based on some assumptions about the study procedure as discussed below.

It was assumed that the respondents in this study would be co-operative in providing information within the required time span.

It was assumed that there would be honesty on the part of respondents in providing information in the questionnaires. However, the principals were not very open with information on school expenditures and this affected the accuracy in determining the Unit costs. The researcher corrected the error by administering a secondary interview to deputy principals

The current school organisation was assumed to prevail. It was expected that in the course of this study, there would be no policy shift that could affect variables. However, the researcher realized that the Ministry of Education had put a policy that tended to regulate the transfer of students freely. The effect of the policy could not stretch to earlier periods which was the concern of the research.

1.10 Scope of the Study

The study was undertaken in Bungoma South Sub-county of Bungoma County over the period of January 2010. The study covered 19 out of the total of 46 secondary schools spread in eight education zones. The respondents targeted for this study are principals in the sampled schools. No other personalities within schools included in the study will be engaged during the study. This study focussed on public mixed day and day/boarding secondary schools which draw the bulk of student population within Bungoma South Sub-County. Pure boarding schools will not be included in the study because their establishment is not affected by spatial factors.

The focus of this study was on isolating the influence of spatial factors such as interschool distance as well as internal school factors such as teacher salaries, non-teacher recurrent expenditure and the student classroom ratio on the operational efficiency of secondary schools in Bungoma South Sub- County.

1.11 Limitations of the Study

The study was faced with a number of limitations as discussed below:

Since the study was limited to a single region, the results of this research may not be generalized to other situations due to unique regional differences that may be inherent between the study area and other counties. The limited scope of this study implies there is an inevitable sampling error hence the interpretation of test of statistical significance should be done with caution. However the study may provide a general guideline in policy in regulating education costs.

This study can yield better results if accurate regional demographic data was incorporated to enable the estimation of regional demand for education. Such data however, could not be obtained from the regional Kenya Bureau of Statistics offices.

The accuracy of findings in this research depended on the honesty, openness and willingness with which respondents would volunteer information due to suspicion. Obtaining data on vital information was not easy. Some principals were reluctant to release information that was being solicited. This was a limitation in relation to accuracy of data.

1.12 Theoretical Framework

This study was based on cost function model of micro-economic theory of the firm postulated by Marshall (1890) and Jevons (1871) and later adopted in economics of education. The theory attempts to determine efficiency of firms through the analysis of the unit cost incurred for a given level of outputs in the production process.

The Cost Model

The study was concerned with determinant of economic efficiency which is to be determined by the resources expended in providing education to schools in a specific location (Ayot & Briggs, 1992). When a school is considered as a producer of education services, then the concept of an **Education Production Function** is implied. However, the school is a non-profit maximizing organization but strives to maximize outcomes rather than outputs, subject to budget/ resource constraints (Boissiere 2004).

This model was used by Downes and Pogue (1994) (as cited in Kosgei, 2001) in their estimation of cost functions for Arizona's elementary and secondary education system. It was also used by Muyia(1999), Kosgei (2001), Oguntoye (1979) and Ngala (1996) cited in Kosgei (2001) to determine the internal efficiency of educational institutions. The model shows the way unit costs change in relation to size of an institution. It also

shows the relationship between the unit cost as the dependent variable and the quality of output, input prices, and measures of attributes of the school as explanatory variables with the error term added to the equation.

The general methodology to examine economies of scale is to estimate average cost, X_1 , as a function of size, X_2 , (such as enrolments), exogenous inputs, Y_1, \dots, Y_n , (such as institutional character, like school location and number of subjects offered), educational outcomes, Q_1, \dots, Q_m , (such as test scores or retention rates) and input prices, X_3, \dots, X_k ,

(Such as teacher salaries). That is,

$$X_1 = f(X_2, Y_1, \dots, Y_n, Q_1, \dots, Q_m, X_3, \dots, X_k) \dots \dots \dots (1.1)$$

For n exogenous inputs, m educational outcomes and k input prices. For the purpose of this study, exogenous inputs and educational outcomes were not included in the cost function model. This is because they are many and they are not easily measured or quantified. Therefore, the cost function used in determining the economies of scale in secondary schools was as follows:

$$X_1 = f(X_2, X_3, \dots, X_k) \dots \dots \dots (1.2)$$

Where X_2 is the school enrolment or size and X_3, \dots, X_k is the input prices in this case, the independent variables other than school size that affect the average cost.

In this study, the independent variables were average Interschool distance (X_3) Student-Classroom ratio(X_4), Average non-teacher recurrent expenditure per student (X_5) and average teacher salary (X_6). The most common functional form for the estimation of equation (1.2) allows for the enrolment variable, X_2 , to be entered as a quadratic as follows:

$$X_1 = o + {}_1X_2 + {}_2X_2^2 + \dots + \mu \dots \dots \dots (1.3)$$

Where X_1 is the average cost, which was known as Total Expenditure per student or cost per student, α_0 is a constant (the intercept) and $\alpha_1, \alpha_2, \alpha_3, \dots, \alpha_5$ are coefficient estimates, X_3, \dots, X_5 are the input prices, and μ is the error term. The error term, μ , refers to the variance in Total Expenditure per student that cannot be explained by the other terms in the regression equation. Therefore, it may capture the omitted variables which include the socio-economic conditions of the school population which affect cost through their effect on the productivity of the school inputs. Langdridge (2004) notes that the stronger the correlation between two variables the more the points on a scatter gram fall on the regression line and the lower the value of the error term μ .

Therefore to achieve the objectives of this study the following cost function was used,

$$X_1 = a + bX_2 + cX_2^2 + dX_3 + eX_4 + fX_5 + hX_6 + \mu \dots \dots \dots (1.4).$$

The variables considered in this model do not exhaustively define the cost but are key in the context of this study. In this study, the independent variables considered in the model are: School Size (X_2), School Size Squared (X_2^2), School location (X_3), Student Classroom ratio (X_4), Non-Teacher Recurrent Expenditure (X_5) and Expenditure on Teacher Salaries (X_6).

1.13 Conceptual Framework

This study was guided by a conceptual frame work, which was used to explain the interrelationship between variables. According to Oso & Onen (2005), a conceptual frame work is a scheme of variables that a researcher operationalizes in order to achieve the set objectives. The study assessed the influence of independent variables such as school location, financial management in the schools, school size, student-classroom ratio, teacher salaries and non-teacher recurrent expenditure on the

operational efficiency which is measured in this study by the total expenditure per student enrolled in the school (Unit cost) as the dependent variable.

The study established how establishment of secondary schools in selected locations affect the management of financial resources and school size which in turn affect the utilization of other resources such as classrooms (measured by student class room ratio); human resources utilization (measured by expenditures on teacher salaries); and other needs required for school operations (measured by non-teacher recurrent expenditure) all of which are directly expected to influence direct costs of education in the established institution.

In the study, other factors that were considered intervening include the influence of political factors, religious considerations and ethnic considerations in school establishments, location and operation and periodic fluctuations in annual enrolment due to drop out.

The presumed relationships above can better be illustrated in the diagram below:

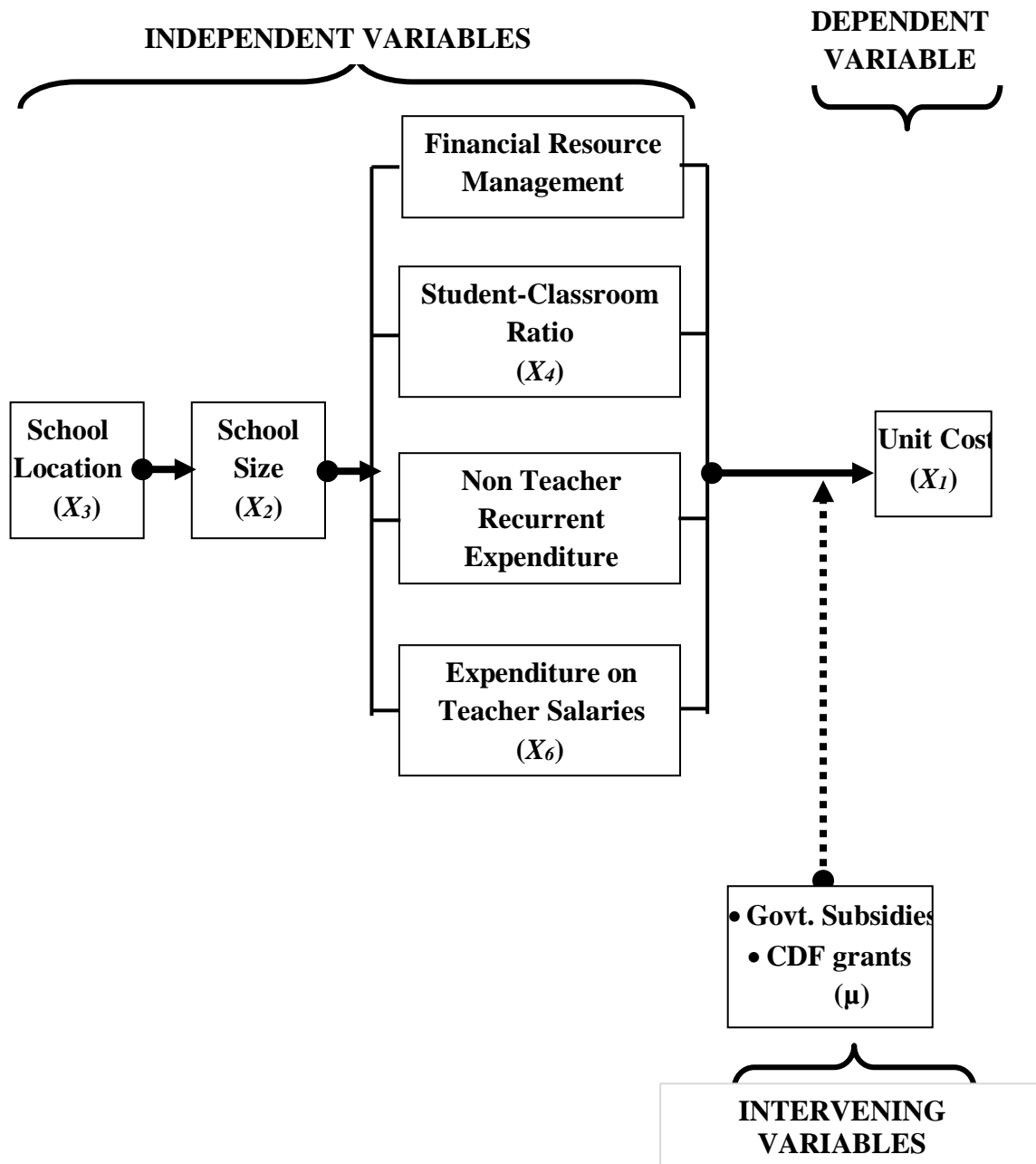


Figure 1-1: Presumed Interrelationships Among The Research Variables

Where;

$$X_1 = a + X_2 + X_2^2 + X_3 + X_4 + X_5 + X_6 + \mu$$

1.14 Operational Terms

Average Interschool Distance: Geographical distance between schools in neighbourhoods or within a similar catchment area.

Average Teacher Salary: The total amount paid to teaching staff employed by the school management (B.O.M) divided by number of the teachers.

Economies of scale- refer to the reduced unit costs as a result of increased enrolment.

It also refers to the benefits that accrue to a secondary school as a result of its large size.

Non-teacher recurrent expenditure-This includes all other expenditures that do not accrue to the teachers for example expenditure on teaching and learning materials and salaries to non-teaching staff.

Operational efficiency: The extent to which a school succeeds in minimizing its operational costs given its target student enrolment. In this study, it was determined by the level of unit costs (total expenditure per student).

School size- this refers to the total number of students enrolled in a secondary school during the year.

School location – Geographical place in which a secondary school is established in relation to the neighboring secondary schools and catchment area. In the study it was measured in terms of Average Interschool Distance.

Student-Classroom ratio-It refers to the average number of students per physical classroom in a school. It was obtained by dividing the average enrolment in the school by the number of available classrooms in a school.

Total Expenditure per pupil-It is the sum of recurrent and overhead cost divided by the total number of students enrolled. It's also referred to as unit cost or Average Total Cost per Student.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter, literary works from various authorities have been examined in order to gather contributions, views, attitudes and theorem regarding fundamental principles that may guide the planning and operation of education institutions. Sources of literature include books, journals, seminar and conference papers, theses and selected periodicals.

The review is based on themes guiding this research such as financing of education, planning of location of education institutions, and lowering unit costs and achieving efficiency in education

2.2 The concept of Operational Efficiency in education

A review of studies on unit costs was necessitated by the need to determine efficiency in the operation of secondary schools.

Li Xigui (2005) observed that the assessment of school- running efficiency is beneficial for the implementation of competence education and improvement of education competitiveness, which is of important theoretical significance and of practical value. In this regard, the operation efficiency was properly defined separately from internal and external efficiency. The variables of analysis are not outlined. The current study attempts to relate operational efficiency to spatial location of the school.

Lewin (1987) noted that where increasing the efficiency of school systems is a priority, like under effects of severe austerity, planners need to concern themselves with cost-effectiveness, efficient utilization of staff and physical facilities. Lewin

further points out that for that to occur, there is need to understand the school process and qualitative inputs that distinguish what he terms 'façade' schools from 'action' schools. Facade schools are high cost, well-organized and efficient schools in which the bulk of students demonstrate useful learning and progress to the next level. Action schools are low cost, poorly organized with irregular attendance and inefficient use of resources where few students demonstrate useful achievement or are promoted to the next level.

