

**COST PRINCIPLES AND QUALITY INSTRUCTIONAL OPERATIONS IN PUBLIC DAY
SECONDARY SCHOOL IN KAKAMEGA EAST SUB – COUNTY**

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ABSTRACT

The study was designed to establish the effects of cost principles on quality instructional operation in day secondary schools in Kakamega East sub-county, after 2008, the time the government declared free day secondary education. The objective of the study was to establish the optimal enrolment size in public day secondary schools in Kakamega East sub-county. Questionnaires were used to collect data for this study. The research was guided the following question; What were the enrolment trends in public day secondary schools in Kakamega East sub-county? The study targeted 36 public day secondary schools, in Kakamega East Sub-county. Validity of the questionnaire and interview schedule was ensured by the expert advice from members of the department of education planning and management of Masinde Muliro University of Science and Technology. The finding of the study revealed that the optimal size of public day secondary schools during the years of investigation (2009-2013) was 168 students. It also established that at this optimal level a student would pay Kenya shillings. 10,735 as PTA levies. Public day secondary schools in Kenya should strive, and attain the optimal level of 168 students for a one stream school.

Key word; Optimal school size.

Background to the study

As many researchers and writers have pointed out, until relatively recently the trend across the country has been to create large schools through consolidation and restructuring (cotton, 1996, Howley 1997). Historical, larger schools have been advertised as providing a more comprehensive curriculum than possible in smaller schools, while reducing per pupil operating cost (Conant,1956, Cubberly, 1922). As a result, during the past seventy-five years in the United States the number of school building has increased from almost 250,000 to approximately 95,000 (Kenne,2003). At the same time the K12public school enrolment has risen from about 28,000,000 students to over 53,000,000. However, a growing body of evidence has accumulated during the past fifteen years that raises significant questions about if large schools provide better academic outcomes and whether, in fact, when all factors are considered, they are less expensive to operate. Howley (1996), based on a combination of his own research findings and review of other work on school size, has raised doubt about the cost effectiveness of larger schools. He argues that though it first appears that large schools are more cost-effective to operate, if the dropout/graduation rates are taken into consideration, smaller schools actually are more cost efficient.

On attainment of political independence in 1963, the government of Kenya (GoK) house and the private sector collectively endeavored to enhance the development of education in the country. The

rapid development of education and training in Kenya was an aftermath of the sessional paper No. 10 of 1965 on Africa socialism and its application to planning in Kenya, which emphasized combating ignorance and disease, a child, irrespective of gender, religion and ethnicity, has the inalienable right to access basic welfare provision, including education; and the GoK has an obligation to provide opportunity to all citizens to fully participate in socio-economic and political development of the country and also to empower the people to improve their welfare. Development of education since independence has been marked by various changes and challenges. For nearly four decades therefore, the sector has undergone several review by special commissions and working parties appoint by the government, with the aim of improving effectiveness of education provision.

In 1963, the government of Kenya promised free primary education for all. Not until 2003, as part of the millennium development goal to end extreme poverty across the world by 2015. Kenya would obtain free and compulsory primary education hence increase in the enrolment in public secondary schools in the future.

According to sessional paper number 6 of 1988 on education and manpower training for the next decade and beyond the government has greatly expanded secondary education since independence in order to meet the growing demand for this level of education for the large number of primary school leavers (MOE Sessional paper no. 6, 1988).

Currently, with public funds for education stagnant or shrinking in many sub-Saharan Africa, policies of universal education for all are facing serious implementation constraints. When public education is insufficient to guarantee access to schooling or good quality of instruction, demand driven private schools of all types normally fill the gap and offer services to house holds in return for a certain amount of fees (Igor, 1999) as cited by Maiyo et al Sep 2008.

According to Odebero (2002) the fundamental understanding of the cost sharing concept was that the government would provide teachers to all public schools while the communities, parents and beneficiaries would provide the learning facilities and equipment needed. For example in secondary schools, the parents are bearing the major burden of tuition fees, boarding fees, development fees, uniform and miscellaneous expenses.

In the published report (Republic of Kenya, 1999) it was revealed that high cost of learning and teaching facilities had proved unaffordable for students from poor families thus leading to low participation rates and high dropout rates for the poor. However, this in Kenya is supposed to be an issue of the past since there is Free Day Secondary Education. Ideally, according to Psacharopoulos and Woodhull (1985) the present patterns of subsidy (tuition) for education may not be achieving both efficiency or equity objectives and need to be re-appraised.

According to statistics given by UNESCO (1995) in their statistical year book on public expenditure on education, the majority of world governments allocate big share of their total budget to education. Therefore, educational input is a government and other educational stake holder expenditure in education and the output expected is human capital. Output of a given cycle of education is the number of students who complete the cycle at the right time. In cases where educational system doesn't fulfill the above criteria then it perverts wastage. The term wastage is an economic terminology where education is compared to a factory with capital investment in the plant and raw materials being processed into finished products (UNESCO 2008b).

Republic of Kenya (2004), report that primary education is offered to children between age 6 and 13 years. Out of the total enrolment into this level of education only 47% of those who complete primary education proceed to the secondary education. Public universities enroll 12% of this group for further education while others join middle level colleges undertake vocational courses.

Statement of the Problem

There has been statistical increase in enrolment in public primary schools in Kenya since 2003 when the government declared Free Primary Education. The primary level enrolment grew from 891,033 pupils at independence in 1963 to about 7.4 million pupils in 2004. Similarly the secondary school enrolment grew from 30,000 at independence in 1963 to over 700,000 in 2003 and 850,000 by 2004. (Republic of Kenya, 2005). Access to secondary education in Kenya had remained limited over the years. This may be testified by transition rates for 1999 - 2004. The transition rates for 2001 to 2002 are 44.4 percent for boys and 42.7 percent for girls. It is therefore evident that the government of Kenya is experiencing challenges.

These challenges include; Increase in enrollment as compared to the number of teachers and insufficient learning resources and physical facilities. Education is considered to be a basic right and a need, its delivery in Kenya had remained sluggish due to bottlenecks such as declining access and participation rates, as indicated by declining gross enrolment rates (GER); differential trends in access and participation in secondary education, with low participation of the poor and vulnerable groups and widening gender and regional disparities, particularly in ASAL, amidst concerns over equity promotion; poor performance in sciences, mathematics and languages; and high wastage rates; declining completion rates; low survival levels from primary school to university, and low female enrolment in science and technical courses.

The pertinent policy questions arising here is: how can the Gok satisfy the increasing demand for the limited number of secondary school places in order to enhance access and participation, against the background of negative effects of the cost-sharing strategy in education?

