



Computer Laptop Project Strategy for Basic Education Schools in Kenya

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ABSTRACT

Kenya's Vision 2030 recognizes the enabling role of Information and Communication Technology (ICT) and anchors some of its key aspirations upon the availability and adoption of computers for schools. The overall objective of this strategy paper is to provide direction for acquisition of equitable and efficient laptop computers to all pupils in public primary schools. The existing education policy on ICT is imbedded in three documents namely; e-Government Strategy, National ICT Policy and Sessional Paper No. 1 of 2005 which is a Policy Framework for Education, Training and Research. There is a need therefore to consolidate these documents into one. The overall objective of the consolidation is to merge and integrate education policy on ICT including the scope, usage, administration and ways to address innovations and attendant Intellectual Property Rights. In the process of strategic planning for utilizing ICT in education, key stakeholders require to be consulted. In addition to the above mentioned, specific stakeholders include the National ICT integration and innovation Centre, Kenya Institute for Curriculum Development, Center for Mathematics, Science and Education in Africa, Teacher Service Commission, Primary Teacher Training Institutions, Universities and the National ICT Steering Committee. The strategy identifies the following as key weaknesses that hamper the implementation of ICT projects: slow integration of ICT in operations and programs; inadequate human and financial resources in some key service areas to meet the rapidly growing work-related demands. In addition there exists lack of appropriate learning facilities and/or infrastructure in some education and training institutions and inadequate number of trainers in modern technology coupled with a mismatch of skills learnt and demands of the labour market. It is also noted that the legal framework is non-harmonized and this inhibits the performance of Ministry of Education, Science and Technology. Further, a number of policy frameworks are yet to be operationalized thus hampering delivery of services. The strategy also identifies a Strategic Model for Laptop Project and an implementation matrix.

Keywords: *Information and Communication Technology, Strategy, Laptop, Education*

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

Every child has a right to Basic Education as provided in Basic Education Act of 2013. For this reason every parent shall ensure that the child attends regularly as a pupil at a school or such other institution as may be authorized and prescribed by the Cabinet Secretary for purposes of physical, mental, intellectual or social development of the child. Education and training in Kenya is promoted under the following system and structure: (1) Pre-primary education; (2) Primary education; (3) Secondary education; (4) Middle level institutions of basic education. The system is structured so as to enable learners to access education and training at any level in a sequence, and at a pace that may be commensurate with the individual learner's physical, mental and intellectual abilities and the resources available.

This Laptop Computers for schools strategy is critical to the achievement of Vision 2030 that seeks to provide Kenyan citizens with a lifestyle that is equivalent to the experience that a newly industrialized country provides.

Kenya's Vision 2030 recognizes the enabling role of ICTs and anchors some of its key aspirations upon the availability and adoption of Laptops for schools. Kenya, therefore, needs a very clear roadmap towards the realization of a connected and knowledge-based economy. This strategy provides such a roadmap. The overall objective of this Strategy is to provide equitable and efficient Laptops to all public primary schools.

1.2 Background

Since the 1980s integration of ICTs in education has been compulsory in the developed nations. This is not so in developing nations such as Kenya, where ICT integration in education is considerably more recent, small-scale and experimental in most of the developing countries including Kenya. It is however, generally recognized that adoption of computers in education has progressed, in nearly identical pattern, from acquisition of basic computer skills, computer aided teaching, communications and research, to usage in every subject. This has been accelerated by convergence of the computer and telecommunication technologies, particularly e-mail and Internet. This progression has been a result of various efforts, and a wide variation on



the levels of ICTs integration to education curriculum, as determined by social and economic conditions of individual countries and regions. It is worthwhile pointing out that most developing countries including Kenya are largely at the basic levels of integration. Furthermore, most developing countries currently place emphases, on new dimensions, pedagogical approaches and teaching and learning that would enhance knowledge in interactive and self-directed ways. This is commonly referred to as interactive education. Whereas the impact of ICTs on the education goals is still inconclusive, reported observations include rapid expansion of knowledge, improved examination outcomes, enhanced communication and technical efficiency, as well as greater decentralization in the delivery of education services. It is not in doubt, however, that ICT has the potential to play a more powerful role in increasing resources and improving the environment for learning. ICTs can also play a role in preparing students to acquire skills, competencies and socio skills that are fundamental for competing in the emerging global “knowledge” economy. With respect to the great concern about the digital divide, it will be noted that access to ICT facilities is currently one of the major challenges in Africa, Kenya is no exception. While the ratio of one computer to 15 students is the norm in most developed countries, the ratio in Africa stands at one computer to 150 students. This ratio is even wider in disadvantaged regions and areas. It will also be recognized that access to ICTs varies according to the various sub-sectors of education. In Kenya, the ratio for university and colleges is one computer to 45 students, one computer to 120 students at secondary school level while access at the primary school level remains much more limited at one computer to 250 students. In addition, the limited and uncoordinated approach to imparting appropriate ICT skills and competencies to teachers remains a major barrier in the integration of ICT in education in Africa generally, and in Kenya in particular. While equal opportunities for access to ICT are provided in Africa, girls are disadvantaged through a wide range of constraints that include choice of subjects, limited computers, and increasing attrition at various levels of education. However, recent observations indicate that ICTs facilities, notably email and Internet, have had the effect of reducing gender disparities leading to increased interest in computer education by girls. Besides limited access, unavailability of ICT teachers, and gender disparities, relatively high costs of ICT components and limited access to electricity are other challenges that continue to hamper adoption of ICTs in most parts of Africa and particularly so in education sector. Indeed, a recent survey by Digital International indicated that the proportion of schools without electrical power range from 58% to 96% in some rural areas. This makes the use of available ICTs considerably difficult.