According to Ayot & Briggs (1992), efficiency in education imply using some combinations of inputs which yield a better output with lower or same costs.

The concern of this study was to determine how spatial planning of secondary schools influences the unit costs, quality of inputs and hence the outcomes in the institutions. The inputs of interest here are teacher utilization, financial stability and facility endowments. The efficiency of any school under study was judged by the quality of the above inputs in their respective locations.

Studies on the lowering of unit cost in the running of schools include that of Cheswas & Hallack (1972) who did a study in Uganda on expenditure of secondary schools from 1965 to 1967. The study established that the larger the school, the lower the unit expenditure particularly in respect of administrative costs, costs on non-teaching staff and the cost of transport. The study ignored some important costs like expenditure on school infrastructure, teaching staff that is hired within the school and wastages resulting from teacher underutilization. This study examined the problem from both the micro and the macro perspectives.

Coombs & Hallack (1972) Observed that education systems are often squeezed between resource scarcity and rising unit cost and must therefore pursue various

courses of action such as Introducing modern teaching media, Utilizing facilities more fully, Freeing teachers from clerical and housekeeping chores to spend more time on actual teaching, Giving both teachers and students better tools and materials to work with and Enlarging small classes and educational institutions to optimum size

The study was in agreement with one done by Dibski (1983) in Canada, on rural school system. It was found that the actual expenditures of the schools exceeded the expenditures recognized under the foundation program. It proposed three strategies of coping with financial constraints in such schools when enrolments are declining which were reducing costs through bulk buying of goods, use of less experienced staff, further centralization and/or closure of schools, Increasing revenue through property taxes and provincial grants and then Improving efficiency, that is, maximizing use of the existing resources to maintain quality, use of alternative modes of programme delivery and sharing resources with neighbouring schools.

Some of the recommendations regarding reduction of unit costs may have little applicability in Kenya because of the cost implication on both the government and households, in view of existing financial constraints. The other measures are in tandem with the current study for instance full utilization of available facilities, enlarging small classes and institutions to optimum and improving efficiency through sharing resources with neighbouring schools. In the cases above, the connotation of spatial planning and optimality is implied and this study aims at investigating anomalies that arise from improper spatial planning.

The idea of spatial planning for enhancing efficiency also manifests in the studies that advocate school consolidation, like Duncombe (2007). In a study of the achievements of the school consolidation program in Maine, Arkansas and Nebraska among other

states, it was observed that there was a significant decline in school districts from 117,000 in 1940 to 14,200 by 2005. The number of schools in the USA had declined from 172,000 (1948) to 92,000 (2004).

Studies done in South Carolina such as by White (2005) on elementary schools found a strong, negative correlation between school size and per pupil operating expenditures, even when controlling for the effects of poverty. That is, smaller schools in her sample cost significantly more to operate regardless of the percentage of students on free and reduced lunch. Similarly, in Roberts' (2002) study of South Carolina middle schools, data indicated that larger schools were significantly less expensive to operate. However, because he found that smaller schools were associated with higher levels of student performance, Roberts concluded that, "Smaller schools cost more but produce better achievement results. Further, Durbin (2001) found that at the high school level in South Carolina an increase in school size increased, per pupil expenditure decreased significantly. Durbin observed that while the results have varied across studies in regard to the relationship of school size to student academic performance and school climate, all studies have affirmed that at the macro-level of analysis larger schools at all grades are less expensive to run when comparing per pupil operating costs.

Norway had to consolidate small rural schools into larger ones as a policy measure to lower unit cost of running schools after a study by Coombs & Hallack (1972) in Norway and the USA. The study by Basov (1972) in the USSR led to consolidation of small schools to realize economies in operations of schools.

Consolidation, which was carried out amid strong local opposition, led to realization of economies of size with decrease in per pupil spending where student performance, teacher salaries, student characteristics and efficiency were held constant. The economies resulted from the following: Saving on administrative costs, more efficient

size of physical plant, for instance larger school, Greater specialization of teachers especially in science and mathematics and Price discounts for materials, supplies, equipment from greater volume.

Gicheru (2000) and Kikechi (2001) observed that the cost of running education institutions was exacerbated by the inefficient application of limited educational resources by the small under enrolled schools. The schools could only be run efficiently and at reduced cost through expansion in facilities and increased enrolment rather than building of new ones and small ones. The advocacy of consolidation is therefore implied in their opinions since already there is considerable fragmentation and achieving higher enrolments within the existing spatial locations may not be feasible.

The issue therefore, is how to achieve consolidation in order to enhance efficiency and reduce unit costs. This study examines the problem from the spatial perspective so that central places in regard to population density can be most appropriate places for location of schools. The OECD (1966) study of Ireland revealed that village schools had substantially higher costs per student though performance was poorer than larger schools. Consequently, a consolidation program was initiated which led to low costs of running schools.

A similar study was done by Coombs & Hallack (1972) in Norway and the USA. Norway had to consolidate small rural schools into larger ones as a policy measure to lower unit cost of running schools. The study by Basov (1972) in the USSR led to consolidation of small schools to realize economies in operations of schools.

Studies of Muyia (1991) and Kosgei (2001) in Kakamega district of western province and Nandi district of rift valley province respectively, revealed the existence of

rampant cases of secondary school establishments with very low enrolment, some with students between 60 and 100. Such schools are not only wasteful, but also inefficient in the way they operate (Kosgei, 2001). The studies determined the size that was optimal for the schools in the respective districts through the cost function. Both studies therefore strongly advocated increasing enrolments in secondary schools especially through ‘mergers’ (consolidation).

For mergers to take place, however, there should be criteria for determining where the larger institutions would be located. Though this study is fundamentally in agreement, the parting point from previous studies is in the rigor involved in the quantitative analysis of unit costs. The study attempted to analyze qualitative indicators for operational point which is more realistic as regards education phenomenon.

2.3 Planning of location of education institutions and effects on operational costs

Spatial organization of utilities is an alien concept in many less developed countries like Kenya. Many authorities lack a co-ordinated policy such as regional development. Spatial planning of utilities and urban places has definite relationship with efficiency in service delivery. Some studies that have examined this phenomenon include Chrystaller (1933) cited in Leong & Morgan (1982), Poignant (1967), Hopkins & Daniel (1992), Institute for Transport Research and Education (2006), Mutua & Namaswa (1992) and those by education commissions (Republic of Kenya, 1964; Republic of Kenya 1999).

The central places theory

This is a geographical theory that seeks to explain the size and spacing of human settlements. The theory was formulated by Christaller (1933). It hinges on two concepts

- a) Threshold- this is a minimum market (population or income) needed to bring about selling of a particular good or service, in this case educational services.
- b) Range – the maximum distance that consumer are prepared to travel to acquire goods/services. At some point, the cost or inconvenience will outweigh the need for the good.

The model predicts a system of centres of various sizes, with each centre supplying some types of goods, forming levels of hierarchy. From the above, Christaller (1933) deduced that settlements would tend to form in a triangular/ hexagonal lattice this being the most efficient pattern for travel between settlements. There would be a centre for each settlement from which consumers obtain services or goods. A size of each centre is defined by the size of threshold and the extent of range. In the case of education institutions, the size of the school would ideally, be determined by the populations, which constitute the social demand for the education as a service as the threshold, and the range, which is the distance learners, can conveniently travel to the institution.

Leong & Morgan (1982) explored the relationship between the location of towns (central places) and their fields of influence (urban fields) whereby the sizes of the towns are ideally dependent on extend of the urban field. The urban field consists of the population density and size of the surrounding area. They further noted the relevance of the theory of central places in determining the location of business enterprises and administration centres. Their postulations are generalizations that may not have a direct bearing on location of education institutions. They require a careful scrutiny of an education planner, like in the case of this research, to open up a new field in planning location of educational institutions.

Hopkins & Daniel (1992) were however particular in generalizing the central place theory, to location analysis for other phenomena than mere settlements and shopping centres. They noted that Shopping centres and their catchments provide good examples of urban hierarchy, so do education establishments and distribution of other public facilities. Hence, they observed that in the rural areas, the catchment areas of secondary schools could be determined by local inquiry and mapped (Mutua & Namaswa, 1992). Perhaps such a fit is exactly what the education ministry in Kenya lacks, and is basis for this research. However, catchments for secondary schools are more than mere spatial hierarchies. Issues of the economic endowment of a given region and the trust a community has in school management can easily override the spatial hierarchy based on demographic study. Their argument is also based on assumption that the schools are day schools. However, many district secondary schools in Kenya are both day and boarding and hence spatial mapping alone can be misleading.

Similarly, Poignant (1967) came close to this assertion. He pointed out two 'considerations' which though sometimes contradictory, but must be taken into account in locating schools:-the size of population and the catchment areas of the school. He recommends that there must be a certain minimum number of pupils living in an area in order to justify the building or installation of a school. On the catchment, he suggests that the area served by the school should not be too large so that the pupils can easily reach the school from their homes. The assertion is too close to postulation of Walter Christaller (cited in Leong & Morgan, 1982) and forms basis of this study, which however, seeks to determine constraint that may face secondary schools in apparently inappropriate locations and most particularly where they are established close to each other.

On the same premise a study by the Institute for Transport Research and Education (2006), identified some factors that commonly influence optimal location of a new school which included; the location of existing schools, their sizes, their useful remaining lives, projected shifts in school district demographics and increasing or decreasing student population. The study however, did not clarify 'optimality' and its effects. The reference frame for this study is spatial optimality which leads to economic optimality and effects on efficiency in operation of secondary schools.

Mutua & Namaswa (1992), were in agreement with Poignant (1967) about need to consider demographic characteristics of an area in planning of location of primary schools. They further gave specific example of characteristics as; general population size, the population growth rates, the number of the school age children and whether people lead a sedentary life or are nomadic. They affirm the importance of population density as prerequisite in planning for a school. The only limitation about their observations is that operations in primary schools in Kenya differ markedly with those in secondary schools. In the latter institutions, the issue is further complicated by financial implications of improper locations.

According to studies of Ngware et.al (2006), location of secondary schools near the recipients of the service has the effect of increasing access. They identified a specific relationship between increased access to secondary education and the number of schools per square km. But they were also quick to comment that increasing secondary schools should target day schools and new schools to be established should be able to attract enrolment to three streams to ensure better utilisation of teachers. The study advocates increased secondary school infrastructure especially in marginal areas. But the study ignores some pertinent issues regarding the establishment of

secondary schools. The establishment of a secondary school is a more of a community initiative than government policy. In addition, the marginal areas are inhabited by nomadic communities that might never settle long enough in any area to warrant location of a secondary school.

Issues regarding the planning of location of secondary schools are not a new phenomenon in Kenya. The evolution of the 'Harambee' secondary schools during the post-independence period drew the concern of the education commission of 1964, which noted that it requires not only a careful regulation of secondary openings area by area, but also Co-ordination with expansion in the primary sector. It noted further that the scramble for secondary school places, which may be expected to follow a marked decline in the index of opportunity, is liable to provoke strong local and tribal feelings which are disruptive of a sense of nationhood. At that early stage, the commission recognized need for careful planning of secondary school location based on the prevailing demographic characteristics of an area (Republic of Kenya, 1964). It so follows that years of neglect of the commission's counsel, have then overseen uncoordinated sprawl of unviable secondary schools in close proximity, which this research endeavoured to establish.

Nevertheless, nearly half a century later, the problem of uncoordinated planning in expansion of education still docks the education sector. The TIQUET report (Republic of Kenya, 1999), observed that the ministry of education was poorly equipped with data critical in planning for establishment of secondary schools such that the anomaly of existence of over enrolled and under enrolled secondary schools in close proximity characterized the provision of education services. It therefore recommends proper planning and guidelines for the establishment of new schools in order to curb the mushrooming of schools which are, as it correctly observes, mostly unviable.

According to government estimates (Republic of Kenya, 2003 cited in Ngware et al 2006), 46.5 % of secondary school students were enrolled in a single streamed school, 33 % in two streamed schools while 20.5 % in three or more streamed schools. The statistics indicate that already there was a high concentration of schools and consequent wastage of resources. Some of the single stream schools remain unviable as observed earlier by Republic of Kenya (1999). This study seeks to establish the magnitude of the problem through analysis of some variables that influence operational efficiency of secondary schools and hence determine their viability. It is important to note here that the study problem of this research emanates from TIQUET report concerning planning, co-ordination and expansion of education and training (Republic of Kenya, 1999: 242).

Similarly, Muyia (2000) raised concern about existence of small under enrolled secondary schools for individual communities. In the study *Determining the optimum size of secondary schools; a case study of Kakamega district*, it was found that small schools in neighbourhoods had enrolments of 60 – 100 students. They were also unviable and could be merged. The study overlooked spatial dimension of the problem which basically, underlie the issues of enrolment and hence viability of the secondary school. This study factored the spatial aspect in the cost function analysis; the Average Interschool Distance which provided a practical aid for evaluating the influence of school location on operational efficiency.