It is therefore observed that the operation between the cost principles and the quality of operation in public secondary schools is a major challenge of the study. The study focuses on optimal use of education resources in public day secondary schools of Kakamega East sub-county. Oweya (2000) asserts that school environment is essential aspect of education planning. He further explains that unless schools have well suited buildings adequately constructed and equipments adequately utilized and maintained, much teaching and learning may not take place. High quality education may not be guaranteed where instructional resources such as classroom, library, teaching workshop and laboratories are structurally defective due to a fore mentioned increase in enrolment while the instructional resources are not increased. From the foregoing issues, it is clear that there is need to study how enrolment are affecting the instructional operations and impacting on the quality of education in public secondary schools in Kakamega East Sub-County of Kakamega County. A study by Nafukho (1989) it established that the optimal size of secondary schools was 574 students. At this level of enrolment, schools in the district would be able to lower their unit costs.

The study however observed that this optimal school size can never be static and will change with time when prices of educational facilities go up and when teachers' salaries are raised. Economies of scale were a reality in the operation of secondary schools in Kakamega district, for the year used in this study.

Objectives of the Study

The study was guided by the following objectives:

- i. To establish the trends in enrolment in public secondary schools in Kakamega East Sub – County.
- ii. To establish the optimal enrolment size in public secondary schools in Kakamega East Sub-County.

Research Questions

- i. What are the enrolment trends of the students in public secondary schools in Kakamega East Sub – County?
- ii. What is the optimal enrolment size in public secondary schools in Kakamega East Sub - County?

2. LITERATURE REVIEW

2.0 Introduction

- This chapter deals with both theoretical and empirical literature review. It is structured into: cost principles, quality instructional operations, government constraints, financing free day and subsidized tuition in Kakamega East Sub-County, optimal size, and government reforms in education.

2.1 Cost Principles

Chiuri and Kiumi, (2005) categorizes cost as both direct and indirect cost born of the individual and society. They give examples of direct cost to the individual as tuition, expenditure on books, school meals and uniforms. Some of the direct costs to the society include payment of teachers` purchase of text books and other learning materials, training of teachers and financing of curriculum research.

Keller (1980) looking at the of fees charged and education participation stressed that given the fees charged peasants were unable to send their children to schools in their own community even after they had contributed towards development of the schools. Those who managed to attend school were frequently sent home for some requirement, this made them miss lessons making them not to do well in exams. (Keller 1980).

Langmead, J. et al (1999) note that economists base their estimates of production costs on the concept of fore gone alternatives. For example, the opportunity cost to a firm of using resource in the production of a good is the revenue foregone by not using those resources in their next best alternative use. –In the case of factors owned outright by a firm, it is necessary to impute (or estimate) the opportunity cost. In this case, the estimate of opportunity cost is normally based on the amount for which the firm could hire out the services of the factor.

Short-Run Costs

Short run is the period of time over which the input of at least one factor of production cannot be increased (fixed factor). Factors whose quantity can be increased in the short run are known as a variable factor.

Corresponding to the above- total cost can be broken down into fixed costs and variable costs.

Total cost =total fixed costs +total variable costs (TC=TFC+TVC)

1 Table 2.1: The Cost of Production of a Hypothetical Firm in Short Run.

Output(units)	TFC(£)	TVC(£)	TC(£)	AFC(£)	AVC(£)	TC(£)	AFC(£)
0	5	0	5				
1	5	4	9	5	4	9	4
2	5	7.5	12.5	2.5	3.75	6.25	3.5
3	5	10.8	15.8	1.67	3.60	5.27	3.3
4	5	13.8	18.8	1.25	3.45	4.70	3.0
5	5	17.0	22.0	1.00	3.40	4.40	3.2
6	5	20.5	25.5	0.83	3.42	4.25	3.5
7	5	24.3	29.3	0.71	3.47	4.18	3.8
8	5	28.6	33.6	0.63	3.57	2.20	4.3
9	5	33.5	38.5	0.56	3.72	4.28	4.9
10	5	39.0	44.0	0.50	3.9	4.40	5.5

Fixed costs are which do not vary as the level of output varies.

Variable costs; costs which vary with the level of output $AVC=TVC/Q$

Average total costs (ATC). The total cost per unit of output. $ATC=AFC+AVC$

Average fixed costs. $AFC=TFC/Q$

Marginal cost (MC)

The change in total cost resulting from changing the level of output by one unit. $MC=$ change in $TC/\text{change in } Q$. If at low levels of output a firm benefits from increasing marginal returns to the variable factors (is increasing mp) MC will be declining, mc reaches a minimum at the level of output at which MP is at a maximum. When the firm encounter diminishing marginal returns, the MP is falling MC begin to rise whenever there is a fixed factor, the law of diminishing returns comes into operation, the MC curve will start to rise.

The school in terms an education system is a firm where these principles apply in terms of enrolment. The school enrolls its first students, which varies at different levels as the school grows. It has fixed cost in terms of physical facilities and variables cost which include teachers, textbook teaching/learning resources. The opportunity cost is the best forgone alternative which the school physical facilities could have been used for.

2.2 Quality Instructional Operation in Kenya

Since the introduction of Free Primary Education in 2003, the Gross Enrollment rate (GER) has remained above 100.0 per cent, indicating enrolment of over-age and under-age pupils. The GER increased from 115.8 per cent in 2012 to 119.6 per cent in 2013 while the Net Enrolment Rate (NER) increased from 95.3 per cent in 2012 to 95.9 per cent in 2013. The NER participation rates in primary school education have remained significantly (UNESCO 2010).

Similarly, the total number of education institutions increased from 78,098 in 2012 to 80,172 in 2013, representing an increase of 2.7 per cent. The number of pre-primary schools increased from 39,758 in 2012 to 40,145 in 2013. The number of primary schools rose by 3.3 per cent from 29,161 in 2012 to 30,122 in 2013. The number of Teacher Training Colleges increased by 4.5 per cent from 246 in 2012 to 257. The number of Technical, Industrial and Vocational Educational Training institutions rose by 6.1 per cent in 2012 to 748 in 2013. In 2013, 14 university colleges were granted charters to offer degree programmes, thereby increasing the number of public universities to 22 (Kenya Economic Survey 2010- 2014). Based on the above statistics, the government of Kenya

has undoubtedly made strides towards the provision of education at all levels.

2.3 Theories of Cost and Approaches

Over the past two decades across countries and regions serious questions have been raised about performance in the public education sector. In the United States, growing reluctance on the part of taxpayers at the local level to pay increasing taxes has become pervasive. School district expenditure, its mode of funding, and social equity effects on educational outcomes have all been the subject of numerous studies. In particular, a number of recent studies have examined the economic efficiency of public schools. One of the common analytic tools used in these studies is the estimation of the cost structure of the educational production process. Knowledge of cost structure and estimates of efficiency should shed light not only on the expenditure side, but also on efforts to derive useful policy implications for the funding and equity in public education.