1.3 Education Policy Framework

According to Sessional Paper No. 1 of 2005, entitled “A Policy Framework for Education, Training and Research”, the overall goal of education was to achieve Education For All (EFA) by 2015 in tandem with national and international commitments. The short-term goal was to attain Universal Primary Education (UPE) by 2010 and to increase the transition rate, from primary to secondary schools, from 47% to 70%. In addition, the policy envisaged expansion of capacity for universities to enroll an average of 5,000 students annually. In addition, the policy provides commitment for enhancement of access, quality and equity in delivery of education services at all levels. Equally important, the policy provides commitment to ensure that learning needs for all are met through appropriate learning and lifelong skills by 2015. In order to realize these policy objectives, commitment is made to integrate ICTs in the delivery of the education curricula, to strengthen Open and Distance Education (ODE) and to promote effective and efficient administration at all levels of education. In pursuit of the policy objective for UPE, the Government introduced Free Primary Education (FPE) in 2003 that has led to an 18% increment in enrolment, from 5.9 million pupils in 2002 to 7.2 million in 2004 in public schools. However, the challenges arising from the increased enrollment rates include overcrowded classrooms and high Pupil Teacher Ratios (PTRs) particularly in densely populated and semi-arid areas. Although not adequately equipped in all subjects, teachers are required to teach seven (7) subjects of the primary school curriculum. ICTs can contribute considerably to addressing these challenges. A limited transition rate from primary to secondary schools remains a major challenge. While there are 20,000 primary schools, there are only 4,302 secondary schools, of which 3,661 are public and 641 private. This has limited the transition rate is less than 47%. The other challenge is the high cost of learning and teaching materials and persistent poverty in some areas. Furthermore, the student-textbook ratio remains substantially high in most areas. In addition, poor performance in mathematics and science has been observed in the national examinations. It is considered in this strategy that ICT has potential to address these and other challenges. In its entirety, the Kenya's Digital Literacy Programme (DLP) will be implemented in all 23,951 public primary schools in the country, with over 1.2 million devices delivered by 2017 at a cost of KES29 billion (US\$286 million). To facilitate this, the Government has also connected the schools to mains electricity, with the more remote areas receiving solar power kits and other off-grid power solutions.

1.4 E-Government Strategy & National ICT Policy

The Government has put in place the National ICT Policy and E-Government Strategy that provides guidelines for transformation of Kenya into a digital society. In both



documents the Government recognizes that an ICT literate workforce is the foundation on which the nation will become a knowledge-based economy. Against this background the government will make education a platform for equipping the nation with ICT skills in order to create dynamic and sustainable economic growth.

1.4.1 E-Government Strategy

The E-Government Strategy, which was adopted in 2004, emphasizes transformation of Government services from manual to digital-based operations. The Government's specific objectives include improved coordination of government agencies to reduce duplication of efforts and to enhance efficiency in utilization of resources, to improve the competitive position of the country through provision of timely information and delivery of services. Other objectives are to reduce transaction costs, and to engage citizens and the private sector through digital and on-line service provision. In pursuing these objectives, the Strategy gave considerable emphasis on the use of education to equip the nation with appropriate ICT competencies and skills and related innovations. In addition, the Strategy outlined information systems to be driven by the education sector that include operationalization of the Education Management Information System (EMIS). EMIS, the Strategy envisages, will be used to collect and process data required for improvement of education policy, planning, implementation and monitoring. It also encompasses provision of online examinations, processing admissions for primary and secondary schools and online dissemination of school and other educational curricula.

1.4.2 National ICT Policy

The principal objective of the National ICT Policy is to facilitate sustainable economic growth and development, and poverty eradication through productive and effective technologies. The Policy also aims at pursuing progress towards full socio-economic inclusion of citizens through universal access. Further, the Policy looks to stimulate investment in ICT sector while at the same time encouraging the spirit of innovation through research and development. The policy envisages harnessing the potential of ICTs and related emerging technologies to eradicate poverty, support universal primary education, improve maternal health, combat diseases, maximize agricultural production, ensure food security, promote trade and industry, ensure environmental sustainability, develop global partnerships for national development, and incorporate technology in mainstream implementation of development policies. In the area of human resource development, the policy emphasizes integrating ICTs in teaching curriculum at all levels of education; establishing e-educational networks for sharing educational resources

and promoting e-learning at all levels; encouraging and supporting ICT training for decision-makers, community and civil society leaders; creating opportunities and providing assistance for the disadvantaged, women and the youth to acquire ICT competencies and skills; and enhancing capacity for research and development in ICT sector.

1.4.3 ICT in Education Policy

The vision of the Ministry of Education (MoE) in Kenya is to facilitate ICT as a universal tool for education and training. In order to achieve this vision every educational institution, teacher, learner and the respective community should be equipped with appropriate ICT infrastructure, competencies and policies for usage and progress. It calls for recognition of the fact that ICT provides capabilities and skills needed for a knowledge-based economy. It also calls for transforming teaching and learning to incorporate new pedagogies that are appropriate for the 21st century. MoE's mission is to facilitate effective use of ICT to improve access, learning and administration in delivery of education programs and services. The principal objective will be to integrate ICT in the delivery of education and training curricula. The existing education policy on ICT is imbedded in three documents namely; e-Government Strategy, National ICT Policy and Sessional Paper No. 1 of 2005 (A Policy Framework for Education, Training and Research). Need therefore arises for consolidation of these documents into one. The overall objective of the consolidation will be to merge and integrate education policy on ICT including the scope, usage, administration and ways to address innovations and attendant Intellectual Property Rights (IPR).

1.5 Justification of the Strategic Plan

This Strategic Plan is a road map for guiding the government to accomplish its operational goal of providing Laptops to standard one pupils. The strategic issues to be addressed in the plan are bottlenecks that must be removed in order to reach the goal effectively and efficiently. The plan also presents situational and strategic analyses which should provide the government with a strategic direction and a focus. The plan is therefore an enabler for the planned operational and managerial activities.

1.6 Organization of the Strategic Plan

It is organized into Four Sections. Section 1 on Introduction provides the background to the plan and the review of past-performance. Sections 2 is on Situational Analysis. It covers the mission, vision, SWOT Analysis, Stakeholder Analysis, Organization structure and staff establishment. Sections 3 presents the Strategic Analysis. The strategic themes are analyzed in terms of strategic issues, strategic objectives, strategies, strategic actions,

outputs and outcomes. In sections 4 we present requirements for implementation, implementation roles, budgetary implication, monitoring and evaluation and the implementation logical framework.