2.4 Financing of education in Kenya

Since the theory of human capital was widely accepted in the 1960s, economic and social conditions in which planning takes place have changed dramatically. The north, which has experienced political realignments, economic recession and rising unemployment, have had to adopt restrictive policies on public investment in education (Lewin 1987). The south however has experienced difficulties in responding to growing demand for universal enrolments where resources available to governments have been adversely affected by global recession as well as slow economic growth.

Generally, the amount of public expenditure on education has been slowing down in most parts of the world as illustrated by published studies such as Coombs (1985); Eicher (1984,1985); Hicks & Kubisch (1984); Psacharopoulos and Woodhall,1985; UNESCO (1985) Cited in Lewin (1987) and World bank (1980). For instance estimates of world public expenditures on education as percentage of GNP was 5.7 % by 1982 (UNESCO, 1985; cited in Lewin, 1987) but by 2000, it declined to 4.4 %.(world development database). Even sub-Saharan Africa's expenditures declined from 5.2% to 3.4%.

The real growth in educational expenditure has not had the dramatic increases in percentage allocation as it were in the 1960s and 1970s (Lewin, 1987).Unlike the trends observed in the above studies, Kenya has seemingly experienced increasing allocation to education. Kenya's proportion is 7%, which is double the sub-Saharan percentage of 3.4%. This has been confirmed by a number of authorities such as the World Bank (1980), Olembo (1985), Riak (1986), Rono (1988) and Ayodo (1991).The studies correctly points out the rise in social demand for education and the

government's perception of the importance of education, as the major cause for phenomenal growth in expenditures on education.

2.5 Secondary Education financing in Developed Countries

According to the World Bank (2005), secondary education in the developed countries was subsidiary to higher education, and this relationship has influenced policy, choice of providers, curriculum decisions, teacher recruitment and training, evaluation, accreditation, and certification.

In the 20th century both U.S. and Soviet education policies led to secondary education models aimed at the creation of massive systems that emphasized open access and universal coverage. After 1945, what were later called comprehensive secondary schools began to spread from Northern to Southern Europe. In comprehensive schools all students receive secondary education in a single institution, based on a common curriculum, and may be streamed through elective subjects. This is in contrast to students being tracked and grouped either by academic ability or by choice on entering secondary education. Meanwhile, the vocational approach to secondary schooling developed rapidly in Eastern Europe. By the 1960s and 1970s secondary education was de facto linked more to primary than to tertiary education. The extension of compulsory education had entirely changed the concept, as well as the duration, of basic education, to the point that basic education usually included lower secondary schooling. Raising average level of schooling was seen as an important objective and as a measure of the success of education reforms. Many other countries have embraced the goal of extending and expanding the notion of basic education to encompass much of what used to be restricted-access, elitist secondary schooling.

Goldin (2001) argues that the spectacular expansion of secondary education in the United States, which took place 40-50 years (two full generations) before the corresponding expansion in European countries, had to do with a template that entailed a sharp departure from the European tradition of secondary schooling. This U.S. template encompassed a number of virtues: public funding and provision; an open and forgiving system (non-selective, with no early specialization or academic segregation); an academic yet practical curriculum; numerous small, fiscally independent school districts; and secular control of schools and school funds. In sharp contrast with the United States, in European countries nearly half a century elapsed between when primary education was generalized and made free and compulsory and when access to secondary education was opened to all. In 1945 countries such as France, Ireland, and Spain enrolled a fairly low proportion of the relevant age group in secondary education. In developed countries, education beyond the compulsory level was usually financed in part and sometimes wholly by the state. In Britain, education up to secondary school level was fully financed by the government (Moon & Mayes, 1994). Parents are only required to ensure that children attend school. In Britain, Education Authority and Central Government are required by Section 7 of the 1944 Act to make education facilities available. This enables parents to carry out their legal duty. Parents are seen as the school's prime legal clients until the child is 16 years of age. Section 36 of the Act states that it shall be the duty of the parent of every child of compulsory school-going age to cause him to receive full-time education suitable to his age, ability, and aptitude, either by regular attendance at school or otherwise (Moon & Mayes, 1994). The study sought to find out whether in the Kenyan situation the parents had similar roles in the provision of education for their children.

In Japan, the government fiscal policies provide for free education up to secondary School level. Those of school going age have no option other than attend school to acquire education that is fully funded by the government (Nyaga, 2005). In the United States of America (USA), the Federal Government supports public education. The government is empowered by the Constitution Welfare Clause, Article 1 Section 8, to levy taxes and collect revenues for the support of education. However, the Congress decides the extent of such support (Nyaga, 2005). The situation in Kenya is not different from that of Japan and America as the government and the community participate in the provision of education.

In Canada, school fees are an integral part of education system. Parents are asked to contribute to their children's education through payment of fees (Nyaga, 2005). However, the government recognizes that some parents are sincerely not in a position to pay so the government makes provisions to ensure that a child is not denied access to education because of an honest inability to pay fees. The department of education in Canada works with school boards, parents, teachers, and other partners to ensure that policies governing school fees are implemented consistently in all the provinces (Nyaga, 2005). The levels of income in Kenya are low and many parents cannot finance education for their children. In effect the government meets the bill for teacher salaries and has initiated a Free Day Secondary Education programme. The responsibility of developing school infrastructure still largely remains with the parents and where many of secondary school units are established with low enrolments, there is an unnecessary escalation of education costs for parents and the government. This study therefore was focussed on establishing the economic viability of some secondary schools.

2.6 Secondary Education in Sub-Saharan Africa

According to the World Bank's report on Governance, Management, and Accountability in Secondary Education in Sub-Saharan Africa, international trends in secondary education have been driving much of the need for reform in secondary education throughout the Sub-Saharan Africa (SSA) region (World Bank, 2008). The international commitment to basic education for all and free universal primary education that coalesced around the 1990 Jomtien and the 2000 Dakar meeting has driven the policies and financial investments of donors and developing nations alike. The successes of this international movement have addressed many of the equity and quality issues facing developing countries as they expand their educational systems. EFA has thus drastically increased the demand for secondary education while competing with the resources necessary to respond to that demand (World Bank, 2008).

Another international trend that is driving change in SSA countries is a move towards compulsory secondary education. Longer periods of compulsory education are becoming a worldwide norm. Lower secondary education is almost universally compulsory in Asia, North America, Europe, and Australasia. Some SSA countries are extending basic compulsory education. In Mali, basic education is going from six to nine years, in Senegal and Zambia, basic education lasts for eight years. Longer basic education allows more time for the consolidation of learning (Holsinger & Cowell, 2000). The introduction of FSE in Kenya appears to be a move toward the extension of compulsory education to the secondary school level. In South Africa, user fees are identified as a barrier to education (Veriava, 2002). While school budgets are funded by allocations from state revenue, school fees are required to supplement these budgets so that schools are able to run smoothly. The South Africa

School Act (SASA) provides that a majority of parents at a public school may determine whether or not school fees are to be charged and the amount that would be paid.

There was however exemptions from paying school fees for parents who could afford to meet the cost. Exemption is extended to parents whose income is less than 30 times, but not more than 10 times the amount of fees (Veriava, 2002). In Kenya the government has a uniform allocation criterion for secondary tuition, meaning that education is accessible to every qualifying student graduating from primary school. The study sought to find out whether government allocations to some schools were adequate to meet the financial needs of the schools. The demand for secondary education is increasing rapidly in almost all SSA countries. Verspoor (2008) notes that between 1999 and 2005 primary school intake increased by almost 40%; adding that even though survival rates have remained stable so far, this still implies a very large increase in the number of primary school graduates that are seeking a place in secondary school. With increasing completion rates the number of primary school leavers could even triple by 2020 in many countries in SSA (Verspoor, 2008).

This creates an enormous challenge for secondary education policy which needs to be designed not only to respond to inevitable rapid increase in demand for access but also to provide the quality of instruction necessary to ensure the supply of personnel with higher levels of education and training demanded by a growing and modernizing economy. Breaking away from the low growth equilibrium that has characterized too many African economies for too long will require sustained investment in the improvement of human resources, including most importantly secondary education (Verspoor,2008). The introduction of free secondary education in Kenya shows the

government commitment to provision of secondary education to all Kenyans. However, without development of human resources and posting of adequate teachers to schools, the quality of education could be jeopardized.

According to Lewin (2008), projections of the financing required for a significant expansion of access to secondary education - including progress towards a basic education cycle of 9 or 10 years- indicate that enrolments in secondary education cannot be expanded at present unit cost levels. Constrained by limited public resources and in the absence of significant policy reforms, SSA countries have responded to the increased demand for secondary places by spreading the same resources over larger number of students (Verspoor, 2008). Consequently, essential inputs often are in short supply resulting in increasing class sizes, shortages of textbooks, instructional materials and supplies, poorly stocked libraries and double or triple shift use of facilities. This study sought to establish the influence of quantitative expansion through creation of new secondary schools closer to others on costs incurred to provide education.

Even in countries where public education has traditionally been free, private contributions to the financing of government schools are increasingly important. Lewin (1987) observes that in public schools in Uganda, Tanzania and Zambia more than half of the total costs per student are financed through fees and other parental contributions. In Kenya, Boards of Management (B.O.M) hire additional teachers paid from fee income to fill teaching positions for which no government teachers have been assigned and virtually all physical facilities for government secondary schools have been funded by parents (Republic of Kenya, 2005). Zambia established in 1996 Education Production Units which enrol students who fail to find regular places in

fee-paying afternoon sessions run by teachers (who participate on a voluntary basis to supplement their income) in school premises. In 1996 Zambia established Education Production Units which enrol students who fail to find regular places in fee-paying afternoon sessions run by teachers (who participate on a voluntary basis to supplement their income) in school premises, which points to high cost of regular schooling. In Rwanda 80% of the students are enrolled in private schools, almost 40% of which receive no public subsidy and have to rely on fee income (Verspoor, 2008). The initiative of FSE was to ensure that every child can access secondary education by reducing the financial burden on parents.

In Benin the majority of the teachers in junior secondary schools are local contract teachers paid at least in part from fee income paid by parents. In the Democratic Republic of Congo parents pay more than 80% of the cost in both private and public secondary schools (World Bank, 2005). In Burkina Faso the government provides two government paid teachers for every newly established lower secondary school; communities and other providers are expected to contract additional teachers as needed. In Chad half of the teachers in junior secondary schools are community teachers mostly paid by parents (World Bank, 2007). In Kenya, the introduction of FDSE was expected to lead to increase in enrolment at the secondary school level, and this requires additional teachers. This study sought to establish whether development of new secondary schools led to more efficient use of available teachers where new schools are established or if it just escalated the cost incurred in providing education at this level of education.

Other challenges facing secondary education in SSA countries concern provision of goods and services for schools. Most SSA countries no longer rely on public entities

for the provision of goods and services, in particular classrooms and textbooks. Textbooks are procured from private publishers and private contractors sometimes hired by schools or communities build most classrooms. A review of textbook provision in 18 countries in SSA by Bapuji et al(2008) cited in Chabari (2010) found that secondary textbooks were entirely financed by parents in 11countries; entirely financed by government in 5 countries (although not always adequately); and financed by government in 2 countries with funding levels that assumed significant parental contributions.

Bapuji et al (2008) noted that secondary textbooks especially at the senior secondary level are often imported and produced at high costs with presentational specifications that are unaffordable for many parents and governments in SSA. Verspoor (2008) proposes that effective textbook supply strategies will depend on a vibrant local publishing industry and effective booksellers' network. In smaller countries regional cooperation is essential to keeping cost down. The cost of construction of classrooms and specialized facilities is another important cost item that needs careful consideration. Verspoor (2008) proposes that at the junior secondary level facilities can resemble primary school facilities, which can often be constructed at reasonable cost by communities without expensive specialized rooms(as is the case for example in Kenya where the government has only constructed classrooms in the most disadvantaged areas) (Republic of Kenya, 2005). Where classroom need to be constructed a transparent process of procurement that is decentralized, managed at the school level and simplified to allow tendering by smaller local contractors will usually be the most cost effective.

2.7 Secondary Education financing in Kenya

In Kenya, as in other developing countries, the provision of quality education and relevant training to all is the key determinant for achieving the national development agenda. The government of Kenya has therefore focused its main attention on formulating appropriate education policies to ensure maximum development of the human resources who are essential for all aspects of development and wealth creation through industrialization. All education stakeholders recognize that quality education at all levels will enable Kenyans to utilize their natural resources efficiently and effectively in order to attain and maintain desirable lifestyles for all Kenyans (Munavu, et al, 2008).

In effect, the pressure on government financing has mounted since independence when education took only 18% of the budget in 1963, but by 1985, the proportion was 35 % (Ayot & Briggs, 1992). Despite the cost sharing measures, expenditure rose further as a result of the inception of the free primary education. Despite such policies, the burden of expenditure on education has never eased. To date, expenditure on education account for Five to Ten percent of the country's GDP, consuming up to 35% of the public sector recurrent budget (Republic of Kenya, 2005).

Table 1 below illustrates the magnitude of dilemma of financing education in Kenya.