2.4 Quality Instruction

Education participation rates in many African countries are low. Schools often lack many basic facilities, and African universities suffer from overcrowding and staff being lured away to Western countries by higher pay and better conditions.

2.4.1 Participation

According to UNECO's *Regional overview on sub-Saharan Africa*, in 2000 52% of children were enrolled in primary schools, the lowest enrollment rate of any region. UNESCO also reported marked gender inequalities: In most parts of Africa there is much higher enrollment by boys; in some there are more girls, due to sons having to stay home and tend to the family farm. Africa has more than 42 million children, almost half the school-age child population, receiving no schooling. Two-thirds of these are girls. The USAID Center reports that as of 2005, 40% of school-age children in Africa do not attend primary school and there are still 46 million school-age African children who have never stepped into a classroom.

The regional report produced by the UNESCO-BREDA education sector analyst team in 2005 indicates that less than 10% of African children are now allowed in the system. Four out of 10 children did not complete primary school in 2002/2003. So, five years after the World Education Forum and the adoption of the Millennium Goals, progress at primary level is far from decisive. The analysis highlights that principal efforts should be directed to reducing the number of dropouts per level. It appears also that geographical disparities (rural areas/urban areas) or economic disparities (low income households/wealthy households) are more significant and take longer to even out than gender disparities. From the quality point of view, studies such as SACMEQ (Southern and performance between and within countries).

This report also shows that secondary (lower and higher levels) and higher education enrolments have progressed proportionally more than primary enrolment over the period 1990–2002/2003 which questions the reality of policy priority given to primary education. The strong pressure for education continuity from the majority already benefiting from schooling explains this trend. To this must be added the weakness of mechanisms regulating pupil flow between the different levels of the education system.

In 2005, the inventory and trends show a definitive risk of not reaching universal primary enrolment by 2015. 14.7% of the world's population is in Africa.

The education systems inherited from the colonial powers were designed for the formal sector and public administration. However, ADEA (Association for the Development of Education in Africa) has become aware of the informal sector's relevance in developing countries, and thus recognized the need for increased vocational school training as a way to help the informal sector.

2.4.2 Challenges

Language Barriers

Due to high linguistic diversity, the legacy of colonialism and the need for knowledge of international languages such as English and French in employment and higher education, most schooling in Africa takes place in languages that teachers and pupils do not speak natively, and in some cases simply do not understand. There is considerable evidence that pupils schooled in a second language achieve poorer results than those schooled in their mother tongue, as lack of proficiency in the second language impairs understanding and encourages ineffective rote learning. Although UNESCO have recommended since the 1950s that children be taught early literacy in their mother tongue, progressing later to other languages, not all African countries implement this effectively. Even where the earliest grades are taught in the mother tongue, pupils are typically forced to switch to languages such as English and French before acquiring proficiency in these languages.

Lack of Proper Facilities and Educators

Another reason for the low education rates in Africa is the lack of proper schooling facilities and unequal opportunity for education across countries. Many schools across Africa find it hard to employ teachers due to the low pay and lack of suitable people. This is particularly true for schools in remote areas. Most people who manage to receive education would prefer to move to big cities or even overseas where more opportunities and higher pay await. Thus, there will be an overly large class sizes and high average number of students per teacher in a school. Moreover, the teachers are usually those unqualified with few teaching aids and poor textbook provision. Due to this, children attending schools in rural areas usually attain poorer results in standardised tests compared to their urban counterparts. This can be seen in the reports given by the Northern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ). Those taking the tests in rural areas score much lower than those in small towns and big cities. This shows a lack of equal education opportunity given to children from different parts of the same country.

With teachers being less qualified than others in urban areas the teaching to learning environment takes an effect amongst the students. In one instance teachers took the same test as their students and three fourths of them had failed. In addition, those that do not receive the same education to those in the bigger cities have trouble even after graduation with reading, writing, and doing math. Students who do not attain the same equal education to those in urban environments do not achieve the same outcome in establishing success with a career. With education being a major concern towards achieving a career and establishing a future, Africa needs to be aware that equal education needs to be established within all schools throughout the countries.

Emigration

Next, emigration leads to a loss of highly educated people and financial loss. The loss of skilled people can only be replaced with another huge cost which imply the loss of money spent educating people who leave and new people to replace them. Even though an almost 5.5% of GDP investment

in education, the loss makes it difficult for the government to budget another amount in education as they will need to prioritize other needs such as military budget and debt servicing.

Military and conflict

Military spending is causing education spending to decrease immensely. According to a March 2011 report by UNESCO, armed conflict is the biggest threat to education in Africa. While the number of dropouts across the continent has been increasing dramatically, one of the influences of war and conflict on education is the diversion of public funds from education to military spending. An already underfunded system is losing more money. Twenty-one African countries have been identified as the highest spenders of gross domestic product on military globally compared with the amount directed toward education. Military and conflict also leads to the displacement of children. It often forces them to remain in camps or flee to their neighbouring countries where education is not available to them.

In Kenya, after disputed national elections in December 2007, civil unrest displaced over 250,000 people and affected a total of 500,000 persons. The Ministry of Education statistics indicate 62,848 of primary school going children were affected by the ensuing violence.

Influential initiatives

Initiatives to improve education in Africa include:

Intercontinental

- NEPAD's E-school programme is an ambitious plan to provide internet and computer facilities to all schools on the continent.
- SACMEQ is a consortium of 15 Ministries of Education in Southern and Eastern Africa which undertakes integrated research and training activities to monitor and evaluate the quality of basic education, and generates information that can be used by decision-makers to plan and improve the quality of education.
- For 10 years, the Benin Education Fund (BEF) has provided scholarships and education support to students from the Atakora province in northeastern Benin. Over 450 students have been able to stay in school because of their programmes.

International

- She's the First is a New York City, New York-based non-profit organization. The organization seeks to empower girls in Asia, Africa, and Latin America by facilitating the sponsorship of their education through creative and innovative means.
- Working through local organizations, The African Children's Educational Trust is supporting thousands of youngsters with long-term scholarships and a community rural elementary schools building programme. It has built seven schools to date and is raising funds for more.
- British Airways' "" project which, in collaboration with UNICEF, opened the model school Kuje Science Primary School in Nigeria in 2002.
- The Elias Fund provides scholarships to children in Zimbabwe to get a better education.
- The Ahmadiyya Muslim Community in association with Humanity First, an international charity organization, has built over 500 schools in the African continent and is running a 'learn a skill' initiative for young men and women.
- Fast Track Initiative

- The Volkswagen Foundation has been running a funding initiative called "Knowledge for Tomorrow – Cooperative Research Projects in Sub-Saharan Africa" since 2003. It provides scholarships for young African researchers and helps to establish a scientific community in African universities.