2. INTRODUCTION SITUATIONAL ANALYSIS

This section discusses the situational analysis of the capacity of the Government of Kenya through the Ministry of Education (MoE) to provide laptops for all primary school children in Kenya. This is studied in line with the strategies of the Ministry of Information, Communication and Technology (MOICT) as a key driver of the ICT sector in Kenya. In this chapter the strategy in Kenya Vision 2030 in the social pillar is linked to the vision of Ministry of Education, (MoE). Further the mission of Ministry of Education (MoE) is understood in the context of enhancing Education through ICT in a close relation to that of the Ministry of Information, Communication and Technology (MOICT). The mandate, core values, situational analysis, Stakeholders' analysis and human resource capacity of MoE in light of the laptop project is analyzed.

3. CURRENT SITUATION

3.1.1 Vision

The parent Ministry of Education has a vision statement; "A globally competitive education, training, research and innovation system for sustainable development" This relates well with that of MOICT which sees "Kenya as a globally competitive knowledge-based economy". These two visions provide a strong statement that creates a strategic environment supportive of implementing large scale ICT projects.

3.1.2 Mission

While the mission of MoE is "To provide, promote and coordinate the delivery of quality education, training and research and enhance integration of Science, Technology and Innovation into national production systems for sustainable development", that of MOICT states is "To facilitate universal access to ICT infrastructure and services all over the country". Again these are two very well intended and complementary paths that should provide the path to achieve the visions stated in 2.2.

4. CORE VALUES

It is important to understand the values that the strategies of the driving Ministry are anchored on. For MOEST, these are; Integrity, innovativeness and creativity and upholding cultural diversity which is interpreted to mean a commitment to setting and maintaining high standards

of education and training through continuous improvement of service delivery.

5. CONCEPTUAL FRAMEWORK

This strategy can adopt the concepts of e-readiness and governance in Kenya, as expressed by Sharples & Moldéus (2013). In their Teacher and school e-readiness - Technology Acceptance Model (TAM), an individual's adoption of new technology is decided by that individual's perceived usefulness and perceived Ease of Use, hence their modification of Musa's TAM model shown in figure 2.1.

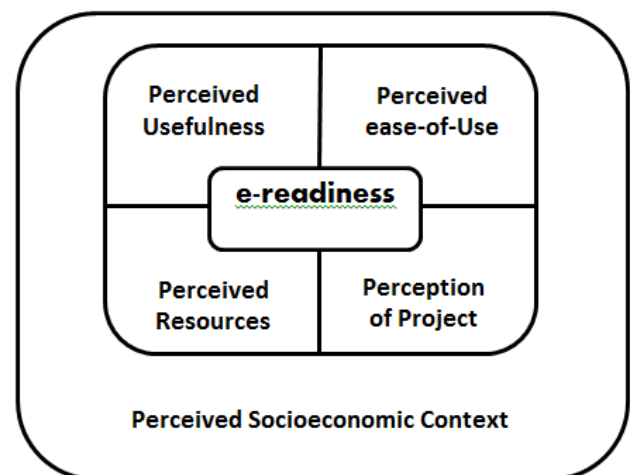


Fig. 2.1: Modified Technology Adoption Model (Source Sharples & Moldéus, 2013)

The concept is further supported by the modification of Cadman's (2012) model of good governance which was designed as a tool by which governance could be evaluated to explain how complex government-led development projects can achieve legitimacy. The central tenet of Cadman's framework is that governance should be analyzed in terms of governance inputs and outcomes. In this case, governance inputs are the processes and structures which direct a governments' actions. Cadman separates inputs into three categories namely; Interest Representation: ensuring that all stakeholders are included in the planning process, given equal voice to direct the process, and that they possess the necessary resources to engage with the process, Organizational Responsibility: there should be both accountability and transparency within the entire research, planning and design process and decision Making: a measure of democracy within the planning process, the reaching of agreements and the settlement of disputes.

This is simplified in their proposed model in figure 2.2

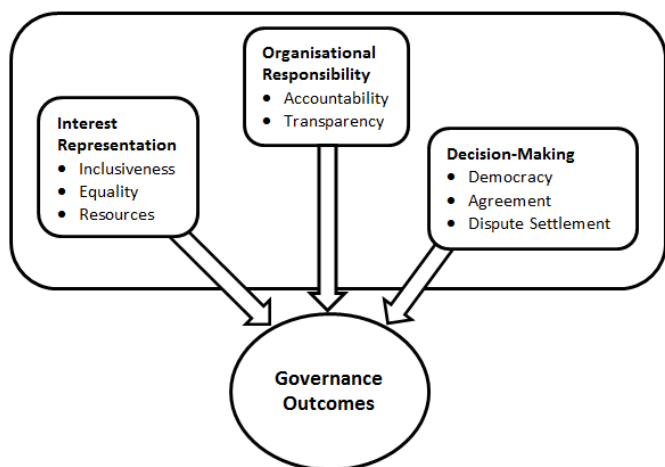


Fig. 2.2: Simplified version of Cadman's, 2012 Model of Good Governance Model.

6. STAKEHOLDERS ANALYSIS

Key stakeholders are critical in the ICT strategy development for laptops. Some of the key roles they play include; coordination, harmonization on all ICT initiatives in the sector advice on ICT issues to government, guiding partners bringing in ICT interventions, advice on MOUs and Agreements proposed for signing on ICT initiatives and programs. Further they are expected to provide coordination, advice and assistance of "ICT Integration in Education" initiatives and programs with other directorates, departments, units, develop appropriate ICT educational strategies, policies, standards, guidelines, procedures, develop pedagogical and didactical concepts and implementation schemes for ICT Integration. They should be responsible for providing leadership for ICT Champions. The key stakeholders in the Education sector include; Ministry of Education (MoE), Ministry of Information, Communication and Technology (MOICT) The National Treasury responsible for Programme funding and formulation of financial policies. Other Government Ministries and Agencies are expected to formulate and implement Government policies. The Development Partners Provide funds, technical support and capacity building while the Public are a Source of data, tax payers, suppliers and consumers of services.