Table 1-1: Ministry of education expenditure (2002/03 -2006/07) Kshs million

	2002/03	2003/04	2004/05	2005/06	2006/07
Recurrent expenditure	61,557.81	72,410.54	0,239.91	88,357.51	99,806.41
Development expenditure	2,547.39	4,314.25	4,771.47	4,002.84	10,020.79
Gross total Expenditures	64,105.39	6,724.79	85,011.38	92,360.35	09,827.20
Percentage increase in total Expenditure	-	19.7	10.8	8.6	18.9

Source: Economic survey 2007:p43

From the table, it can be seen that there has been a perpetual increase in government expenditure for the period 2002/03 to 2006/07 with annual increases of up to 19.7%. The government is likely to be faced with limited fiscal options as it should not be construed that there always is a bottomless depot of finance for various expenditures. The government must therefore seek alternative means of financing education such as cost sharing and initiating income generating project in secondary schools (Republic of Kenya, 1999). However, the former option is unlikely, considering the low per capita income of an average Kenyan household. Secondary education already costs an average household 49% of annual spending and cost sharing would only exacerbate poverty.

A study by Centre for research and Development (2004) revealed that the subsidy given by the government of Kenya to primary schools to facilitate free learning was very inadequate. While Ksh 1,020 was given, it required an average of Ksh 6154 per pupil per year. The schools are forced to bear the brunt of the deficit (Ksh 5134). The implication is that schools have to look for extra monies from parents, communities or

well-wishers to meet both direct and indirect cost of learning. If extra resources are not mobilized the teachers and pupils have to bear with shortages of teaching learning facilities and materials (CRD 2004). However, most studies hardly explore methods of rationalizing the resources available for education in such a way as to make education more affordable to the government as well as the public. This study attempts to explore ways of minimizing wastages through wise investments in education.

Many studies in education financing in Kenya tend to focus on primary education and ignore the unique attributes and evolution of secondary education. Such studies include the World Bank (1980, 1981), Rono (1988), Gravenir (1991) and Achola (1988). Community initiatives in financing secondary education far out did government allocations until the inception of 'free secondary education' as noted in the Ominde education report (1964) and the Kamunge report (1988). Most secondary schools were initiated and maintained as community schools (Harambee) until recommendations of the latter report (Republic of Kenya, 1988) when they were classified as public schools, hence drawing paltry support from the government in the form of staffing. In the study by Mwiria and Ogbu (1999) cited in Chabari (2010), Government subsidies were found to hardly exceed 8% of financial resources for secondary schools while household contributed 91-100%.

In view of that, cost sharing and recovery strategies in the financing of secondary education are inapplicable. Instead, a strategy that could promote community initiatives through regulation of secondary school establishment would not only save the household and the government wasteful investments but might also promote establishment of fewer but reliable institutions.

Further, Gravenir (1991) advocates initiating income generating projects in schools as an alternative measure of reducing dependency on already overburdened government. However, the Education act does not ascribe to commercial activities for schools. In addition, the accounting system in schools would not easily be adapted for such transactions. The approach of this study to the impasse is different. It will attempt to evaluate how improper planning of location of secondary school institutions affects efficiency and hence resource utilization. Larger sized, more efficient systems may probably reduce the overall burden to communities and the government.

According to Onderi & Makori (2013), the number of public secondary schools in Kenya rose from 3,684 in 2002 to 4,245 in 2007 as a result of Constituency Development Fund (CDF), Local Authority Transfer Fund (LATF) increased infrastructure investment into the sector. Enrolment at the secondary level grew by 38.6% from 851,836 in 2002 to 1,180,268 in 2007 resulting from increased enrolment in primary school due to the introduction of free primary education (FPE) in 2003. The review also indicate that over half (57%) of those who complete primary school education progress to secondary level. The total number of public and private secondary schools in Kenya are almost one third (6,484) of all primary schools in Kenya (18,000) (Republic of Kenya, 2008), which is a serious challenge. Similar trend is also reflected in Africa as a whole. UNESCO (2005; 2010) cited in Ohba (2011) indicate that the general secondary education average enrolment (NER) only increased from 18% in 1999 to 27% in 2007. Some Kenya's strategies to deal with the shortfall in secondary schools to a minimum of three streams; establish new mixed day secondary schools especially in deficit areas and improvement of facilities in existing secondary schools (Republic of Kenya, 2008)

In order therefore to attain the desired millennium development goals (MDGs) and education for all, the introduction of free secondary education was intended to reduce the cost burden on parents and enable more children access and attain the minimum basic secondary education. There are, however, many challenges which threaten the sustainability of a robust educational regime in Kenya. The key challenges include low enrolment and retention rates, constricted access and equity at higher levels, establishment and maintenance of quality and relevance, and myriad inefficiencies in managing the limited resources allocated to the education sector (Republic of Kenya, 2005).

Implementation of the free primary education (FPE) has been responsible for the recent upsurge in the secondary school enrolments since 2003. Enrolment trends in secondary schools show a steady growth from 30,000 in 1963 to 860,000 students in 2003, and to over 1 million in 2006 (Munavu et al, 2008). Similarly the number of public secondary schools increased from 151 in 1963 to 3660 in 2005 (Republic of Kenya, 2005). One of the factors limiting growth in Gross Enrolment Ratios (GERs) at the secondary level is the limited number of secondary schools compared to the number of primary schools. The current gapping mismatch between the capacities at these levels is approximated by comparing the number of primary and secondary schools. The number of public primary schools was 18,081 in 2003 compared to 3,660 public and 641 private secondary schools in the same year (Republic of Kenya, 2005). This mismatch will pose a major challenge in implementing the declared government policy of free secondary education with effect from 2008.

Previous studies have shown that secondary education in Kenya is faced with a number of challenges. These challenges fall under the various school management

task areas, which, according to Okumbe (2001), include management of staff personnel, pupils, school finance, physical and material resources, and the curriculum. A study carried out by Mbaabu (1983) revealed that lack of physical facilities, materials, equipment and tools were among the major problems that school principals are faced with in Kenya. The study found out that in most schools classes had over 50 children. This study revealed that free education at the primary level brought about problems related to over-enrolment, lack of physical facilities, and inadequate teachers. This study also sought to establish whether, with the introduction of free secondary education, similar challenges are experienced in general and in particular Bungoma County.

Cameron (1986) indicates that school principals face increasing administrative difficulties. These include inadequate and badly constructed buildings; shortage of books and equipment; lack of proper school furniture particularly desks; poor or sometimes non-existent maintenance and repairs; untrained and half trained teachers who seldom stay long; over-crowded classrooms; poor communications and few supporting services especially health services. As a result the administration of schools has become one of the most taxing jobs in the whole education system.

In relation to the structure of physical facilities, Olembo & Ross (1992) indicate that the development efforts of school principals have sometimes been frustrated because of lack of space for extension of the school, lack of housing for teachers and worse still lack of essential facilities like desks, chalk, books and so on. In secondary schools however, some schools which have been established are faced with the challenges of limited resources and facilities due very low levels of enrolment. The Principals rely on very few students to finance operations and development of

facilities which causes efficiency issues in provision of quality education to students in the schools. Some newly established schools do not have adequate classrooms and where they exist they are sometimes in very poor condition, which are hazardous to students and staff. Such a situation is likely to be observed in public secondary schools at present. The study therefore addressed the challenges faced in the financing of education as examined below:

2.8 Challenges Related to Material and Physical Resources

According to Republic of Kenya (1999) effective implementation of the curriculum calls for the provision of adequate and appropriate facilities, equipment, learning and teaching materials. The Republic of Kenya (1999) also observed that almost all the previous Education Review Reports stressed on the need to provide facilities, equipment, learning, and teaching materials. In its inquiry the Koech Commission found out that most of the secondary schools do not have adequate facilities, equipment, and materials for the teaching of practical subjects. The situation worsens with Subsidized Secondary Education. In the process of conducting its inquiry, the Commission noted that the interaction between teachers and students was better where the class size was between 25 and 35 students. Against this background and in view of the need to provide quality secondary school education, the Commission recommended that deployment of secondary schoolteachers be reviewed with a view of effecting a Pupil Teacher Ratio (PTR) of 35:1 and that the average class size in secondary schools segment be 35 students (Republic of Kenya, 1999). With the introduction of SSE secondary schools in high potential areas are required to have a minimum of 40 and a maximum of 45 students per class in order to qualify for TSC teachers and government funding (MOE, 2008).

The management of material resources entails planning, acquisition, allocation, distribution and controlling the use and maintenance of the materials. Onyango (2001) states that planning for material resources involves the identification of the resource requirements, assessing quality in terms of the needs, establishing criteria for standards, determining the cost per unit and the use of the materials whether by individuals or groups. With the introduction of Free Secondary Education, schools could have registered over-enrolment, which means that the resources available in schools are constrained. The principal is also responsible for the school facilities.

Bell and Rhodes (1996) noted that school facilities include the administrative office, staff rooms and offices, classrooms laboratories, workshops, equipment, stores libraries, hostels, staff houses and the school grounds. In order for a school to advance the learning opportunities offered to the pupils, it has to adequately utilize the facilities available. It is the responsibility of the principal to ensure that there is adequate classroom space to enable the teaching-learning process take place without any hitches. He should ensure that the facilities are used efficiently and effectively. The school grounds e.g. play grounds should be safe and well maintained. Verspoor (2008) argues that increases in public spending will be inadequate to generate increases in education attainment and learning achievement unless accompanied by reforms that aim at a more efficient use of available resources and find sources of additional funding. He advises that well structured Public-Private Partnerships (PPPs) can help diversify the sources of financing and provision.

Mbugua (1987) says that one of the duties of the principals in Kenya is to develop the school's physical facilities. She argues that in dealing with physical facilities, a principal has to bear in mind where to house the educational program, the population

to be served by the facility and ensure that financial resources are readily available for the school expansions. This is achievable where the school enrolment is sufficient to provide the requisite financial resources. In newly established schools enrolments are normally low and principals are faced with large fee balances, making it very difficult for the principal mobilize the development of facilities for such school which affects the quality of education in such school. This study sought to determine whether low levels of enrolment in schools led to escalation of education costs through provision of additional physical facilities.

2.9 Challenges Related to School Human Resources

Onyango (2001) emphasizes that human resource is the most important resource in a school organization. He adds that teachers comprise the most important staff in the school. However, the contribution made by other staff members such as secretaries, bursars, accounts clerk, matron, nurses, messengers and watchmen is also important. Odhiambo (2005) observes that the most important purpose of a school is to provide children with equal and enhanced opportunities for learning, and the most important resource a school has for achieving that purpose is the knowledge, skills and dedication of its teachers. Teachers therefore need to be well managed. The principals' responsibility in human resource management involves: Leading and motivating staff; delegating responsibilities effectively; and conflict management. With increased number of students as a result of free secondary education, teacher-students ratio is likely to be high, leading to increased workload for teachers. This is likely to pose a challenge to principals, who are expected to ensure that the quality of education is not compromised.

The Koech Commission (Republic of Kenya, 1999) recommended that deployment of secondary schoolteachers be reviewed with a view of effecting a Pupil Teacher Ratio (PTR) of 35:1 and that the average class size in secondary schools segment be 35 students. With the introduction of FDSE secondary schools in high potential areas are required to have a minimum of 40 and a maximum of 45 students per class in order to qualify for TSC teachers and government funding (MOE, 2008). However, where new schools are established and enrolments are low, the principals encounter financial difficulties resulting from need to hire teachers. This is aggravated by the fact that the government may not post teachers due to a low enrolment leading to a low Curriculum Based Establishment. Since some subjects must be taught, the schools are forced to incur more to employ teachers which escalate costs of education.

2.10 Challenges Related to Adequacy of Finances

Principals play a major role in the management of all school financial activities, which involves the disbursement of money. The money is obtained through various sources such as fees. According to Orlosky (1984), financial management determines the way the school is managed and whether or not the school will meet its objectives. The principal is responsible for budgeting, accounting and auditing functions of financial management. With the introduction of free secondary education, schools get some funding from the government while parents are required to meet various other costs such as school development projects and boarding fees (Republic of Kenya, 2005).

In the financing of secondary education in Kenya, the Ministry of Education operates a bursary scheme at secondary education level in order to enable students from poor families to get access to secondary education. A study done by Njeru & Orodho

(2003) both of the Institute of Policy Analysis and Research (IPAR) found that only about 22% of the children belonging to the poorest quintile enjoy bursary relief. However at the current level of funding, bursaries provide only 4% of relief of the total cost per student in secondary schools. In the background of extreme poverty in school environs, schools end up accumulating large fee arrears as the bursary schemes are not sufficient to enable parents to clear fee arrears. This poses a managerial challenge to principals who rely on fee payment to procure materials and services in order to facilitate learning.

Achola (1988) studied the financing of secondary schools in Kenya and found out that the public expenditures on education were too high and unrealistic and recommends for urgent need for community and local governments to finance the supply of education with a very limited support from the central government. The study fails to suggest ways of putting the existing finances into better use by the institutions. The current study was centred on how best the existing financial resources in secondary schools can be efficiently utilized.

2.11 Summary

The chapter has reviewed works and opinions of various authorities in Kenya as well as the rest of the world, regarding the issues of operational efficiency of schools, the case for coherent of planning of location of secondary school institutions, education financing and related challenges that warrant rational allocation of scarce resources.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Overview

This chapter outlines the plan and methods that were used to capture information crucial for verification of research hypotheses. The focus here is on description of the study setting, the research design, the target population and sampling procedures, research instruments, validity and reliability and methods of data collection and analysis.