NGO involvement

A report by USAID and the Bureau for Africa, Office of Sustainable Development, found that NGOs are increasingly participating in contribute to the delivery of education services, education policy decisions and are included by donors and government officials in many parts of the education system. Of course, this varies country to country and region to region.

NGOs working in education in Africa often encountered tension and competition when working. Schools, parents and, most often government officials, feel threatened by third-party involvement and feel that they are "crashing the party." The report continues that for NGOs to be effective, they must understand that they do not have the same perspective as government officials as to who is in control. If they do not recognize the government of the country they are working in, they will compromise their objectives.

The report goes into more detail about NGO relations with governments in education. The relationship is viewed from completely separate points. African governments see NGOs and their work as "an affair of government" or, in other words, working as a part and in collaboration with the country's government. NGOs on the other hand view themselves as very separate entities in African education. They see themselves fulfilling moral responsibility. They believe that they are identifying needs or areas of development in situations under which the government has ultimately been unaccountable and separately mobilizing resources toward those needs or development areas. Government and NGOs are hold contrasting beliefs about each other's abilities. Governments often think NGOs are unqualified to make important policy decision and that they could undermine their legitimacy if seen as superior. In some cases, NGOs have found government incompetent themselves, if not their own fault, as the fault of a lack of resources. In the best cases, NGOs and government officials find each other's mutual strengths in education policy and find ways to practically collaborate and reach both of their objectives.

To be effective in education in Africa NGOs must effect policy and create policy changes that support their projects. NGOs also found that, to see this policy change that they are striving for, they must create and foster relationships with many different stakeholders. The most important stakeholders are usually donors and government officials. The biggest challenge for NGOs has been linking these networks together. NGO interventions to change policy have revealed that NGO programmes have failed to create a successful way to change the policy process while making sure that the public understands and is a part of education policy. This problem will prove more influential in the future if it is not solved.

Women's education

A positive correlation exists between the enrolment of girls in primary school and the gross national product and increase of life expectancy.

In 2000, 93.4 million women in Sub-Saharan Africa were illiterate. Many reasons exist for why formal education for females is unavailable to so many, including cultural reasons. For example, some believe that a women's education will get in the way of her duties as a wife and a mother. In

some places in Africa where women marry at age 12 or 13, education is considered a hindrance to a young woman's development.

Women's education is sometimes corrupted by sexual violence. Sexual violence against girls and female students affects many African education systems. In Sub-Saharan Africa, sexual violence is one of the most common and least known forms of corruption.

Disparity in Education

While most of the Millennium Development Goals face a deadline of 2015, the gender parity target was set to be achieved a full ten years earlier - an acknowledgement that equal access to education is the foundation for all other development goals. Gender disparity is defined as inequalities of some quantity attributed to the reason of gender type. In countries where resources and school facilities are lacking, and total enrolments are low, a choice must often be made in families between sending a girl or a boy to school. Of an estimated 101 million children not in school, more than half are girls. However, this statistic increased when examining secondary school education. In high-income countries, 95% as many girls as boys attend primary and secondary schools. However, in sub-Saharan Africa the figure is just 60%.

The foremost factor limiting female education is poverty. Economic poverty plays a key role when it comes to coping with direct costs such as tuition fees, cost of textbooks, uniforms, transportation and other expenses. Wherever, especially in families with many children, these costs exceed the income of the family, girls are the first to be denied schooling. This gender bias decision in sending females to school is also based on gender roles dictated by culture. Girls usually are required to complete household chores or take care of their younger siblings when they reach home. This limits their time to study and in many cases, may even have to miss school to complete their duties. It is common for girls to be taken out of school at this point. Boys however, may be given more time to study if their parents believe that the education will allow them to earn more in the future. Expectations, attitudes and biases in communities and families, economic costs, social traditions, and religious and cultural beliefs limit girls' educational opportunities.

Additionally, in most African societies, women are seen as the collectors, managers, and guardians of water, especially within the domestic sphere that includes household chores, cooking, washing, and child rearing. Because of these traditional gender labour roles, women are forced to spend around sixty percent of each day collecting water, which translates to approximately 200 million collective work hours by women globally per day and a decrease in the amount of time available for education, shown by the correlation of decrease in access to water with a decrease in combined primary, secondary, and tertiary enrolment of women.

Whatever the underlying reason(s) are, about having large numbers of girls outside the formal schooling system brings developmental challenges to both current and future generations. According to the UNESCO, the rate of female children out of primary school is higher than that of male children in all the African countries where data is available. Until equal numbers of girls and boys are in school, it will be impossible to build the knowledge necessary to eradicate poverty and hunger, combat disease and ensure environmental sustainability. Millions of children and women will continue to die needlessly, placing the rest of the development agenda at risk.

Current policies of Progression

The Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), adopted in 1979 by the UN General Assembly and acceded to by 180 States, sets down rights for

women, of freedom from discrimination and equality under the law. CEDAW has realized the rights and equality of woman is also the key to the survival and development of children and to building healthy families, communities and nations. Article 10 pinpoints nine changes that must be changed in order to help African women and other women suffering from gender disparity. It first states, there must be the same conditions for careers, vocational guidance, and for the achievement of diplomas in educational establishments of all categories in rural as well as in urban areas. This equality shall be ensured in pre-school, general, technical, professional and higher technical education, as well as in all types of vocational training. Second, is access to the same curricula, the same examinations, teaching staff with qualifications of the same standard and school premises and equipment of the same quality. Third, is the elimination of any stereotyped concept of the roles of men and women at all levels and in all forms of education. This is encouraged by coeducation and other types of education which will help to achieve this aim and, in particular, by the revision of textbooks and school programmes and the adaptation of teaching methods. Fourth, the same opportunities to benefit from scholarships and other study grants. Similarly, fifth is the same opportunities of access to programmes of continuing education, including adult and functional literacy programmes, particularly those aimed at reducing, at the earliest possible time, any gap in education existing between men and women. Sixth, is the reduction of female student drop-out rates and the organization of programmes for girls and women who have left school prematurely. Seventh concern listed is the same opportunities to participate actively in sports and physical education. Lastly, is access to specific educational information to help to ensure the health and well-being of families, including information and advice on family planning?