The Workers unions like the Kenya National Union of Teachers (KNUT), Kenya Union of Post Primary Education Teachers (KUPPET), University Academic Staff Union (UASU) and other trade unions and associations have a role in collective bargaining for Employee welfare. The Academic Institutions provide expertise, professionalism, and human capacity building. Further research Institutions (private and public) carry out collaborative research, and undertake collaboration in programme development, policy guidelines, synergies

and capacity building. The Industry Regulators and Marketing Agencies perform marketing and Industry regulation as the Private sector and Civil Society partner with the Education sector in programme development, implementation and community advocacy. Learners at all levels participate in learning access and completion of each cycle. The Teachers Service Commission Ensuring effective curricula implementation at all Levels while households, parents and communities participate in the resource mobilization and management of the sector programs. County governments play a crucial role in augmenting the sector through provision of bursary fund and support development infrastructure.

In the process of strategic planning for utilizing ICT in education, key stakeholders require to be consulted. In addition to the above mentioned, specific stakeholders include the National ICT integration and innovation Centre, Kenya Institute for Curriculum Development, the National Industrial Training Authority (NITA), CEMASTE (in-service), Teacher Service Commission, Primary Teacher Training Institutions, Universities and the National ICT Steering Committee. TSC (2014) says in its report on Integration of Information Communications Technology in the learning and teaching situations is also well covered in various policy frameworks and specifically in Sessional Paper number 14 of 2012 that states in part: "The Government recognizes that an ICT literate workforce is the foundation on which Kenya can acquire the status of a knowledge economy by 2030." Against this background, the Government shall make education the natural platform for equipping the nation with ICT skills in order to create dynamic and sustainable economic growth.

Other stakeholders in the ICT sector were identified by Waema et al (2012) as National Communications Secretariat (NCS), which advises the MoICT on ICT policy; the regulator (CAK), which licenses and regulates telecommunications, radio communications, postal services and, as per the most recent Act, broadcasting (the Kenya Communications Act of 1998 transformed the CAK into the converged regulator, meaning that the CAK's regulatory menu now includes broadcasting services, Directorate of e-Government (DEG), which was founded in March 2004 in the Office of the President (OP) to oversee the implementation of e-Government strategy and to assist the Government of Kenya on the effectively delivery of services to citizens; Government Information Technology Services (GITS), which is under Treasury, and is a technical entity that provides computer services to government ministries and departments.

In addition, Kenya ICT Board (KICTB), which was created by a Presidential Order in 2007 to promote the development of ICT in the country, especially BPO and IT-enabled services (in practice, its role sometimes overlaps with those of the NCS (see above), especially



with respect to advising the government on ICT issues, as well with the Directorate of e-Government (see above) with respect to implementation of e-governance systems. These overlaps need to be addressed); Parliamentary Committee on Energy, Communications and Public Works, which provides Parliamentary oversight on communications matters; and Monopolies and Prices Commission, the Commissioner of which, in terms of the Monopolies and Prices Commission Act, can make determinations on matters that may affect competition in the economy, including matters that involve companies in the telecommunications business. (The Commission has indeed dealt with some matters in the ICT arena, especially with respect to mergers and acquisitions.) The ICT responsibilities are distributed across different arms of the government, as per the outline just provided, with little, if any, coordination, with negative consequences.

In a supportive strength, the National ICT strategy (2006) was directed to modernize Kenya's educational system using ICTs and expand access to education, training and research resources and facilities, as well as to improve the quality of education and training. This was meant to be responsive to the needs and requirements of the economy and society with specific reference to the development of the information and knowledge based economy and society. The aim of this is to transform Kenya into an ICT or information knowledge-driven nation.

7. ENVIRONMENTAL ANALYSIS

According to MoE strategic plan 2013-2017, primary school enrolment increased from 8.7 million in 2008 to 10.0 million in 2012 with 4.9 million and 5.0 million girls and boys respectively. The Gross Enrolment Rate (GER) increased from 109.8 percent in 2008 to 115.3 per cent in 2012. Completion rate increased marginally from 79.8 percent in 2008 to 80.3 percent in 2012, whereas transition rate from primary to secondary increased from 64.1 percent in 2008 to 76.6 percent in 2012. Alternative Provision to Basic Education and Training (APBET) formerly known as Non formal Education plays a critical role in increasing access to basic education especially in informal settlements and marginalized areas. In 2010, there were 392 registered APBET institutions in the country with the majority in Nairobi region. Government has been giving capitation grants to 474 APBET Institutions.

8. SWOT ANALYSIS

8.1 Strengths

Drawing from the MoE strategic plan 2013-2017, the strengths of the Education sector include well established institutional structures for the management of education services from national to county levels and below. There is also an existing legal framework for the delivery of

education, training, science, technology and innovation as articulated in the constitution of Kenya 2010 and various Acts of parliament. There is also goodwill from Government, private sector and Development Partners and a well spread of learning institutions across all the counties. These strengths are complemented by those from MOICT strategic plan 2013-2017 in which there has been the creation of ICT authority as a one stop shop for all ICT related issues, the availability of National ICT policy framework and improved private sector participation and PPP arrangements.

8.2 Weaknesses

However some of the noted relevant weaknesses are the slow integration of ICT in operations and programs; and inadequate human and financial resources in some key service areas to meet the rapidly growing work-related demands. In addition there exists lack of appropriate learning facilities/infrastructure in some education and training institutions and inadequate number of trainers in modern technology coupled with a mismatch of skills learnt and demands of the labour market. It is also noted that the legal framework is Non harmonized and this inhibits the performance of MoE. Further, a number of policy frameworks are yet to be operationalized thus hampering delivery of services.

8.3 Opportunities

Some of the notable opportunities that support the larger Education ecosystem include the implementation of Government Vision 2030 development blueprint to which all education and training sub-sectors would draw from in terms of contribution to socio-economic growth. There is also increased political and development partner goodwill and support to education, training, science, technology and innovation and an increased budgetary support to education by the Government and development partners. There also exists an increasing demand for accountability by stakeholders in terms of service delivery and resource utilization. The Government is also obliged to International commitment on literacy including the attainment of Millennium Development Goals. In terms of clients, there is a youthful population with the potential of adopting a STI culture coupled with high demand for vocational skills. Further, there is an ongoing initiatives to improve and expand ICT network through the fibre optic cable.

This is supported by the opportunities recognized by MOICT as including the existence of terrestrial and submarine fibre networks for broadband connectivity, a vibrant private sector and stakeholders and the increased adoption of ICT in work and social places.