3.2 The Study Area

The study was conducted in Bungoma South Sub-county in the Bungoma County. The Sub-county initially constituted the larger Bungoma South District which was created from the greater Bungoma district in 2006 covers an area of 664.3 sq km with an estimated total population of 410,685 by the time this study was done. The District had headquarters in Bungoma town where Sub-County Education offices were located. The economy of this district hinges mainly on small-scale agriculture with tobacco and sugar cane being the major cash crops. In the urban area, trading and commercial activities are the mainstay. A large proportion of the inhabitants are however peasant farmers who can barely foot the cost of secondary education (County Statistics office, 2008).

The researcher's choice of this area is primarily based on the fact that the Sub-County experiences a high proliferation of secondary schools, despite the relatively high incidence of poverty, which raises questions on their cost effectiveness (Bungoma South Sub-county Education QUASSO, 2005). The area is also accessible and therefore the costs of carrying out the study would be greatly minimized.

3.3 Research Design

The study employed a descriptive survey research design. According to Oso & Onen (2005), survey provides quantitative and numeric descriptions of some part of the population. In this design, cross sectional data relating to both quantitative variables was gathered at a specific time in order to verify the stated hypotheses. It was assumed that the variables were normally distributed and a cross sectional study fairly estimated trends of variables. The reason for choice of this design is that it did not involve manipulation of variables but only provided an insight in to the operations of school systems by gathering data on some variables.

3.4 Target Population

Mugenda and Mugenda (1999) define a population as a complete set of individuals, cases or objects with some common observable characteristics. A target population is that population to which a researcher wants to generalize the results of a study. The study area has a total of 46 public day secondary schools spread over seven zones. Hence the target population was 46 principals of each of the day secondary schools in the Sub-county.

3.5 Sample Size and Sampling Procedure

The study used stratified and proportional random sampling to select a sample of 19 schools from the 46 secondary schools which are spread across seven zones as shown in table 2. The sample constitutes 41% of the population and is sufficiently above 20% as recommended for educational descriptive research (Van Dalen 1979). The large proportion is sufficient to counter bias that may result in estimating parameters since the phenomenon under study is not homogenously distributed (Kothari 1985).

Sampling is the process of selecting a sub-set of cases in order to draw conclusions about the entire set. A sample is a small part of large population, which is thought to be representative of the larger population. Any statements made about the sample should be true for the entire population. As noted by Cohen (2003), factors such as expense, time and accessibility frequently prevent researchers from gaining information from the whole population. Therefore there is need to obtain data from a smaller group or subset of the total population in such a way that the knowledge gained is representative of the total population under study.

Table 2: Registered public secondary schools in Bungoma south sub-county

Name of zone	No. of schools	sample size	Percentage
Bumula	5	3	60
Kabula	5	2	40
Siboti	4	2	50
Kimaeti	5	3	60
Municipality	11	4	36
Sang'alo	8	3	38
Mwibale	8	2	25
Total	46	19	41

Source: DEO office, Bungoma South Sub-county

The choice of the sampling technique was due to the grouping of the schools in to the seven educational regions which exhibited unique spatial distribution of secondary schools. A school in each region therefore stood an equal chance of being included in the study. The sampling of schools was made in such a way that at least 20% of schools in each zone could be included in the study. Hence while Bumula, Kabula,

Siboti and Kimaeti had over 40%, Sang'alo, Mwibale and Municipality zones had between 25% and 40% included in the study. In the schools sampled, 19 principals were respondents for this study.

3.6 Data Collection Procedures

Research instruments were administered to respondents in sampled secondary schools in Bungoma south Sub-county after valid research permit was issued and permission granted by the Ministry of Education, through its agent who is the District Education Officer (DEO) Bungoma south sub-county. The researcher personally visited sampled schools, whereby he administered the Questionnaires to principals. The principals' questionnaires captured information about the size, school expenses, facilities and the financial status of the school.

3.7 Research Instruments

The study used a structured questionnaires to collect data. Structured questionnaires facilitated easy and quick derivation of information within the short period of time when data was collected. They enabled large quantity of data to be collected over a short period of time over which the research was to be conducted. Kerlinger (1973) notes that a questionnaire is an appropriate data collecting instrument as it gives the respondent time to give out well thought out answers and also effective when analysing collected data especially using computer coding. It has the following advantages: low costs, it is free of bias and large samples can be made use of and the results can be more dependable and reliable. However, the method has some rigidities because of the difficulty of amending the approach once questionnaires have been dispatched; there is also the possibility of ambiguous replies or omissions of replies to certain questions (interpretations of omissions is difficult) and it is difficult to know

whether willing respondents are truly representative. Both open and closed ended questions were used in the questionnaires and involved use of Likert Scale, single answer questions, numeric, skip contingency and multiple questions.

A structured questionnaire was administered to principals in sampled schools in order to capture data on school characteristics interschool distance, school facilities, school expenditures and financial resource utilization in the year of study (2008)

3.8 Validity and Reliability of Research Instruments

3.8.1 Validity

Validity is concerned with the degree to which an empirical measure, or several measures, of a concept accurately represent that concept. Validity, according to Borg and Gall (1989) is the degree to which a test measures what it purports to.

The researcher scrutinized the tools to ensure that they were valid. The research instruments were availed to members of the department of Educational Management and Policy Studies-Moi University to examine the relevance of the content used in the questionnaires in relation to the purpose of the study. The validation of the instruments ensured that the data captured was relevant for the verification of research hypothesis. The feedback was provided and utilized by the researcher to modify the items to ensure that enabled the researcher to investigate the variables in the study.

A pilot study carried out in the neighbouring Sirisia Sub-county enabled the researcher to interact with respondents hence the researcher scrutinized the shortcomings in the items in the questionnaire. Sirisia Sub-County has similar socio-economic circumstances like those of Bungoma South and exhibit a trend of proliferation of secondary school establishments. Some sections were too wordy and

tended to obscure the aim of the questionnaire items. Therefore, the instructions of some sections were simplified and modified accordingly. Hence the research commenced with certainty that correct data would be obtained.

3.8.2 Reliability of research instruments

The reliability of research instruments in this research was determined after a pilot study was carried out in two schools in the neighbouring Sirisia Sub County before the actual study. A test-retest was done in which the same questionnaire was administered twice to the 4 principals from a neighbouring Sirisia Sub County. Sirisia Sub County was selected for the pilot study because it shares common socio-economic conditions with the area of study. Both were part of the former larger Bungoma district. Schools in the two sub counties exhibit similar conditions. The study area was not used for the pilot study in order to minimize probability of respondents within the same regions sharing information required for study. This could have led to generation of specific responses which could be unreliable for actual study.

The administration of the questionnaire in the pilot study was done at interval of one month in order to minimize tendency to regenerate responses based on earlier responses given. A correlation between responses in the two administrations done with use of the Pearson's product-moment correlation coefficient (r). A correlation coefficient of 0.7 was obtained and this was considered sufficient for adopting the research instruments as suggested by Mugenda and Mugenda (1999).

3.9 Data analysis Techniques

Data which was collected from questionnaires was tabulated, coded, and processed by the computer using the Statistical Package for Social Sciences (SPSS) 20.0

programme. The programme provided a vital tool for processing the data and generating the summaries as an output. Descriptive statistics techniques were used to analyse the qualitative data and these included frequencies, means, standard deviations, and percentages were used in analysis of opinions of respondents on spatial relationships which was mainly qualitative data. Means were used in analysis of teacher workloads and pupil classroom ratios. Tables were used to present findings. Quantitative data was further analysed with use of the Multiple regression analysis was used to test hypotheses in order to determine the degree of variation in unit cost explained by spatial factors and internal factors. A co-efficient of determination (R^2) was obtained as 0.859 which meant the proportion of variations in unit costs were attributable to the independent variables. The significance of coefficients was tested with use of critical values of the t-test at a confidence level of 0.05.

3.10 Ethical consideration

Kombo & Tromp (2006) note that researchers whose subjects are people or animals must consider the conduct of their research, and give attention to the ethical issues associated with carrying out their research. Where possible some of the respondents were contacted in the course of carrying out a pilot study and their consent obtained. They were informed about the objectives and significance of the study and where they were in doubt clarifications were made.

The respondents were made aware that the aim of the study was not to audit the school accounts and that they were to feel free and assist the researcher in achieving the objectives of the study. In the course of carrying out the actual study appointments with the respondents were made in advance. It was the intention of the researcher to treat all the respondents equally. The respondents were assured that all the

information they provided was to be treated in confidence. All the respondents remained anonymous. The researcher has reported the research findings honestly and objectively. All the support received was acknowledged.

CHAPTER FOUR

DATA, PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter concerns itself with the final process of data analysis, presentation and interpretation in order to answer research questions, verify hypotheses and hence meet research objectives as was initially stated. The first part presents a summary of the background information about the sampled schools and response rate. Then a descriptive analysis of variables used in the regression model has been presented. Lastly, inferential statistical method of multiple regression analysis was used test the research hypothesis.

4.2 Background Information on Secondary Schools in Bungoma South Sub-county

Important features of the secondary schools involved in the study are provided in this section in table form. This information is important in understanding the nature of the schools studied and therefore possible to draw appropriate conclusions.

4.2.1 Types of Schools

Table three presents the frequency and percentage of the schools used in this study in relation to the type and their status.

Table 3: School Operations

Type of School	Frequency	Percentage
Boys Boarding/Girls day	2	10.5
Girls boarding/Boys day	3	15.7
Mixed day	10	52.5
Mixed day & Boarding	4	21.3
Total	19	100

From the table, the majority of secondary schools in Bungoma South Sub-county are mixed day schools where there is no boarding facility but both male and female students are enrolled. Out of the 19 schools included in the study, 52.5% were mixed pure day schools, 21.3 % were mixed-day and boarding schools where there was a boarding section for both female and male student while a large proportion of the students were enrolled in the day section, 10.5% were Mixed with a boarding section for boys while girls were enrolled in day school. The rest of the schools (15.7%) had girls boarding section but a Boys day section.

The table reveals that a majority of the secondary schools in the study area were co-educational. There were 17 (84.3%) out of 19 secondary schools included in the study which were co-educational. On the other hand, majority of schools included in the study were full day or partially day schools. The possible reason as to why the majority of the secondary schools in the district are co-educational and day schools is the cost implications. The government provides finances to cater for tuition fees to all the students in public secondary schools. Boarding fees and other expenses on development activities are paid by the parents. The average expenditure by households amounts to 200% of the total per capita income measured by consumption of the poorest 20% of the Kenyan households (Republic of Kenya, 2005).

The other reason would be the fact that the schools are closer to each other and located in rural areas and draws their students from the same catchment area. Therefore, the students commute from their homes since the distances are shorter. Starting single sex schools is perceived as a duplication of services and therefore a waste of resources. Chai(1971) asserted that where financial resources are very limited, the extra costs of duplicated educational services may have to be maintained at the expense of qualitative improvements. The high percentage of day schools in the district is in line with the government's policy to have more day schools, especially in high population density areas (Republic of Kenya, 2005).

4.2.2 Year When the School was founded

This item was included in the research instrument in order to establish the relationship between funding and the establishment of schools. The results were recorded in Table four below.

Table 4: Year school was established

Period	Frequency	Percent
Before 1995	4	21.1
1995-2000	2	10.5
2001-2005	6	31.6
2006-2007	7	36.8
Total	19	100.0

As shown in the Table above, 36.8% of the schools under study were established after 2006. This rapid quantitative expansion may have been due to the high demand for secondary education that resulted after implementation of Free Primary Education programme in 2002 and subsidized Secondary Education. It is during this period

when many Harambee secondary schools were established by the communities in the spirit of Harambee. Between 1985 and 1995, 10.9% of the secondary schools in Bungoma South District were established. This was after the introduction of the 8.4.4 system of education.

The low percentage may be attributed to the government's consolidation and rationalization policy in order to improve the financing of education, quality and relevance as per the recommendations of Kamunge Report (Republic of Kenya, 1988). This is the period when cost-sharing between the government, parents and communities was introduced. The Table also shows that 68.4% of the secondary schools were founded between 2001 and 2007. This may have been due to the introduction of Free Primary Education (FPE) which increased demand for places in secondary schools.

The opinion of principals was sought to assess the schools under study were sited in appropriate locations and whether the establishment was due to demand for secondary education in the catchment areas. Their responses are recorded in the table five below

Table 5: Suitability of location of secondary schools

STATEMENT	SA		A		NS		D		SD	
	f	%	f	%	f	%	f	%	f	%
1. School established mainly due to community Interests	3	15.8	7	36.8	-	-	9	47.4	-	-
2. This School was established due to demand for F1 chances	4	21.1	4	21.1	-	-	11	57.9	-	-
3. The Neighbouring secondary schools are very close	5	26.3	9	47.4	1	5.3	4	21.1	-	-
4. Closeness of schools limit enrolment in this school	2	10.5	12	63.2	1	5.3	4	21.1	-	-
5. This School can accommodate higher enrolment	11	57.9	6	31.6	-	-	2	10.5	-	-

From the table, many principals indicated that the schools were established due to community lobbying for their own schools. Of the 19 principals included in the study, a total of 10 (52.6%) agreed that their schools were established due to community interests while 9 (47.4%) indicated that they disagreed that school was established due to community interest. On the other hand a large proportion indicated that demand for form one chances did not necessitate establishment of the school. When asked their opinion on whether the school was established due to demand for form one chances, A total of 11 (57.9%) disagreed, 8 (42.2%) agreed.