Other global goals echoing these commitments include the World Education Forum's Dakar platform, which stresses the rights of girls, ethnic minorities and children in difficult circumstances; and A World Fit for Children's emphasis on ensuring girls' equal access to and achievement in basic education of good quality.⁽²²⁾ In April 2000 more than 1,100 participants from 164 countries gathered in Dakar, Senegal, for the World Education Forum. Ranging from teachers to prime ministers, academics to policymakers, non-governmental bodies to the heads of major international organizations, they adopted the Dakar Framework for Action, Education for All: Meeting Our Collective Commitments. The goal is education for all as laid out by the World Conference on Education for All and other international conferences. Between 1990 and 1998 the net enrolment of boys increased by 9 per cent to 56 per cent, and of girls by 7 per cent to 48 per cent in sub-Saharan Africa. However, these figures mask considerable regional variations. In countries of the Indian Ocean, both girls and boys attained over 70 per cent net enrolment. The most outstanding progress in terms of percentage increase of boys' enrolment was in East Africa, where the net enrolment of boys increased by 27 per cent (to 60 per cent) and of girls by 18 per cent (to 50 per cent). For girls in Southern Africa, the comparable figures for girls were 23 per cent (to 76 per cent) and for boys, 16 per cent (to 58 per cent). This is the resurgence of a vibrant Africa, rich in its cultural diversity, history, languages and arts, standing united to end its marginalization in world progress and development. A prosperous Africa, where the knowledge and the skills of its people are its first and most important resource.

The Forum for African Women Educationalists (FAWE) announces a call for the second round of research proposals from research institutions for its Strengthening Gender Research To Improve Girls' And Women's Education In Africa initiative. The initiative, which is supported by the Norwegian Agency for Development Cooperation (NORAD), promotes girls and women's education through the integration of gender into education policy and practice in sub-Saharan

Africa. FAWE believes it is vital to invest in research in Africa as way producing current information for advocacy in education policy. This three-year research initiative aims to work collaboratively with established research institutions to produce pertinent and robust research. That can be used to constructively engage government, policy makers and other regional bodies on strategies to advance girls' education in Africa. Findings from the research will be used to inform FAWE's advocacy work and help redress gender inequities that hinder women's fulfillment of their right to education and meaningful participation in Africa's social and economic advancement.

2.5 Financing Free Day Subsidized Tuition in Kakamega East Sub-County

Kakamega East Sub County has forty-two public secondary schools, with seven boarding schools and the rest as day secondary schools. The government offers free day tuition for day secondary schools and subsidized tuition for boarding schools. There is a constituency development fund (CDF) which offers bursaries to some needy students in the sub county. On the other hand, the area is endowed with good climate and fertile soil which enable small scale farming in growing tea, coffee, maize, trees, sugarcane and bananas among others. Most parents have been using proceeds from crops to pay fees for their children in public secondary schools.

2.6 Enrolment trends in Kenya

Increased social demand for education following independence led to tremendous increase in the number of secondary schools in Kenya. Secondary schools numbered 152 in 1963 and by 2004 this number of schools had increased to 3277 with total enrolment of 926,149 students, Republic of Kenya, (1998) and Republic of Kenya, (2006). The same sources reveal that 48% of this enrolment was female and 52% were male students, the general enrolment trends were 29.8%, even with this increase of the number of schools. According to the Ministry of Education Science and Technology (MOEST, 2004), internal efficiency of education system requires policy attention. The cumulative dropout rates. In primary school's education have been as high as 37% and the repetition rates of 14% between standard one and seven. The survival rate at the primary level has been low at 40%. Although at the secondary level the survival rate has been better at 84%, the overall performance remains low considering that Gross Enrolment Rate (GER) for secondary is at 22%. At the secondary school level in the year 2007 a total of 2.8 million boys and girls aged between 14 years and to 17 years who should have been in secondary school were not enrolled. The policy measure was required to address the constrained access and to enable the country to attain its EFA goals and prepare future manpower.

The conclusion drawn from the statistic above according to Republic of Kenya, (1998, 2006) give a national statistic of under enrolment rates. The researcher establishes enrolment trends by gender at sub-county level in Kakamega East sub-county. The statistic cannot be used to estimate the enrolment trends at all sub-county because trends differ from sub-county to sub-county. The information gathered from study can be used to evaluate optimality of enrolment in the sub-county.

2.7 School Size and Achievement

The findings for elementary school (Fowler 1995) appear fairly consistent; the research on high school size and achievement is less conclusive. Using state achievement test data from 293 public high schools in New Jersey, Fowler and Walberg (1991) found that school size was inversely related to test scores in mathematics and writing. They also found that smaller schools were associated with higher passing rates on the reading portion of the state's Minimum Basic Skills Test as well as on the mathematics and writing portions of the state's High School Proficiency Test. These effects were statistically significant even after controlling for students' family income level,

but the actual size of the effects was not clearly reported. The schools in this study had enrollments ranging from 147 to 4,018, with an average enrollment of 1,070.

2.8 Financing Free Day Subsidized Tuition in Kakamega East Sub-County

Kakamega East Sub County has forty-two public secondary schools, with seven boarding schools and the rest as day secondary schools. The government offers free day tuition for day secondary schools and subsidized tuition for boarding schools. There is a constituency development fund (CDF) which offers bursaries to some needy students in the sub county. On the other hand, the area is endowed with good climate and fertile soil which enable small scale farming in growing tea, coffee, maize, trees, sugarcane and bananas among others. Most parents have been using proceeds from crops to pay fees for their children in public secondary schools.

2.9 Optimal School size in Kakamega County

According to Nafukho (1989) it was established that the optimal size secondary schools in the year of study (1989) was 574 students. At this level of enrolment, schools in the district would be able to lower their unit costs. The study however observed that this optimal size can never be static and will change with time when prices of educational facilities go up and when teachers 'salaries are raised. Economies of scale were a reality in the operation of secondary schools in the district, for the year used in this study. The savings that would be realized by increasing enrolment from 250 students to 500 students would be very high (Kshs. 635.25) per pupil. The study recommended that to lower the unit costs in secondary schools in the district, each school should have a minimum size of 480 students (3streams of 40 students per class).

3. RESEARCH METHODOLOGY

3.1 Research Design

To achieve the research objectives a descriptive survey approach was adopted. According to Kerlinger (1996), descriptive survey deals with collection of data, measurement and classification of data analysis, comparison and scientific interpretation of data. One and Yuku (2005), states that this design can be effectively used to investigate qualitative and quantitative data of population by selecting samples for analysis and discovery of new facts. The design was found relevant to the study since the study was aimed at establishing cost principles effects on quality instructional operations in public day secondary schools in Kakamega East sub-county. The design is also appropriate for this study since it is easier to comprehend. The study also involves exploration of and description of already happened phenomena. Cohen and Manion (1980) counted that the intention of a survey research is to gather data on a particular point and use it to the nature of the existing conditions.