8.4 Threats

A few threats have been stated that could affect the larger ICT strategy and these include inadequate funding especially in some programs as well as Regional disparities in distribution of resources. There is also the occasional high operational costs brought about by corruption.

Barmao (2014) however observes that in order to implement ICT in education, it is necessary to have a three-way interaction between learners, teachers, and computers while regarding the wider context in which teachers and learners work. The implementation of ICT faces several infrastructural and personnel challenges including limited schools with ICT facilities, costly Internet access, limited information sharing, limited skills for ICT integration, shortage of labour force due the failure of training institutions to produce ICT technicians and professionals needed for the labour market, limited electricity supply, fixed telephone networks and number of computers, few people have heard of or used computers, lack of policy framework, inadequate infrastructure, cost of bandwidth, and inadequate in-service training on ICT integration in education, hence there is a Potential gap between the intended, implemented and attained curriculum.

Barmao (2014) further shares some findings highlighting that most head teachers cited that they weren't ready for lap top project due to infrastructure and electricity and are finding it difficult in integrating computer-based activities into their lessons. While computerization continues to advance in developed countries, Kenya still experience a lag in its implementation, and that continues to widen the digital and knowledge divides. The respondents were further asked whether teachers had confidence in teaching using laptops in schools where (37.8%) disagreed with the statement while (50%) strongly disagreed with the statement. Head teachers interviewed on the same claimed that they were not confident in the using laptop in teaching. The study also notes that attitude, motivation, computer anxiety, and computer self-efficacy are factors affecting teachers' use of computers in their lessons.

Further the study finds that factors that inhibit ICT integration in Education include; general lack of ICT knowledge among teachers, lack of focus on educational objectives and lack of policy direction and enforcement at all levels. This was further aggravated, lack of trained ICT personnel.

The MoE in a brief to the Parliamentary committee for Education (2014) held extensive consultations with key stakeholders on the crafting of the new procurement proceeding with an objective of reducing the prices of the computing devices. These consultations were done with the Public Procurement and Oversight Authority (PPOA),

ICT experts drawn from Universities of Nairobi, Strathmore and JKUAT, Rural Electricity Authority, Kenya Institute of Curriculum Development, Teachers Service Commission, procurement experts and the Laptop Project Implementation Committees which included the Cabinet Committee, the National ICT Steering Committee (Principal Secretaries) among others.

In addition, the Ministry carried out a Benchmarking visit to Portugal in November 2013 together with members of the Departmental Committee on Education, Research and Technology of the National Assembly as part of the study to establish how ICT integration has been implemented successfully in order to inform the Kenyan initiative. The same Committee of the National Assembly had earlier visited Rwanda to learn from their experience of "One Laptop per Child Project" (OLPC). These two study visits have informed our implementation strategy, especially on phasing out the project in order to inform future scale up.

8.5 Human Resource Complement

Capacity building is a critical component of the successful implementation of the national laptop project. To achieve the intended goals of integrating ICT in primary schools, the implementation has adopted a three tier training strategy using a cascade model of training. This programme targets master trainers, trainers of trainers and teachers. All stakeholders have to be sensitized n the key roles and the impact of the strategy in this case sensitization of managers in all the beneficiary institutions, national and county education officers. Teacher development agency KEMI has to develop an ICT Integration course for heads of institutions.

MoE in collaboration with Teachers Service Commission (TSC) has trained 150 National master trainers whose role is to undertake training of training of Trainers across the counties. The selection was based on their previous training in ICT skills and certification by a recognized institution.

By December 2016, 70,000 teachers had been trained to incorporate ICT in teaching and learning. Support ICT officers were currently being trained and would be deployed to counties as quality inspectors. Further, the Training of Trainers (ToTs) is ongoing at county levels and this will be expected to carry out training of their peers (2 teachers from each of the beneficiary school) at the school level or Zonal centres where it is convenient and cost effective for teachers to commute daily to cut down on costs. In order to have an implementation impact on capacity to deliver, it was expected that the training would be cascaded to the identified teachers at each school level. This would be rationalized to the right number of teachers that would facilitate the delivery of the digital content for the pilot classes.



8.6 Digital Content Development

Inaugural digital content has been prepared by Kenya Institute of Curriculum Development (KICD). By December 2016, digital content for standards one, two and three was ready while contents for other classes were being developed given that the digital learning programme is progressive. The devices were preloaded with interactive digital content for pupils undertaking the first two years of primary education, and currently covers 5 subjects: Kiswahili, English, Mathematics, Science, and Social Studies. The teachers will be facilitated with laptops. Further, servers and wireless routers were preloaded with the teacher training curricula on ICT integration, Teachers training manual on ICT and a resource kit for teachers. KICD has also completed preparing interactive content for visually impaired pupils in the five subjects.

8.7 Electricity Connection

According to 2013/14-2015/16 Medium Term Expenditure Framework by MOEST, The Education sector has to undertake various investments in energy, infrastructure and ICT development at all levels including construction, rehabilitation and expansion of education and training facilities and ST&I infrastructure thus will heavily rely on the Energy, Infrastructure and ICT for technical support. Further a report from Rural Electrification Authority indicates that good progress has been made to ensure that schools are ready to roll out the laptop programme. As at December, 2016, only 500 public primary schools out of 23,900 had not been connected to electricity. The government had put a lot of effort from 2014 to connect power, either through solar or the national grid, to public primary schools. In addition, leading telecommunications company Safaricom offered free internet services to 150 schools across the country by 2016.

9. STRATEGIC ANALYSIS

The introduction of technology in education is gaining momentum worldwide (Severin et al, 2011). The Kenya Vision 2030 under the seven key social sectors identifies establishment of a computer supply programme as a Flagship Project for Education and Training to equip students with modern Information Technology (IT) skills. In the Second Medium Term Plan of the Kenya Vision 2030, the Kenya Government outlined the policies, programs and projects which the Jubilee Coalition Government intended to implement during the five year period starting 2013 to 2017.