On whether they considered neighbouring day secondary schools to be very close to affect their operations in each of the schools, a majority of the principals indicated that secondary schools in neighbourhoods are very close to each other which affect their operations. A total of 5 (26.3%) of the principals indicated that they strongly agreed that schools were located very close to one another. The majority, 9 (47.4%) agreed that day schools were very close. Only 4 (21.1%) disagreed with the statement that day schools were very close to each other.

When asked to indicate opinion on whether closeness of secondary schools limits enrolment in their school, a very large proportion indicated they agreed. Of the 19 principals, 12 (63.2%) indicated they agreed while 2 (10.5%) indicated they strongly agreed with the statement. Only 4 (21.1%) disagreed with the statement while 1 (5.3%) was not sure. Hence most Principals feel that setting up secondary schools close to each other has limited the size of their schools.

Principals were further required to indicate opinion on whether they agreed with statement that their schools can accommodate higher enrolments. The majority 11 (57.9%) indicated they strongly agreed. Another 6 (31.6%) Agreed with the statement while only 2 (10.5%) disagreed. Hence most of the schools under study could accommodate higher enrolments. This raises concern as to why new schools could be established near older ones when the older schools were still under enrolled. It can be concluded that most of the schools were not established because of pressure for secondary education but community desire for own school which contravenes basic planning principles for schools as proposed by Mutua & Namaswa (1992).

4.2.3 Descriptive Analysis of the Variables used in the Regression Cost Model

As stated in Chapter One under theoretical framework, the regression analysis in this study used a Cost Model with seven variables. There was one dependent variable and six independent variables.

Table 6 states in summary the variables, the units of measurement for each variable, the mean, the minimum and maximum values of each and the standard deviation.

Table 6: Major Variables Used in the Cost Model

	Variable	Minimum	Maximum	Mean	Std. Deviation
X_1	Average Total Expenditure (Ksh)	27980.00	42000.00	33879.47	3789.28
X_2	School Size	80	650	284.26	148.337
X_2^2	School Size Squared	6400.00	422500.00	101651.3	103740.26
X_3	Average Interschool Distance (km)	2.00	7.50	3.9263	1.70028
X_4	Student Classroom Ratio	23.00	52.00	35.65	8.93
X_5	Average Non-Teacher Recurrent Expenditure (km)	10000.00	24000.00	15406.63	3315
X_6	Average Teacher Salary (Ksh)	80000.00	168000.00	126686.3	23852.48

As indicated in Table 6 above, the average total expenditure per student during the year of study (2008) was Ksh 33 879.47. On average, it cost Ksh.33 879.47 per student to cater for establishment and operation of a school. The school that incurred the lowest Total Expenditure per student spent only Ksh 27,980.00 while the school that incurred the highest expenditure per student spent Ksh42, 000. It was also established that the average school size in this study was 284 students. The school with the lowest enrolment had 80 students while a school with the highest had 650 students.

Average teacher salary was also one of the variables in the Cost Model. The Table shows that that on average, a school spent Ksh 126,686.3 on teacher salaries with the lowest incurred being Ksh 80,000 and the highest incurred being Ksh168, 000.

Other non-teacher recurrent expenses incurred in schools understudy averaged Ksh. 15,406.63 per student. Lowest incurred in the schools were Ksh. 10,000 while highest cost incurred was Ksh. 24,000.

The table indicates that on average a school was 3.9263 km away from others with some being 2km from each other while others as far as 7.5km. The standard deviation is 1.7km. The implication is that some schools have been established very close to each other that pose managerial challenges and increases cost of providing education per student.

4.3 The Influence of School Location on Financial Resource Management

The first objective of this study was to determine the influence of spatial location of secondary schools on financial resource management Vis a Vis the school size in Bungoma South Sub-county in relation to catchment areas. It was expected that where the establishment of schools was unregulated, it may result in closeness that would generate financial managerial difficulties where the schools within a catchment compete for admissions and may not raise adequate enrolments that sustain their operations efficiently.

The study set to determine whether spatial location had effect financial resource management given the closeness of schools under study and the consequent under enrolment in the schools. Hence principals were required to indicate their opinions on given statements in order to determine the influence of spatial location of schools on financial resource management. Their responses are shown in table seven below.

Table 7: Influence of school location on financial resource management

STATEMENT	SA		A		NS		D		SD	
	f	%	f	%	f	%	f	%	f	%
1. Closeness of schools has contributed to frequent fee defaulting	6	31.6	7	36.8	2	10.5	3	15.8	-	-
2. Students can easily transfer to nearby schools	5	26.3	5	26.3	2	10.5	7	36.8	-	-
3. Most students transfer to neighbouring schools to evade fee arrears	3	15.8	5	26.3	2	10.5	7	36.8	2	10.5

When asked to indicate opinion that fee defaulting was due to closeness of schools, 6 (31.6%) strongly agreed while 7 (36.8%) agreed. While 3 (15.8%) disagreed that closeness of schools lead to fee defaulting and 2 (10.5%) were not sure. Hence majority agreed that closeness of schools lead to fee defaulting.

The principals were further required to indicate whether students in their schools easily transfer to other neighbouring school. Though a large proportion of the respondents, 7 (36.8%) disagreed with the statement, a total of 10 (52.6%) agreed or strongly agreed with the statement. Which imply that there was easy transfer of student to neighbouring schools, most probably whenever there were accumulated arrears. Hence the principals were requested to give opinion on whether the main reason for interschool transfer was to evade accumulated fee arrears. There was a fairly divided opinion on this statement with a total of 9 (47.3%) of the respondent indicating they disagreed while a total of 8 (42.1%) indicated they agreed with the statement and 2 (10.5%) were not sure that fee balances were the main cause of transfer.

The establishment of schools close to one another in a catchment area has the effect of putting a strain on financial resources as the school administration is faced with large

fee arrears where student are accorded an opportunity to transfer to neighbouring schools and evade fee balances. In turn the school administrations are unable to meet supplier claims which can compromise quality of education.

From table 5 and 6, it can be established that the interschool distance among secondary schools under study is low in any given catchment area of the schools in the district are very close to each other which has paused a challenge in financial resource management. The schools attract low enrolments which limit their financial resources required to provide quality education in the schools. The distance further offers an easy avenue for evading fee balances making it difficult for the school administrations to execute budgets and meet obligations to suppliers. This compromises quality of education in the schools and contravenes planning principles as postulated by Poignant (1967) and Mutua & Namaswa (1992) who recommended that the size of population and the catchment areas of the school be considered in locating a school facility. He recommends that there must be a certain minimum number of pupils living in an area in order to justify the building or installation of a school. The study confirms the observations of Gicheru (2000) and Kikechi (2001) that unregulated establishment of secondary schools is expected to generate difficulties in each school having viable level of enrolment that generates managerial difficulties and that the cost of running education institutions was exacerbated by the inefficient application of limited educational resources by the small under enrolled schools.

4.4 Hypothesis Testing

The study set to verify hypotheses in order to determine whether the stated independent variables significantly led to variation in the dependent variable (Total Expenditure per student).

H_01 : School size(X_2) does not significantly influence Total Expenditure per student (X_1) in secondary schools in Bungoma South Sub-county.

H_02 : The Average Interschool Distance (X_3) does not significantly influence Total Expenditure per Student(X_1) in secondary schools in Bungoma South and Bumula Sub-counties.

H_03 : The student-Classroom ratio (X_4) does not significantly influence the Total Expenditure per Student (X_1) in secondary schools in Bungoma South Sub-County.

H_04 : Non-Teacher Recurrent expenditure per student(X_5) does not significantly Influence the Total Expenditure per student (X_1) in secondary schools in Bungoma South Sub-county

H_05 : The Average Expenditure on Teacher salary (X_6) does not significantly Influence the Total Expenditure per student (X_1) in secondary schools in Bungoma South Sub-county

The study examined the relationship among variable through analysis of the cost model. A multiple regression analysis method was employed involving the independent variables: school size (X_2), school size squared (X_2^2), Average Interschool Distance (X_3), Student classroom ratio (X_4), Average Non-Teacher Recurrent expenditure (X_5), Average Teacher Salary (X_6) and the dependent variable Average Total Expenditure (Unit cost) (X_1), was used to determine the actual

prediction equation and show the direction, collinearity and strength of the relationship among the variables. The components of the multiple linear regression analysis used in this study are the Model Summary, the ANOVA Summary and the Table of Coefficients.

The output from the SPSS 20.0 package was used to obtain the results. The output generated consisted of the co-efficient of each independent variable, the significance value for the coefficients, the standard error and the t-statistic value.

4.4.1 Simple Correlation Matrix

The table 8 below presents a simple correlation matrix showing the relationship between the variables used in this study.

Table 8: Simple Correlation Matrix

	X_1	X_2	X_2^2	X_3	X_4	X_5	X_6
X_1	1						
X_2	-0.764	1					
X_2^2	-0.823	0.966	1				
X_3	-0.550	0.481	0.486	1			
X_4	-0.697	0.840	0.785	0.285	1		
X_5	0.786	-0.841	0.753	0.404	0.712	1	
X_6	0.740	-0.895	-0.840	-0.425	-0.864	-0.699	1

The SPSS output in table 8 was useful in the multiple regression analysis because it guided the researcher on the relationships between the predictors and hence determine multicollinearity in the models variables.

From table 8, the variable school size (X_2) has a negative correlation coefficient of 0.764 with the dependent variable, Average Total Expenditure (AC), meaning that if school size is increased by 1, Average Total Expenditure reduces by Ksh 0.764. The school size squared (X_2^2) had a stronger correlation coefficient of 0.823 because it actually represents the school size which is in its second order degree. It is included in this study for the purpose of determining the optimal school size of secondary schools in Bungoma South District.

On the other hand, there was a fairly strong and negative Correlation between the Average interschool distance (X_3) and the dependent variable of 0.550 indicating that establishment of schools close to each other led to higher Average Total Expenditure since the schools would have low enrolments and hence higher overhead cost. This is further evidenced by the collinearity between Average interschool distance and School Size (0.481) the further the schools, the higher are the enrolments.

There was a negative and fairly significant correlation between the Student – Classroom ratio (X_4) and the Average Total Expenditure of 0.697. An increase in the Student Classroom ratio by 1 leads to a decrease in Average total Expenditure by 0.697. Hence the enrolments in the schools under study could be increased without necessarily spending more on classrooms.

Total non-teacher recurrent expenditure per student (X_5) had a slightly higher correlation coefficient of -0.841 when compared with the school size in relation to the dependent variable (Average Total Expenditure) which was 0.786. This shows that the degree of collinearity between the total non-teacher recurrent expenditure per student (X_5) and Average Total Expenditure was high.

The Table also shows that there was a positive, but low, correlation coefficient of 0.740 between average teacher salary and the dependent variable, Total Expenditure per student. There was a strong negative correlation of 0.569 between student-teacher ratio and the Total Expenditure per student. This shows that the student-teacher ratio was a major predictor of the Total Expenditure per student. This means that if schools increased teacher recruitment by 1, recurrent expenditure per student increase by Ksh.0.569.

4.4.2 Linear Cost Function of Bungoma South Secondary Schools

Table 9 below presents the coefficients used in the multiple regression equation, the t-statistics and the p-values derived after running the multiple regression analysis using a computer programme known as SPSS.

Table 9: Linear Cost Function of Bungoma South District Secondary Schools

Variable	Coefficient	t-statistics	Significance (α)	Remarks
X_1	-47.409	-2.483	0.029	Significant
X_2^2	0.058	3.196	0.008	Significant
X_3	-681.899	-2.368	0.036	Significant
X_4	-63.115	-0.628	0.542	Not Significant
X_5	-0.192	-1.701	0.0497	Significant
X_6	0.007	0.152	0.882	Not Significant
Constant	48379		0.000	

$R^2 = 0.859$

F-ratio = 12.214 with degrees of freedom of 6 and 12

Table 9 shows the coefficients used in the multiple regression equation derived from the Cost Model in Chapter one. This is where the actual prediction equation can be found. Substituting the coefficients in the multiple regression equation (1.4), we get:

$$X_1 = 48379.012 - 47.409X_2 + 0.058X_2^2 - 681.899X_3 - 63.115X_4 - 0.192X_5 + 0.007X_6 \dots \quad (4.1)$$

From Table 9, the coefficient for school size (-47.409) is negative hence total expenditure per student and school size are inversely related. An increase in the enrolment of a school leads to a decrease in the total expenditure per student decreases. It implies that schools with lower enrolments experience higher Total expenditure per student as compared to those that have higher enrolments. Schools with enrolments below the optimum therefore experience operational inefficiency. An efficient school system is that which optimizes output for a given level of input. The Table shows that if there is an increase in the number of students by 1 above the average school size of 284 students, the schools will reduce their Total Expenditure on each student by Ksh47.40.

However the Variable school size squared (X_2^2) had a positive coefficient indicating that as the school size increases, the total expenditure per student continues to decrease up to an optimum point. Beyond this optimum, an increase in school size will lead to the increase in total expenditure per student. Using the equation $X_1 = 48379.012 - 47.409X_2 + 0.058X_2^2$ the optimal school size for Bungoma South sub county secondary schools in the year 2008 was 409 students (see Appendix B).