3.2 Study Population

The study targeted 36 public day secondary schools, in Kakamega East Sub-county. The 36 school principals, 36 school accounts clerk formed the target population.

3.3 Data Collection Instruments

The data collection procedure was based on questionnaires and interview schedule.

3.3.1 Questionnaire for School Principals

The questionnaires for school principals was a 17 instrument with both structured and open ended questions. The closed ended questions included single answer and linkert scale questions. The

instrument was divided into three parts namely: Background information, enrolment and school expenditure. This study used self-completion questionnaires (Mugenda & Mugenda, 1999) to obtain information from Secondary Schools Principals and Accounts on student's enrolment, wastages, academic performance and school size. Self-completion questionnaires were convenient since they enable data collection over a large sample in shortest time possible and in the most convenient way (Bryman, 2001).

The questionnaire administrations were both structured and open ended in nature (Nsubuga, 2000). Whereas the open ended items permitted greater depth of response and ensured that the respondents gave answers on certain issue in exactly the manner they perceived it, closed ended questions eased the work of the researcher during data collection and analysis (Kathuri and Pals, 1993). Two sets of questionnaires were administration in this study. The first sets of questionnaires were administered to the school principals while the second set was admin to school accountants.

3.3.2 Questionnaires for school Accounts

The questionnaire for school account's clerk was a one instrument, see appendix. This questionnaire was divided in two parts namely: Background information and school financial records.

3.4 Procedure for collecting data

The researcher obtains a letter of introduction from the Masinde Muliro university of science and Technology school of graduates which was intern used to obtain permit from NACOSTI, Kakamega county director of education, and Kakamega county commissioner.

Two research assistants were used to assist in administering the questionnaires. The two research assistants received a day's training on how to approach and administer and to understand the questionnaires. They were trained on the objectives of the study, data collection tools and were allowed to conduct a mock interview amongst themselves. This was done to reduce any interview bias and to enhance responses rate through good approach and support creation with respondent. The researcher supervised and facilitated the data collection exercise. The researcher cross checked the collected data at the field to timely correct errors due to omission and or in appropriate recoding.

3.5 Data Analysis Procedures

The quantitative data emanating from the field were edited then numbered. They were then entered into a data base prepared in SPSS version 17 that aided in analyzing the data. The quantitative data was analyzed thematically, for qualitative cross tabulation and frequencies were adopted and the findings were done using graphs and tables. Descriptive statistics for the schools studied were analyzed based on enrolment trends performance of cohort and optimal school size calculated. To determine optimal school size, the data from sampled schools was economically determined using fixed cost, variable cost, total cost, and marginal cost to arrive at the optimal school size in Kakamega East sub-county.

4.0 DATA ANALYLIS, PRESENTATION, INTERPRETATION AND DISCUSSION

4.1 Enrolment trends in Public Day Secondary Schools in Kakamega East Sub-County

Objective 1. To establish the trends in students enrolment in public day secondary schools in Kakamega East sub count.

Figure 4.1 shows the enrolment trends in Kakamega East sub-county between 2009 and 2013. In 2009 – 2011 and from the schools sampled out, they were 11 school which were in existence, in

2012 the figure indicates that there 13 school established and finally in 2013, there 14 school established and finally in 2013, there 14 school established. These clearly shows that there was increase in school establishment.

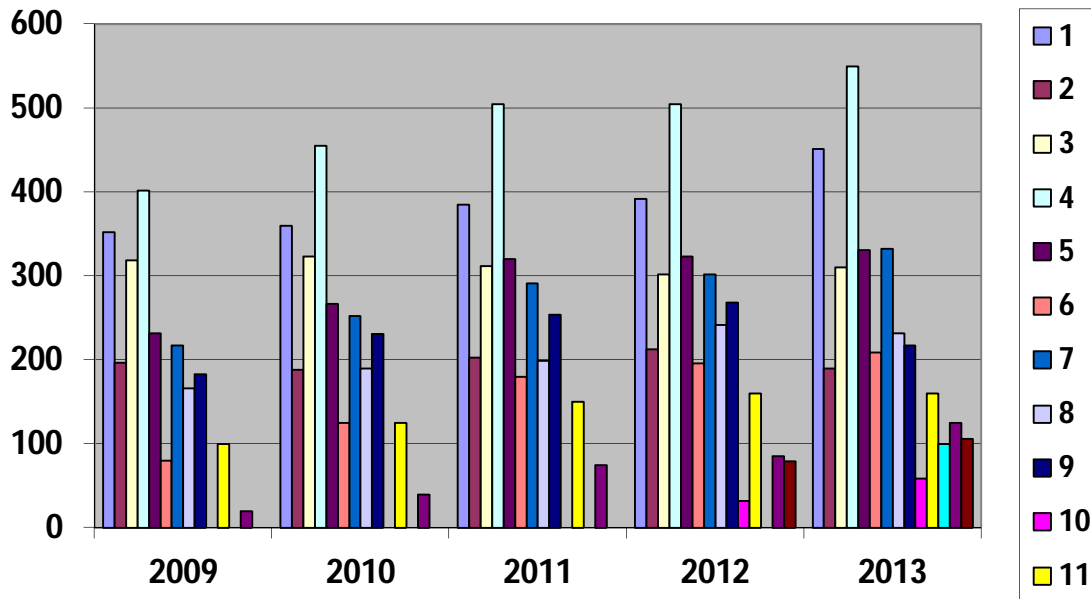


Figure 4.1: Enrolment trends in Kakamega East Sub-county

Key; 1-10 number of school

Figure 4.1 Shoe the enrolment trends in Kakamega East sub-county between 2009 and 2013

In 2009 -2011 from the school sample out there were 11 schools which were in existence, in 2012, the figure indicates that there were 13 schools that were establish and finally in 2013 there 14 schools established. This clearly shows that there was increase in school establishment. In order to determine the trends in enrolment data obtained from the schools was summarized in table 4.4 below.

Table 4.1: Percentage increase in enrolment in public day secondary school in Kakamega East Sub-County from 2009 to 2013.

	Enrolment for 2009	Enrolment for 2010	Enrolment for 2011	Enrolment for 2012	Enrolment for 2013
Valid	11	11	11	13	14
% Increase	18	12.698	12.44	7.828	8.809
Sum	2268	2556	2874	3099	3372

Source; Field data 2013

Figure 4.1 and Table 4.1 shows the trend in enrolments rising in public day secondary schools from 2009 up to 2013 with a percentage increase of 18% in 2009 and it can also be observed that there was a declining percentage in enrolment in subsequent years after 2010. This implies that many students adhered to the government policy and were excited to join secondary schools. However, the declining enrolments reveal that student’s enrolment in public day secondary education is

influenced by other factors. The Kenya education sector supports program (KESSP) identified one of the key reforms in education in Kenya as subsidized Free Day Secondary Education (FDSE) and boarding tuition of 2008. They observed that the government decided to subsidize the cost of secondary education in all public secondary schools to ensure secondary education accessibility to the needy. The government therefore failed to observe the future impact of the policy to the operations in the public secondary schools. According to Psacharopoulos and Woodhull (1985) the present patterns of subsidy for education may not be achieving both efficiency or equity objectives and need to be re-appraised. This concurs with Nginya (1996) and Moigosi (1998) that inequalities in the distribution of educational opportunities are largely caused by out-of-school factors.