The laptop programme was aimed at aligning integration of ICT into teaching and learning as the Government's Manifesto key programme of provision of laptop computers equipped with the relevant content for every

school age child. The Government took steps by (1) Integrating ICT curriculum in teacher training colleges which was made compulsory in the first year in 2004, (2) Engaging Kenya Institute of Curriculum Development (KICD) to ensure digitized content for classes one to eight which was done and (3) Piloting with 40 primary schools to learn the way.

In recognition of the unique and significant mandate of the Ministry of Education regarding the integration of ICT in education, an institutional framework was created to address ICT integration in education. Two specialized units were created, namely; the ICT for Education (ICT4E) to spearhead the pedagogical use of ICT, while National ICT Innovation and Integration Centre (NI3C) was to carry out the testing of technical solutions submitted for consideration by firms in order to establish their appropriateness and use in curriculum delivery. Further, in order to ensure ICT is entrenched in the curriculum, the Ministry developed an ICT integration model which emphasize four key pillars critical to effective implementation of ICT initiatives, which are teacher capacity development; relevant digital content; deployment of ICT infrastructure and robust policy and strategy.

Hence, Laptop project has a critical role to play towards the realization of the goals of the social pillar of the Kenya Vision 2030. This Strategic Plan thus incorporates strategies intended for the achievement of the goals of the Laptop project.

10. KENYA VISION 2030 AND 2ND MEDIUM TERM PLAN

10.1 Overall Goal of the Ministry

The Ministry of Education is committed to the provision of quality education, training, science and technology to all Kenyans, in an effort to contribute to the building of a just and cohesive society that enjoys equitable social development. This way the country will have a "Globally Competitive Quality Education, Training, Research and Innovation for Sustainable Development". To fulfill this mandate, The Ministry has to strategize in order to achieve one of its strategic objective of providing Laptops to all primary school going children. This will be realized through the implementation of the following strategies for the overall goal of improving access to quality education and training as well as revitalizing and harnessing Science, Technology and Innovation in Kenya.

10.2 Strategic Issues, Objectives and Strategies

The following issues are critical areas of focus in order to realize Laptops for Basic Education. (a) Quality and relevance; (b) ICT integration; and (c) Governance and management. In considering these critical areas, it is

prudent to formulate strategic objectives and strategies to:

- (1) Improve quality and relevance of Education and Training. To achieve this first objective, the following strategies are necessary: Reform/Review Education Curriculum; Strengthen the capacity of the Ministry to assess and assure quality of Education and Training and institutionalize demands driven human resource development.
- (2) Integrate ICTs in education, training and research for management, teaching and learning at Basic Education level. The strategy here is to: develop digital content for basic education; develop and implement comprehensive legal, policy and institutional framework for ICT integration in basic education; develop an enabling and robust ICT infrastructure for all education, training and research institutions and promote Public Private Sector Partnerships for ICT in education resource mobilization including cost sharing and lastly
- (3) Re-engineer the governance and management system to improve efficiency, accountability and quality education and training service delivery through a strategy of: enhancing accountability by empowering communities through mass media; establishing laptop project governing bodies created by the Acts of Parliament and establishing a system of tracking learners from pre-primary level through to primary levels of education.

10.3 Key Results Areas

The key strategic issues that the Laptop project needs to address are the challenges it faces in order to effectively achieve its realization as set in the 2nd MTP aspirations of Kenya Vision 2030. This paper identifies the following key results: (1) Teacher capacity development; (2) Relevant digital content; (3) Deployment of ICT infrastructure and (3) Robust policy and strategy.

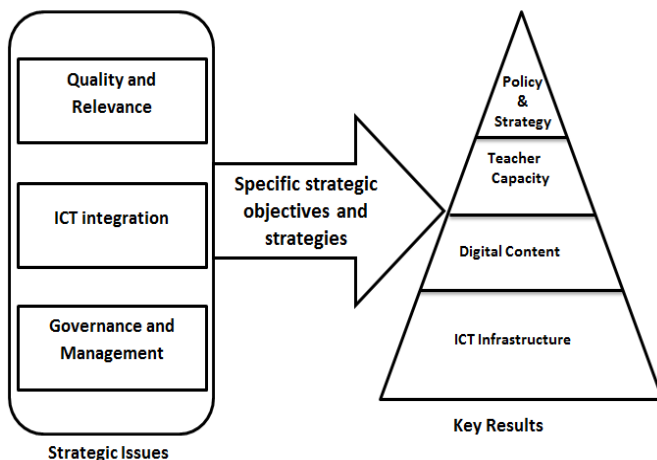


Fig. 3.3 Strategic Model for Laptop Project

10.4 Strategic Implementation

This section deals with the implementation of this strategic plan. Implementation of the plan is expected to

be logical and measurable. The implementation responsibilities of this Strategic Plan will be devolved to all levels in order to allow for maximum participation of all the relevant stakeholders. Formal existing government structures including departments that undertake regulatory responsibilities will be charged with carrying out their appropriate roles. Stakeholders will be accorded their rightful sway and space in the implementation of this strategy. In particular, the implementation of Laptop for Schools Strategic Plan will require the full involvement, effort, commitment and leadership from the government, politicians and all key stakeholders. It will also require that mobilized resources are focused on the achievement of the objectives laid out in the plan. This strategic plan sets out the framework for MOEST budget and operations for the implementation of the Laptop for schools project.

Given the matrix nature of government decision-making organs, the Strategic Plan's implementation framework will have a wide spectrum of players/actors. Each of the strategic objectives will be scheduled in order to ensure timeliness, effectiveness and accountability for performance.

In presenting the implementation plan, this chapter also addresses some of the challenges and concerns that relate to the very process of implementation. The government and in particular MoE will address the structural issues, capacity building gaps and will pursue the appropriate budgetary resources and resource mobilization efforts in order to support the effective implementation of the plan. Measurement tools will need to be refined and utilized to assess outcomes of activities that are undertaken. While it is not envisioned that every strategy can be pursued due to limited staff and financial resources, developing and assigning responsibilities that identify specific action steps to be taken each year will keep the plan on track. Accordingly, MoE will draw its annual work plan that will be prepared in conjunction with annual review of this strategic plan.

Monitoring and evaluation will be done using the implementation logical framework (Logframe) provided in this Chapter.