The implication is that school that operate with an enrolment of less than 409 students in the district incur higher expenses per student hence operationally inefficient. From this study, about 73.7% of the schools under study had enrolments less than 400 hence

they operate below the optimum enrolments which amounts to inefficient operation in the school systems

The table further shows that the average interschool distance (X_3) had a negative coefficient of -681.899 which can be interpreted that establishing a school 1km further than the mean distance of 3.9km has the effect of reducing expenditure per student enrolled by Ksh. 681.90. The explanation is that schools established closer to each other in the same catchment area mostly operate below the optimum hence experience higher expenditure per student.

Table 9 also shows that average teacher salary (X_6) had a positive coefficient of 0.007. This can be interpreted as an increase in average teacher salary by Ksh 1 will lead to an increase in total expenditure per student by Ksh 0.007 this means that if average teacher salary is increased by 100%, it will trigger an increase in total expenditure per student by 0.7 %. This implies that there is a minimal effect of teacher salary on total cost of establishing and running a secondary school in the sub county.

In this model, Non- teacher recurrent expenditure per student (X_5) had a negative coefficient with elasticity of -0.192. In the model, there is an inverse relationship between Total expenditure per student and non- teacher recurrent expenditure. The implication is that larger schools spend less on overhead expenses but more on recurrent expenditure, while small schools which are in early stages of establishment spend more on overhead expenses and minimize recurrent expenses expenditure.

The student-classroom ratio variable (X_4) had a coefficient of -63.115. The negative coefficient shows that there was an inverse relationship between student-classroom

ratio and Total Expenditure per student. The magnitude 63.10 implies that 1% increase in Student-Classroom ratio above the Sub County's current average student-teacher ratio of 36:1 would cause a decrease in total expenditure per student by Ksh 63.10. The student-classroom ratio variable is not a significant predictor of Changes in Total Expenditure but nevertheless it points to the fact that most schools in the district can greatly reduce costs of education by increasing enrolments than by creating new ones.

In table eight, R^2 was 0.859. R^2 is the coefficient of determination which shows the proportion of the variance in the dependent variable that can be explained by variation in the independent variables. The implication is that the independent variables in the model explain up to 85.9% of the variation in Total Expenditure per student (school size, school size squared, Average interschool distance, average teacher salary, Student-Classroom ratio, total non-teacher recurrent expenditure per student). The remaining 14.1% of the variation in the Total Expenditure per student can be explained by other variables not covered in this study. From the Table the F-ratio computed was 12.214 with degrees of freedom of 6 and 12, $p < 0.05$. This implies that there was a significant regression equation at 0.05 level of significance and hence the independent variables are significant predictors of variation in the dependent variable.

4.5 Rejection and acceptance of Hypotheses

The Multiple regression analysis was used to verify the hypotheses of study. This was done from the output generated from the SPSS 20.0 programme which consisted of the co-efficient of each independent variable, the significance value for the coefficients, the standard error and the t-statistic value.

The coefficients were tested at a significance level of ± 0.05 . Where the significance value generated was less than $0.05(p < 0.05)$, while If the significance value was greater than 0.05 , ($p > 0.05$), the null hypotheses stated were accepted hence the relationship between the dependent variable and independent variable doesn't exist.

The SPSS output on coefficients of the independent variables and their significance levels are shown in table ten.

Table 10: SPSS output on regression coefficients and their significance levels

Variable	Coefficient	Std Error	t-statistics	Significance (α)	Remarks
School Size (X_1)	-47.409	19.095	-2.483	0.029	Significant
School Size Squared (X_1^2)	0.058	0.018	3.196	0.008	Significant
Average Interschool Distance (X_2)	-681.899	287.929	-2.368	0.036	Significant
Student Classroom Ratio (X_3)	-63.115	100.510	-0.628	0.542	Not Significant
Average Non-teacher recurrent expenditure (X_4)	-0.192	0.274	-1.701	0.0497	Significant
Average Teacher Salary (X_5)	0.007	0.048	0.152	0.882	Not Significant
Constant	48379.01	9221.42	5.246	0.000	Significant

From the table, the null hypotheses stated were tested as below:

H_01 : School size (X_2) does not significantly influence Total Expenditure per student (X_I) in secondary schools in Bungoma South Sub-county.

From the table, the significance value (α) for the variable School Size is 0.029. Therefore ($\alpha < 0.05$). The null hypothesis was rejected. This implies that there is a significant relationship between school size and Total Expenditure per student. School Size accounts for a significant variation in Total Expenditure per Student. The coefficient had a negative value which implies that larger school size led to lower total costs per student while smaller sizes led to higher costs per student which is in agreement with Studies of Muyia (1991) and Kosgei (2000) in Kakamega district of western province and Nandi district of rift valley province respectively. The studies revealed the existence of rampant cases of secondary school establishments with very low enrolment, some with students between 60 and 100. Such schools were not only observed to be wasteful, but also inefficient in the way they operate (Kosgei, 2000).

A similar study was done by Coombs and Hallack (1972) in Norway and the USA. Norway had to consolidate small rural schools into larger ones as a policy measure to lower unit cost of running schools. The study by Basov (1972) in the USSR led to consolidation of small schools to realize economies in operations of schools.

H_02 : The Average Interschool Distance (X_3) does not significantly influence Total Expenditure per Student (X_1) in secondary schools in Bungoma South Sub-county.

From the table, the significance value (α) for the variable Average Interschool Distance is 0.036 hence $\alpha < 0.05$. The null hypothesis is rejected and alternative hypothesis accepted. There is a significant relationship between Average Interschool Distance and Total Expenditure per Student. Hence Average Interschool Distance accounts for variation in Total Expenditure per student.

The findings are in agreement with postulations of Poignant (1967) who pointed out two 'considerations' which must be taken into account in locating schools: -the size of population and the catchment areas of the school. He recommended that there must be a certain minimum number of pupils living in an area in order to justify the building or installation of a school. It further confirms government estimates (Republic of Kenya 2003 cited in Ngware et al 2006), which indicated that already there was a high concentration of schools and consequent wastage of resources. Some of the single stream schools remain unviable as observed earlier by Republic of Kenya (1999).

The TIQUET report (Republic of Kenya, 1999), observed that the Ministry of Education was poorly equipped with data critical in planning for establishment of secondary schools such that the anomaly of existence of over enrolled and under enrolled secondary schools in close proximity characterized the provision of education services. It therefore recommends proper planning and guidelines for the establishment of new schools in order to curb then mushrooming of schools which are, as it correctly observes, mostly unviable.

The findings in this study agree those in the study by Muyia (2000) who raised concern about existence of small under enrolled secondary schools for individual communities. In the study *Determining the optimum size of secondary schools; a case study of Kakamega district*, it was found that small schools in neighbourhoods had enrolments of 60 – 100 students. They were also unviable and could be merged.

The findings show that there is need to consider spatial planning of secondary schools in such a way as to eliminate wastages arising from existence of many under enrolled schools close to each other within a given catchment area. Planning of location of secondary schools should consider the population densities which indicate the social

demand for education in any given location, as well as the maximum possible distance that learners can commute conveniently to the facility. However, interschool distance must not be too large as to deny access to learners as this would be contrary to the policy of widening access.

H_03 : The student-Classroom ratio (X_4) does not significantly influence the Total Expenditure per Student (X_I) in secondary schools in Bungoma South Sub-county.

The α value that corresponds to Student-Classroom is 0.542. The α value is greater than 0.05 ($\alpha > 0.05$). The null hypothesis is therefore accepted and the conclusion is that there is no significant relationship between student classroom ratio and total expenditure. This is attributable to the fact that the constructions of facilities including classrooms were greatly subsidized through CDF initiatives especially in newly set up institutions hence putting less burden on expenditures by newly established schools with lower enrolments.

H_04 : Non-Teacher Recurrent expenditure per student (X_5) does not significantly influence the Total Expenditure per student (X_I) in secondary schools in Bungoma South Sub-county

Table 10 indicates that the α -value for the non-teacher recurrent expenditure per student was 0.0497. The null hypothesis was rejected since the ($\alpha < 0.05$). The alternative hypothesis was hence accepted that there was a significant relationship between non-teacher recurrent expenditure per student and the Total Expenditure per student. This implies that non-teacher recurrent expenditure like expenditure on tuition, stationeries, textbooks, teaching aids, trips, boarding among others were major predictors of the Total Expenditure per student.

The study indicates that the increase in non-teacher recurrent expenses led to higher total expenditure per student. From table 8, there was a negative correlation between school size and non-teacher recurrent expenditure per student which imply that lower size schools more costs on non-teacher recurrent expenditures per student compared to larger ones. The study confirms other similar studies of Cheswas and Hallack (1972) on the lowering of unit cost in the running of schools. In their study of schools in Uganda on expenditure of secondary schools from 1965 to 1967, the study established that the larger the school, the lower the unit expenditure particularly in respect of administrative costs, costs on non-teaching staff and the cost of transport.

Similarly, Gicheru (2000) and Kikechi (2001) observed that the cost of running education institutions was exacerbated by the inefficient application of limited educational resources by the small under enrolled schools. The schools could only be run efficiently and at reduced cost through expansion in facilities and increased enrolment rather than building of new ones and small ones. Dibski (1983) in his study on rural school system in Canada found that the actual expenditures of the schools exceeded the expenditures recognized under the foundation program. Among the proposed strategies to ease financial constraints in small size schools were to reduce costs through bulk buying of goods, use of less experienced staff, further centralization and/or closure of schools and Improving efficiency, that is, maximizing use of the existing resources to maintain quality, use of alternative modes of programme delivery and sharing resources with neighbouring schools.

H_05 : The Average Expenditure on Teacher salary (X_6) does not significantly Influence the Total Expenditure per student (X_1) in secondary schools in Bungoma South Sub-county

The α value that corresponds to average teacher salary is 0.882. The α value is greater than 0.05 ($\alpha > 0.05$). The null hypothesis is accepted and the conclusion is that there is a no significant relationship between average teacher salary and Total Expenditure per student. The Average Teacher Salary is not a significant predictor of variation in Total Expenditure per Student. The results are attributable to lower expenditures by most low sized schools which are generally newly established on teacher salaries which generally hire less qualified staff and underpay such staff while larger sized schools are well staffed by the Teachers' Service Commission hence spend less on teacher salaries.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings discussed in Chapter Four, draws conclusions and recommendations based on the findings of the study. At the end of this chapter, suggestions for further research are given.

5.2 Summary of Findings

5.2.1 The influence of School location on financial resource management in the schools in Bungoma South District

Data collected and analysed revealed that secondary schools in Bungoma South district have been established very close to each other. On average, a secondary school lies 3.9 km away from each other (table 6). A large proportion of principals included in the study felt that schools were located close to each other within limited catchment areas which decimated the their sizes. The closeness accorded many students an opportunity to transfer to other neighbouring schools and whenever there was accumulated fee balances hence higher incidences of fee defaulting, which indirectly accounts for higher unit costs. The effect was that principals could not execute school budgets effectively while at the same time failed to meet the schools' financial obligations to suppliers. This compromised quality of education in the schools. The schools incur large debts and consequently experience difficulties in procuring teaching and learning materials.

5.2.2 To establish the effect of school size on total expenditure per student in Secondary schools.

The current study established that increase in school size had the overall effect of reducing the expenditure per student. It was found out that the optimum school size was 409 students hence schools which operated with lower enrolments were assumed to incur higher costs per students hence operationally inefficient. Schools with enrolments approaching the optimum achieved operational efficiency. In the study about 73.7% of the school had enrolments below the optimum implying most school had sizes that led to higher costs per students which means there was widespread operational inefficiency.

5.2.3 The relationship between Average Interschool Distance and Total Expenditure per Student.

The third objective of this study was to determine the relationship between Average Interschool Distance and Total expenditure per student. The study established that there was average interschool distance (X_3) had a negative coefficient of -681.899 which can be interpreted that in establishing a school 1km further than the mean distance of 3.9km has the effect of reducing expenditure per student enrolled by Ksh. 681.90.

The explanation is that schools established closer to each other in the same catchment area mostly operate below the optimum hence experience higher expenditure per student.

5.2.4 The relationship between Average Teacher Salary and Total Expenditure per student in secondary schools.

The study established a significant relationship between average teacher salary and Total expenditure per student. Expenditure on teacher's salary was found to minimally account for total expenditure per pupil. In most cases few teachers were hired in the schools under study. The teachers were also lowly paid hence accounted minimally for variations in total expenditure per student.

5.2.5 The effect of student-Classroom ratio on Total expenditure per student in secondary schools.

However the study revealed a negative relationship such that increase in Student-Classroom ratio led to a decrease in total expenditure per student which imply higher enrolments in the schools under study could reduce cost per student. Lower enrolments meant higher expenditures on establishing classrooms. The study established that there was no significant effect of Student-Classroom ratio.

5.2.6 The relationship between total non-teacher recurrent expenditure per student and Total Expenditure per student in secondary schools.

The study established that Non- teacher recurrent expenditure had the strongest correlation with Total expenditure per pupil and accounted for the largest variation in the total expenditure per pupil. Schools with lower enrolments incurred relatively higher recurrent expenses compared to ones with higher enrolments. The variation is further aggravated by the fact that some newly established institutions had not received government funds by the period of the study which escalated the expenses on stationery, personal emoluments, tuition materials and other recurrent expenses.