Table 4.2: Enrolment trends in Kakamega East Sub-County, Public Day Secondary Schools

2	Year	3	Gender	4	No. of Students	5	% Increase in Enrollment
6	2009		BOYS		1164		00
		7	GIRLS	8	1100	9	00
			TOTAL		1915		17%
10	2010		BOYS		1320		18%
			GIRLS		1236		
			TOTAL		2256		18%
	2011		BOYS		1474		8%
			GIRLS		1400		14%
			TOTAL		2489		10%
	2012		BOYS		1600		12%
			GIRLS		1499		9%
			TOTAL		2752		11%
	2013		BOYS		1740		8.7%
			GIRLS		1632		8.87%
	TOTAL		3372		8.809%		

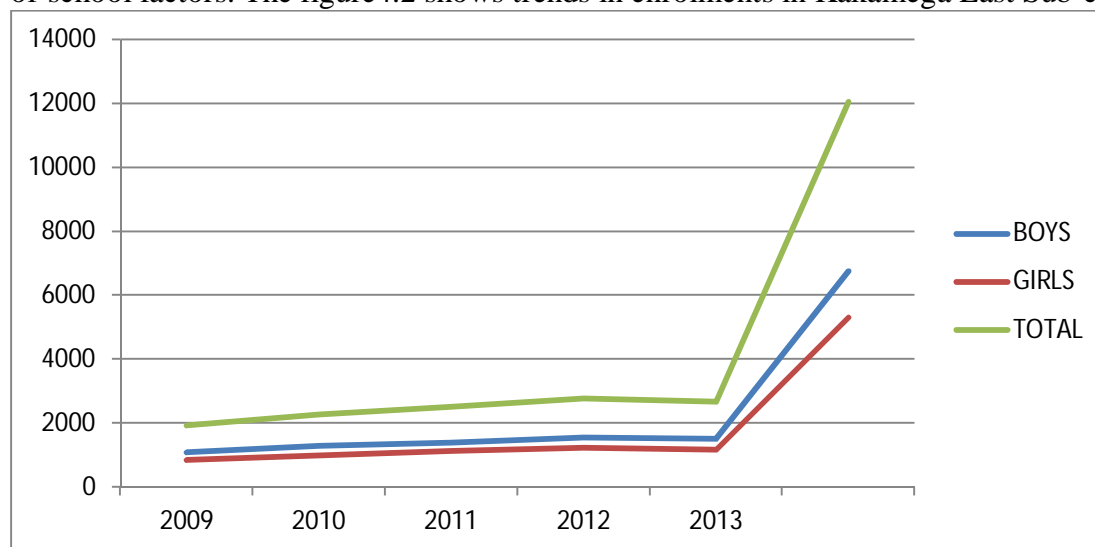
11

Source: Field data 2013

The table 4.2 above shows that immediately after 2008 the percentage of enrolment went up by 18% with 17% male students and 18% female in 2009. This reveals change of attitude among parents about girl child that when you educate a girl child you have done it for whole society on the previous believe that when you educate boys, one is improving future bread winners. This concurs with Nginya (1996) and Moigosi (1998) that inequalities in the distribution of educational opportunities are largely caused by out-of-school factors. The trends in enrolments shows a rising enrolments in public day secondary schools until 2013 where a negative percentage in enrolment was recorded.

The table also clearly shows that immediately after 2008 when Free Day secondary education was declared in Kenya there was an 18% increase in total enrolment and it can also be observed that there is a declining percentage enrolment in subsequent years after 2010 check the student against figure. This implies that many students adhered to the government policy and were excited to join secondary schools. However, the declining enrolments reveal that student's enrolment in public day secondary education is influenced by other factors. The Kenya education sector supports program (KESSP) identified one of the key reforms in education in Kenya as subsidized Free Day Secondary Education (FDSE) and boarding tuition of 2008. They observed that the government decided to subsidize the cost of secondary education in all public secondary schools to ensure secondary

education accessibility to the needy. The government therefore failed to observe the future impact of the policy to the operations in the public secondary schools. Nginya (1996) and Moigosi (1998) observe that inequalities in the distribution of educational opportunities are largely caused by out-of-school factors. The figure 4.2 shows trends in enrolments in Kakamega East Sub-county.



Source: Field Data 2013

Figure 4.2: Enrolment Trend in Kakamega East Sub-County.

From the figure 4.2 it is evident that there is a general increase in the enrolment in each sub-sequent class from 2009 to 2013 from one to form four every year. A similar increasing trends was also witnessed for each gender. Example the boys cohort of 2009 showed an increase of enrolment from 1082 in form 1 to 1498 in form 3. The girls cohort of 2009 showed an increase of students enrolment from 833 to 1151 in 2013. The figure further shows that immediately after 2008 when Free Day secondary education was declared in Kenya there was an 18% increase in enrolment in subsequent years after 2010 in Kakamega East Sub-County. This implies that many students adhered to the government policy and were excited to join secondary schools.

4.2 Optimal School Size in Public Day Secondary Schools

12 Respondents were asked to indicate the subsidy grants for each student. They were also asked whether or not the grant was enough to cater for the needs of their schools.

In order to compute the optimal school sizes in Kakamega East Sub-County the researcher summarized the data collected in table 4.9 below.