10.5 Key Assumptions/Success Factors

The successful implementation of this Strategic Plan will depend on a number of assumptions/Key success factors that include: (i) Political goodwill and government continued support and ownership of the strategic plan; (ii) Timely mobilization and utilization of resources; (iii) Capacity of stakeholders to implement the new strategic plan; (iv) Strict adherence to content and timeframe; and, (ix) Support of strategic plan by all stakeholders.



10.6 Risk Management Strategy

The following matrix constitute the range and types of risks should be anticipated during the course of implementation of the Strategic Plan and how to mitigate the attendant risks

Table 4.1 Risk Management Strategy

No.	Risk	Issue	Priority	Mitigation Measure
1	Poor Plan Implementation	Failure to develop and implement diligently individual Authority's plans that are intended to help achieve the global industry objectives.	High	Close monitoring and tie funding to agreed performance outcome
2	Lack of Political goodwill	Lack of political goodwill to facilitate necessary legal amendments and policy guidance. Change of guard especially after the general election	High	Strong lobbying for political goodwill and issue-based decisions. Anchor the plan in law
3	Lack of resources	Inadequate human, financial and other resources pose risks to the implementation of these activities. The absence of an effective and agreed communication strategy may result in poor information flow and thereby delay decision-making.	High	Design and implement training Programmes
4	Delay due to procurement	Delays in procuring the Laptops due to vested interests, corruption, delay in disbursement of finances	High	Develop approve and implement a procurement plan
5	Insecurity	Insecurity is both a threat to human life and a major risk against the objective of attracting investment especially from strategic partners. Disruption of planned activities	High	Government to address insecurity concerns
6	Poor Communication	Resistance to change by members of staff/Board may result in failure or delay in the Plan's implementation	Medium	Prepare and implement a communication Strategy to ensure effective information flow.
7	Lack of ownership	The lack of ownership by the stakeholders, for instance may lead to failure in the implementation of the strategic plan	Low	Consultation and involvement of key stakeholders at all stages of strategy formulation and implementation is necessary
8	Resistance to change/ Negative attitude	Failure by participating stakeholders to diligently carry out the changes needed to make regulation.	Low	Create awareness of the intended changes in good time through active participation and discussions with stakeholders/staff

10.7 Implementation Framework

In the implementation framework, we need to define the context which informs the implementation process. The implementation process adopted determines the

outcomes. The learning curve from process to context and Outcomes to context is continuous. Therefore, there should be a regular review of the process and an assessment of outcomes to capture this learning. Monitoring and evaluation addresses this learning. The figure below captures the Implementation Framework.