5.3 Conclusions

It can be deduced from this study that in many secondary schools in Bungoma South Sub-county have been established close to other schools within similar catchment areas hence majority studied have failed to attract critical enrolments that can sustain school operations. Such schools are faced with large fee arrears and financial resource management difficult which affect the quality of education offered in the schools.

Most schools under study were found to operate at less than optimum enrolments of 409 students. This implies they incur higher expenditures per student which leads to operational inefficiency in the schools which escalates costs of education. Since their existence has to be sustained, the schools operate without the basic facilities or use low quality ones as well as underpaid and untrained teachers which compromise the quality of education offered.

The student-classroom ratio was found to be low, which imply there is underutilization of physical facilities (classrooms) in many of the schools under study since enrolments are low. This further implies there is unnecessary escalation of costs of establishing more institutions where existing ones are underutilized.

Finally it was found that schools operating with low enrolments had relatively higher expenditure per student due to higher recurrent expenses. Higher enrolments lead to relatively lower recurrent expenditure per student hence lower costs of education. This is in agreement with the cost model as postulated in the theoretical framework in which enrolments below an optimum number lead to higher costs of education and hence increases in enrolment to optimum enable schools to lower costs of education through economies of scale. In this model the optimum enrolment was determined as

409 students. Hence most schools operating below this number in Bungoma South Sub-county are considered wasteful.

5.4 Recommendations

Arising from the study, the following recommendations should be considered by the Ministry of Education as a way of minimizing unit costs:

- i) The Ministry of Education should develop a policy that protects schools from frequent transfers of students to neighbouring schools in cases where they owe fee balances to the previous schools. This would enable secondary schools cover expenses incurred on such students and regulate their operations basing on reliable student populations. For instance, all transfers must be validated at the County Education Office with consultation with principals of secondary schools from which the student wishes to transfer. Some sanctions can be imposed on principals who admit students from other schools without approval of the County Education Office.
- ii) The Ministry of Education through the County Quality Assurance and Standards personnel must adopt a more strict policy on registration of new secondary schools. New schools should only be registered where the existing ones have raised their enrolments to a level above the optimum, in this case 409 students. This would guarantee sustainability of the schools.
- iii) The County Quality Assurance and Standards officers should work with communities in order to determine suitability of location of new schools before they are registered. They should always advise communities on the managerial challenges that are associated with lowly enrolled schools which are established close to one another.
- iv) Non-teacher recurrent expenditure per student largely accounted for variation in

total expenditure per student hence newly established secondary schools with low enrolments experience more operational challenges. The government must therefore hasten the disbursement of the subsidy funds to newly registered schools. Schools in neighbourhoods can also embark on cost cutting measures and rationalization of use of resources by sharing facilities and services such as school buses, libraries, resource centres, printing services and laboratories.

v) Average teacher salary minimally accounted for variation in total expenditure per student but schools with low enrolments spend more on hiring teachers on BOM hence the Ministry of Education should ensure balancing of teachers so that some with low workloads can be deployed to newly established schools. The Ministry of Education can also explore means of assigning teachers to teach in more than one school where they have low workloads in schools which have been established close to each other.

5.5 Recommendations for Further Study

While the current study focused on factors influencing the operational efficiency of secondary schools in Bungoma south District, there is need to undertake similar studies in other parts of the country which may be experiencing prolific quantitative expansion of secondary school institutions.

There is also need to determine factors that contribute to higher unit costs in already established secondary school institutions than in newly established schools with less enrolment which is contrary to economic logic.

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APPENDICES

Appendix A: Questionnaire

Serial No. _____

Dear participant,

I am a postgraduate student at Moi University in the department of Education Management and Policy Studies undertaking a study on the factors influencing the operational efficiency of secondary schools.

You have been selected to participate in this study as a respondent, to provide data crucial for its success. Hence your co-operation and honesty will be very highly appreciated.

Responses given will be treated with absolute confidentiality. Kindly withhold your name.

Yours faithfully

Masifwa John M'malasi

1. Tick the appropriate category of school in which this school belong

Mixed day and boarding	
Full day	
Mixed day	
Boarding	
Other (specify)	

2. When was the school established? _____

3. Tick in the table below to indicate your opinion on reasons that led to establishment of this school.

SA- strongly Agree A- Agree NS- Not sure D- Disagree SD – Strongly Disagree

	STATEMENT	SA	A	NS	D	SD
1.	School established mainly due to community Interests					
	This School was established mainly due to demand for F1chances					
	The Neighbouring secondary schools are very close					
	Closeness of schools limit enrolment in this school					
	This School can accommodate higher enrolment					

4. What was the enrolment of this school for the year 2006 and 2007?

2006

2007

5. Estimate their distances from this school to other schools in the neighbourhoods of this school.

	Name of school in the neighbourhood	Distance from this school
i)		
ii)		
iii)		
iv)		

6. Tick in the table below to indicate your opinion how the schools in the neighbourhood affect operations in your school.

	STATEMENT	SA	A	NS	D	SD
i)	Closeness of schools has contributed to frequent fee defaulting					
ii)	Students can easily transfer to nearby schools					
iii)	Most students transfer to neighbouring schools to evade fee arrears					

7. Estimate the cost of the following facilities for this school

	Number/ area	Cost per unit (sh)
Classrooms		
Libraries		
Laboratories		
land		

8. Estimate the amount of fee balances owed to the school for the years 2006 and 2007.

	Sh
2006	
2007	

9. Which group of students are the most likely fee defaulters?

Boarding students	
Day students	

10. What number of teachers does this school?

BOG	
TSC	

11. Estimate the actual monetary value of the following expenses as incurred over the 2006 and 2007

	2006	2007
	Sh	Sh
BOG Teachers remuneration
Support staff salaries
Teaching /Learning materials (Books, Stationery, Apparatus and Chemicals)
Co-curricular activities
Boarding/Accommodation
Transport(Teachers and students on trips)
Operational expenses (Fuel, Electricity, water)
Other recurrent expenditures
Total recurrent expenditure

Appendix B: Determination of the Optimal Size

To determine the optimal school size of secondary schools in Bungoma South District, the following equation was used:

$$X_1 = 48379.012 - 47.409X_2 + 0.058X_2^2 \dots\dots\dots(4.2)$$

Differentiating X_1 with respect to X_2 we get

$$\frac{dX_1}{dX_2} = -47.409 + 2 \times 0.058X_2 \dots\dots\dots(4.3)$$

For optimal school size, equation (4.3) is equated to zero

$$-47.409 + 0.116X_1 = 0$$

$$0.116X_1 = 47.409$$

$X_1 = 408.698$ which approximates to 409 students

Therefore, the optimal school size of secondary schools in Bungoma South Sub County during the Year 2008 was 409

Appendix C: Determining the Operational Efficiency In Schools


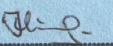
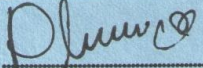
From equation (4.1) established in this model the additional cost incurred by students where other predictors of Total expenditure per student are held constant can be determined in the following way:

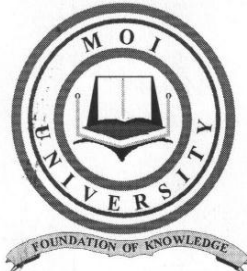
If the school enrolment is below the optimum of 409 for instance by 100 students, the additional unit cost incurred would be:

$$\begin{aligned} & (-47.409 \times 409 + 0.058 \times 409 \times 409) - (-47.409 \times 300 + 0.058 \times 300 \times 300) \\ & = -9687.983 - (-9002.7) \\ & = -685.283 \end{aligned}$$

The additional cost would be Ksh. 685 per student. Therefore secondary schools in the district with enrolments lower than 409 incur higher unit costs and are hence operationally inefficient.

Appendix D: Research Permit

PAGE 2	PAGE 3
THIS IS TO CERTIFY THAT:	Research Permit No. NCST?5/002/R/1036
Prof./Dr./Mr./Mrs./Miss. MASIFWA	Date of issue 11.11.2009
JOHN M'MALASI	Fee received SHS 1000
of (Address) MOI UNIVERSITY	
PO BOX 3900 ELDORET	
has been permitted to conduct research in	Applicant's Signature
..... Location,	
BUNGOMA SOUTH	Secretary
..... District,	National Council for
WESTERN	Science and Technology
..... Province,	
on the topic AN INVESTIGATION INTO	
FACTORS INFLUENCING THE	
OPERATIONAL EFFICIENCY OF	
SECONDARY SCHOOLS IN BUNGOMA	
SOUTH DISTRICT	
for a period ending 30TH DECEMBER, 20 09	

Appendix E: Research Authorization

MOI UNIVERSITY

Tel. Eldoret (053) 43555
 Fax No. (053) 43555

P.O. Box 3900
 Eldoret, Kenya

SCHOOL OF EDUCATION

REF: MU/SE/PGS/54**DATE: 12th February, 2009**

The Permanent Secretary
 Ministry of Education
 Science and Technology
 P.O. Box 30040-00100
NAIROBI

Dear Sir/Madam,

**RE: RESEARCH PERMIT IN RESPECT OF
MASIFWA JOHN M'MALASI (EDU/PGA/12/07)**

The above named is a 2nd year Master of Philosophy (M.Phil) student at Moi University, School of Education, Department of Educational Management & Policy Studies.

It is a requirement of his M.Phil studies that he conducts research and produces a thesis. His research is entitled:

"An Investigation into Factors Influencing the Operational Efficiency of Secondary Schools in Bungoma South."

Any assistance given to him to facilitate the successful conduct of his research will be highly appreciated.


Yours faithfully,


DR. I. N. KIMENGI
DEAN, SCHOOL OF EDUCATION

/db

Appendix F: Research Authorization from NACOSTI

REPUBLIC OF KENYA



NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams: "SCIENCE TECH", Nairobi
 Telephone: 254-020-241349, 2213102
 254-020-310571, 2213123
 Fax: 254-020-2213215, 318245, 318249
 When replying please quote

P. O. Box 30623-00100
 NAIROBI-KENYA
 Website: www.ncst.go.ke

Our Ref: **NCST/5/002/R/1036/5**

Date: **12th November, 2009**

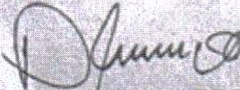
Masifwa John M'malasi
Moi University
P. O. Box 3900
ELDORET

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "*An investigation into factors influencing the operational efficiency of secondary schools in Bungoma South*" I am pleased to inform you that you have been authorized to undertake your research in *Bungoma South District* for a period ending *30th December 2009*.

You are advised to report to *The District Commissioner Bungoma South District and The District Education Officer Bungoma South District* before embarking on your research project.

Upon completion of your research project, you are expected to submit two copies of your research report/thesis to our office.



PROF. S. A. ABDULRAZAK Ph.D, MBS
 SECRETARY

Copy to:

The District Commissioner
 Bungoma South District

Appendix G: Research Authorization From County Education Office



REPUBLIC OF KENYA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
State Department of Education – Bungoma County

When Replying please quote
e-mail: bungomacde@gmail.com

County Director of Education
P.O. Box 1620-50200
BUNGOMA

Ref No: BCE/DE/19 VOL I/22.

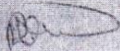
Date: 16th November, 2009

The Sub County Director of Education,
BUNGOMA SOUTH

**RE: AUTHORITY TO CARRY OUT RESEARCH – MASIFWA JOHN M'MALASI –
NCST/5/002/R/1036/5**

The bearer of this letter Masifwa John M'malasi is a student of Moi University. He has been authorized to carry out research on "*An investigation into factors influencing the operational efficiency of secondary schools in Bungoma South*". The research period runs up to 30th December, 2009


Kindly render her necessary assistance.


Adie Olero,
For County Director of Education,
BUNGOMA

COUNTY DIRECTOR OF EDUCATION
BUNGOMA
P. O. Box 1620,
BUNGOMA - 50200

Appendix H: Research Authorization from County Commissioner

REPUBLIC OF KENYA



THE PRESIDENCY

MINISTRY OF INTERIOR AND CO-ORDINATION OF NATIONAL GOVERNMENT

Telegrams "DISTRICTER" BUNGOMA
Telephone: 055- 30340
FAX: 055-30216
Email: dcbungomasouth@rocketmail.com
When replying please Quote

DEPUTY COUNTY COMMISSIONER
BUNGOMA SOUTH SUB COUNTY
P.O. Box 550 - 50200
BUNGOMA

RE: ADM.15/22/172

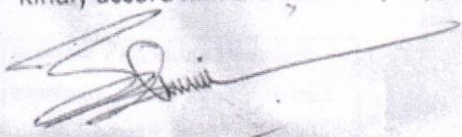
Date: 28TH August, 2015

TO WHOM IT MAY CONCERN

RE: AUTHORITY TO CARRY OUT RESEARCH
MASIFWA JOHN M' MALASI

This is to inform you that **Mr. Masifwa John M'Malasi** who is a Student of Moi University Eldoret has been authorized to carry out research on " Factors influencing the operational efficiency in Secondary School in Bungoma South Sub County " for a period ending 30th December 2015.

Kindly accord him the necessary support.


J. K. TONUUI
DEPUTY COUNTY COMMISSIONER
BUNGOMA SOUTH SUB COUNTY

Appendix I: Bungoma South Administrative Boundaries