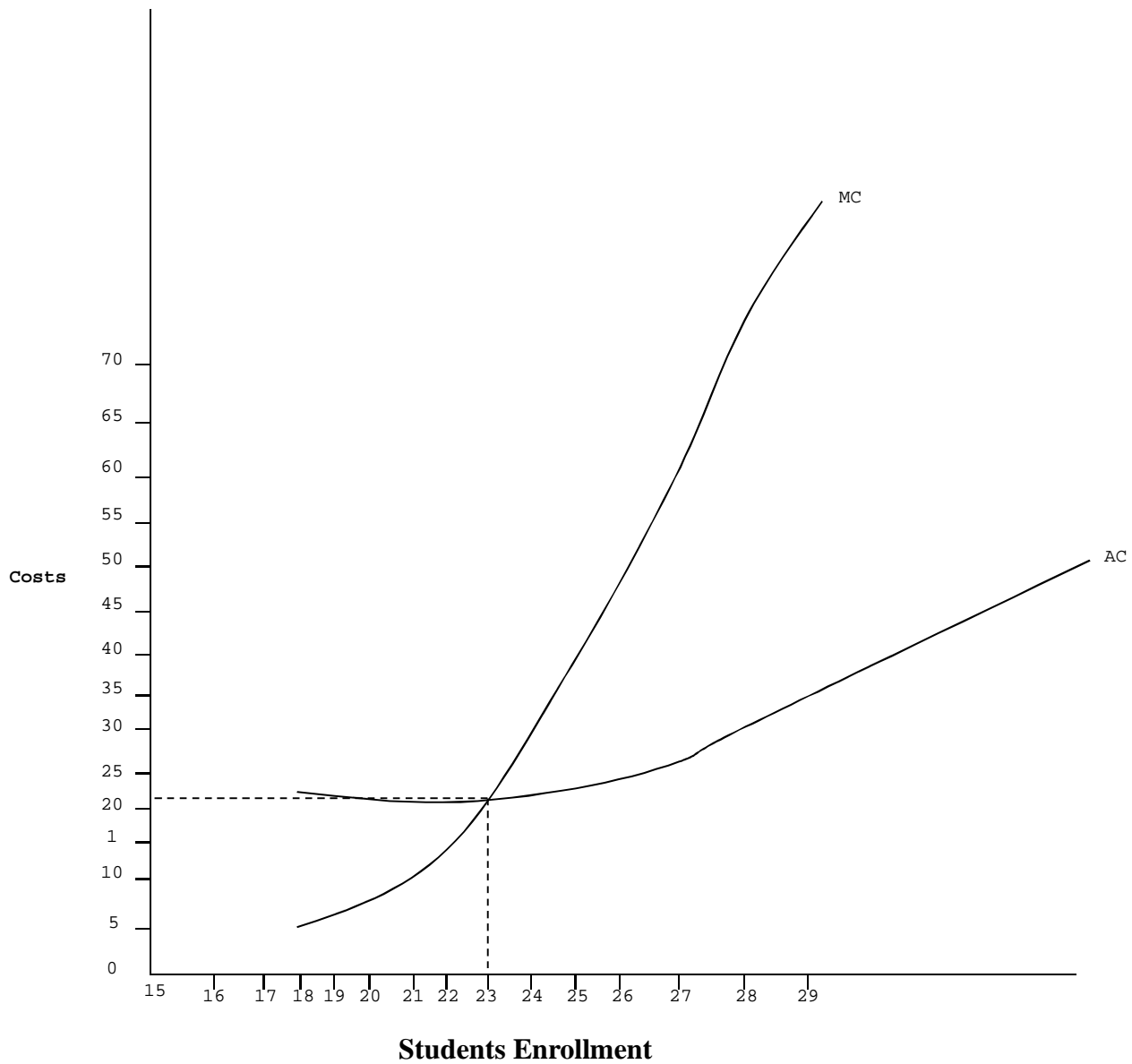
Table 4.9: The optimal School size in Kakamega East Sub-county

YEAR	ENROLLMENT	FIXED COST	VARIABLE COST	TOTAL COST	AVERAGE COST	MARGINAL COST
2008	0	0	0	30,627,366	0	0
2009	1836	19,287,935	19,892,850	39,180,785	21,340	4,660
	1800	5	5	5	21,000	5,000
2010	2196	22,932,010	21,100,064	44,032,074	20,051	13,476
	2200	0	4	4	20,000	13,500
2011	2489	25,847,270	29,284,594	55,131,864	22,150	37,883
	2500	0	4	4	22,000	38,000
2012	2677	28,177,425	35,407,838		24,908	57,914
	2700	5	5		25,000	58,000
2013	2844	29,388,695	48,863,888	78,252,583	27,515	75,337
	2800	5	3	3	28,000	76,000

Source: Field Data 2013

Fixed cost is the cost made by the government through grants every year on each student. Variable costs are cost incurred by students every year in terms of PTA, motivation, tuition and other levies. Total cost is the summation of fixed cost and variable cost. Average cost is computed by dividing total cost with total enrollment in Kakamega East Sub-County.

Marginal cost (MC) is the additional cost of producing one more unit. MC measures are used to identify the consequences of any change in enrolment. As enrolment increases more supplies of books, lateral space and staff are required which increases the total cost. MC is used to determine whether it is advisable to continually increase costs in an effort to increase enrolment. It is necessary to determine the marginal cost which is calculated by dividing the change in total cost by the change in total enrolment. When the average cost is falling or declining the marginal cost is less than the average cost. When the average cost is at the minimum the marginal cost equal average cost, this point of interaction represents the optimal level of operation or optimal enrolment.



Source: Field Data 2013

Figure 4.4: Optimal School Size in Kakamega East Sub-county

Based on the data collected and analyzed the research establishes optimal enrolment for the sample schools in sub-county to be 2350 students and school fees at kshs. 21000 per year, which include both government grant and school PTA approval levies put together in Kakamega East sub county. The analysis can further be done to show that the optimal school size for a public day school is 168 students at least for single stream and class size of 42 students, government grant according to the government is ks.10265 (MOE, 2008) and PTA approved levies to be Kshs. 10,735. However, when respondents were asked whether the subsidy was enough a 100% gave NO as their respond. The study therefore reveals that most public day secondary schools are under enrolled. Basing on

the fact that the government set class size is 40 students per class. It is therefore very clear that public day schools in Kakamega East sub-county are not performing efficiently and resources are underutilized. Okwach and Odipo (1997) indicate that very low or high pupil teacher ratio could lead to inefficiency and propose that savings made from increased class size could be utilized in teacher training or for the acquisition of other educational materials which are crucial for learners' achievement. Ogenga (2010) share that, consequently, there will be under utilization of valuable scarce educational resources such as the class rooms and teachers in the school.

Conclusion

Based on the study findings, the following conclusions were reached.

- i) Student's enrolment factors have strong influence on quality of instructional operation in public day secondary schools. The lower or higher enrolment of students in school will affect the efficient of school operations.
- ii) The optimal school size is determined by the school administration and management. This could mean, where the level of enrolment is increased or decreased by school administration and management the quality of instructional operation would increase or decrease. The optimal school size is vital for the quality instructional operation in schools.

Recommendation

The following recommendations were made based on the findings and conclusions of the study.

1. 3.Students enrolment factors have strong influence on quality of instructional operations in public day secondary schools. The government should not establish new schools since the existing ones are underutilized.
2. The government should enforce the implementation of the fees guidelines in all public secondary schools as a way of enhancing retention in schools.

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