Laptop Implementation Framework

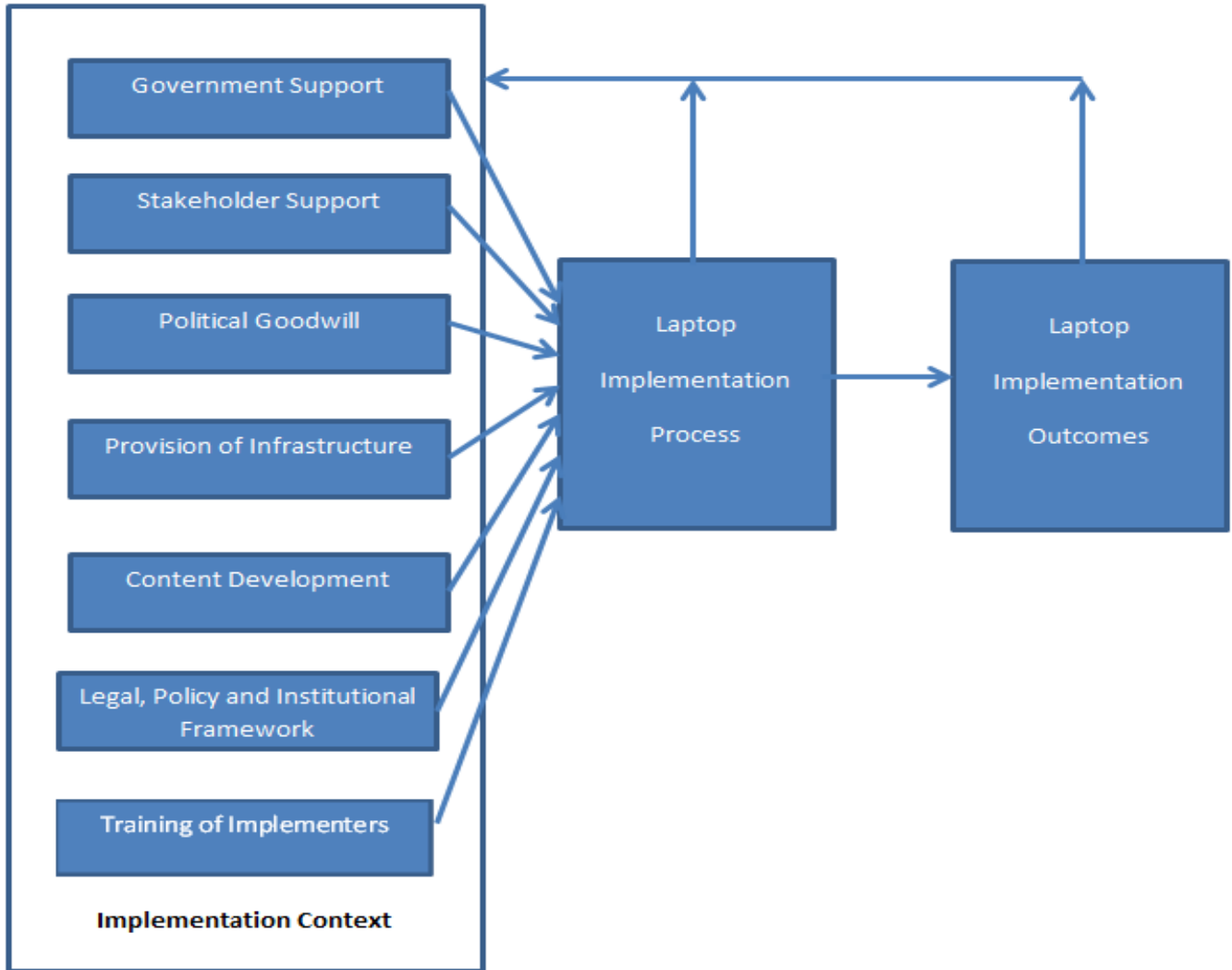


Fig. 4.1: Laptop Implementation Framework



10.8 Implementation Matrix

STRATEGIC ISSUE 3: ICT INTEGRATION								
STRATEGIC OBJECTIVE 3: TO INTEGRATE ICTs IN EDUCATION, TRAINING AND RESEARCH FOR MANAGEMENT, TEACHING AND LEARNING AT ALL LEVELS.								
Strategy 1: Develop and implement comprehensive legal, policy and institutional framework for ICT integration in education at all levels;								
Develop and implement policy and strategy for ICT integration in ICT4E	Policy and strategy for ICT integration in ICT4E	Percentage completion of ICT4E policy.	ICT4E	Chapter 7 of the sessional paper No. 14 of 2012	100%	2014-2017	A strategy on education and training	10 million
Directorate (division) established to coordinate ICT4E & STI functions in education	ICT4E/ STI Directorate /division established	Structure & functions of the directorate Deployment of human resource with relevant skills	ICT4E	Proposed ICT4E structure	100%	2014-2017	A fully established directorate/unit	11 million
Strategy 2: Develop an enabling and robust ICT infrastructure for all education, training and research institutions.								
Provide ICT infrastructure and equipment to schools, ECDE centres, ACE centers and TTCs strengthened	ICT equipment and infrastructure provided to ET&STI institutions	No of ET&STI institutions with ICT equipment	ICT4E	Zero primary schools ECDE centres, ACE 1,850 secondary schools	3.6 million devices for primary 1250 secondary	2014-2017	21,000 primary schools equipped with ICT infrastructure 1,250 secondary schools equipped 22 TTCs fully equipped	72 billion 1.75 billion
Develop Quality digital content for all levels of education.	Digital content for all levels of education developed	100% Percentage of Digital developed	ICT4E KICD	Zero for ECDE Std 1 & 2 content developed Form 1 – 4 content developed for 12 subjects Zero for TTCs	100%	2014-2017	Digital content for all levels of education developed	200 million 900 million 500 million 400 million
Strategy 3: Facilitate provision of connectivity to enhance collaboration and information sharing in the sector.								
Provide Internet connectivity/access to Institutions	ET&STI institutions connected to internet/broadband	No of ET&STI institutions connected to internet/broadband	ICT4E	Piloting	100 schools per county 22 TTCs	2014-2017	5000 learning institutions connected to internet	



10.9 Monitoring and Evaluation

Monitoring and evaluation will involve a number of planned review activities coordinated by the MoE. The Head teachers will be required to prepare yearly reports which shall be presented to County Education Boards to be convened for this purpose. The yearly M & E Reports will state the targeted activities, state of accomplishment with explanation for non-accomplishment (where applicable), targeted activities for the next period and the status of the budget. The Reports will indicate what has been accomplished during the period, target for the next period, budgetary position and notes on performance or non-performance. The MoE will conduct an evaluation arising from the reports received and report to the Ministry of Devolution and Planning for action.

The M & E will also involve external evaluations to assess accomplishments against set auditable milestones. These will be stated in the implementation log-frame. A mid-term external evaluation will be conducted semi-annually throughout the duration of the project. The report will give status, lessons learned and the way forward.

Specifically, it will be to assess the extent to which the Plan is meeting its implementation objectives and timelines. The report will also indicate which areas should be changed and how such changes will affect the original design.

End of term evaluation will be conducted after 5 years. Again this will indicate the accomplishments, lessons learned and strategic themes/issues that would be included in the next strategic plan. Specifically it shall address the following issues: (i) Impact: The extent to which the implementation of activities met the stated strategies and objectives; (ii) Sustainability: Assesses the sustainability of the achievements made; (iii) Effectiveness: Determine the level of effectiveness of the strategies in achieving objectives; (iv) Efficiency: Assess the efficacy of the methodology employed in achieving results obtained; (v) Economy: Determine the level of effective use of resources available during the period; (vi) Accountability: Assess the level of accountability in the deliverables as were set out in the Strategic Plan; (vii) Lessons Learnt: Document lessons learnt/best practices; (viii) Terms of Reference (TORs): Prepare the TORs for the next strategic plan.

10.91 Structure of M & E reports

Strategic Plan implementation Review Reports for each period.

SN	Strategic theme	Target activities	Achieved	Not achieved	Explanation (notes)	Targets for Next Period

REFERENCES

- [1] Barmao, C. 2014, Laptops-for- Pupils Project: Challenges and Opportunities
- [2] Government of the Republic of Kenya, 2007, Kenya Vision 2030 http://www.vision2030.go.ke/cms/vds/Popular_Version.pdf
- [3] Ministry of Education, Science and Technology (MOEST) (2006). National Information and Communication Technology (ICT): Strategy for Education and Training.
- [4] Ministry of Education, Science and Technology (MOEST) Strategic plan, 2013-2017.
- [5] Ministry of Education, Science and Technology (MOEST), 2012, report on ICT Integration In Education, MOEST Nairobi, Kenya
- [6] Ministry of Education, Science and Technology (MOEST), 2013 Sessional Paper No.14 of 2012, a policy framework for education and training, Reforming Education and Training in Kenya.
- [7] Ministry of Education, Science and Technology (MOEST), 2013, Education Sector Report, Medium Term Expenditure Framework
- [8] Ministry of Education, Science and Technology (MOEST), 2013, Report on status of projects undertaken by directorate of technical education
- [9] Ministry of Information, Communication and Technology (MOICT) Strategic plan, 2013-2017 Public Primary Schools in Eldoret Municipality, Research on Humanities and Social Sciences, ISSN (Paper)2224-5766 ISSN (Online)2225-0484 (Online) Vol.4, No.27, 2014
- [10] Severin, E. & Capota, C. 2011, One-to-One Laptop Programs in Latin America and the Caribbean.
- [11] Waema, M. T., & Nd'ung'u, N. M. (2013). Understanding what is happening in ICT in Kenya-A supply-and demand side analysis of the ICT sector. *Research ICT Africa. Policy Paper, 9*, 2012.