

African Leadership in ICT

Assessment of Environmental, Institutional and Individual Leadership Capacity Needs for the Knowledge Society in Mauritius

A Situational and Needs Analysis

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This report is part of 4 assessment reports: Mauritius, South Africa, Tanzania and Zambia, plus a summary report, all available at <http://www.gesci.org/african-leadership-in-ict-alict.html>

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Acronyms

ADB	African Development Bank
AU	Africa Union
BPO	Business Process Outsourcing
COMESA	Common Market for Eastern and Southern Africa
EHRSP	Education and Human Resource Strategy Plan
EPA	Economic Partnership Agreement
ETA	Electronic Transactions Act
EPZ	Export Processing Zone
ICTA	Information Communication Technology Authority
IOC	Indian Ocean Commission
IPLC	International Private Leased Circuit
IPVPN	Internet Protocol Virtual Private Network
KPIs	Key Performance Indicators
LION	Lower Indian Ocean Network
MoFED	Ministry of Finance and Economic Development
MRC	Mauritius Research Council
NCB	National Computer Board
NICTSP	National ICT Strategy Plan
PSSA	Private Secondary Schools Authority
R&D	Research and Development
RGSC	Rajiv Gandhi Science Centre
RMCE	Regional Multi-Disciplinary Centre of Excellence
SADC	Southern African Development Community
SAFE	South Africa – Far East
SITP	School Information Technology Project
SME	Small and Medium Enterprise
STI	Science, Technology and Innovation
UIEP	Universal ICT Education Programme

1. Introduction

Mauritius is a democracy with a Government which is elected on a five-year basis. In international affairs, Mauritius is part of the Indian Ocean Commission (IOC), the Southern African Development Community (SADC), the Common Market for Eastern and Southern Africa (COMESA) and the Commonwealth of Nations and La Francophonie (French speaking countries), amongst others. Mauritius' economic success has been widely praised with some referring to it as the 'African Tiger' with sugar, Export Processing Zone (EPZ) services, tourism and financial services as the four pillars of the economy. The country has shown resilience and considerable socio-economic commitment in turning its economy around by developing and strengthening the EPZ and the tourism sector, and how it had developed from being a poor country with a high unemployment rate to a relatively prosperous one (Chan-Meetoo 2007, p3). This achievement is also perceived to a great extent to have been possible due to the vision and policy of the first Prime Minister of the Independent Mauritius to have free education until the end of the tertiary education cycle. The pivotal role of education and training in the development of sustainable Knowledge Societies cannot be over emphasised.

According to the policy paper "The ICT Sector in Mauritius – an Overview" (2004), ICTs "hold great promises for small island economies like Mauritius" (Information and Communications Technology Authority, 2004) and rapid advances in technology have contributed to the convergence of telecommunications, broadcasting and information technologies globally but also in Mauritius. The socio-economic life of the island is benefiting from the progressive opening up and reform of the telecommunications sector and a favourable environment has been created for Mauritius to become an info-communications hub in the Eastern African region (as per classification of AU). Extensive training has been carried out by private and public institutions for public officers to address the IT skills shortage as the latter are seen to be vital to achieving the government's vision to transform the socio-economic landscape of the country.

While it seems that the policy frameworks do exist to provide an environment that is conducive to strengthening the knowledge society (KS) pillars, a number of challenges and problems still exist in all the three KS pillars of education, ICT and STI (Science, Technology and Innovation). In its quest towards achieving the knowledge society objectives, it is important for the Mauritian

government to find sustainable solutions to what appear to be lingering challenges such as the relatively unacceptable failure rate at primary school level, growing socio-economic issues such as poverty and crime, universal access to information and communication technologies and attracting young Mauritians towards Science Education.

2. Country Profile

Mauritius has a population of 1,281,214 based on data from 1 July 2010. The country is densely populated with 596 persons per km, the highest in Africa. Around half the population lives in urban areas. Pockets of both urban and rural poverty exist, with Mauritian Creoles, who make up about a third of the population, living in relatively greater poverty than the other groups (Duclos & Verdier-Chouchane 2008). Mauritians are a multi-ethnic society including people of Indian, African, Chinese and European origin. English is the official language, but Creole is the most popularly used language spoken by about 70% of the population at home. Mauritians are multi-lingual and most also speak French (International Telecommunication Union 2004, p4).

Mauritius' economic success has been widely praised with some referring to it as the 'African Tiger' with sugar, Export Processing Zone services, tourism and financial services as the four pillars of the economy. The government is giving top priority to the development of ICT to make it the fifth pillar of the economy. Sectors such as seafood processing, information technology and medical tourism are rapidly developing. The economic policies aim to make the country more resilient to external financial shocks and to increase its competitiveness in global markets. A key element is a focus on higher value-added services such as information and communications technology.

The World Bank classifies Mauritius as an Upper Middle Income economy (ibid., p5). In the 2010 World Bank Doing Business indicators, Mauritius was ranked 17 out of 183 countries, improving from 24 in the 2009 survey and showing the country as a strong reformer. Mauritius ranks particularly strongly in indicators on starting a business, protecting investors and paying taxes. In addition, the World Economic Forum ranked Tunisia and Mauritius as the only African countries in the first 50 most developed countries in ICT (World Economic Forum 2011). According to the

Ministry of Finance and Economic Development (MoFED) having “one of the lowest tax rates in the world has been a powerful competitive edge to attract businesses, investments and talents to Mauritius” Ministry of Finance 2010). In 2006 Mauritius set its goal on being among the top countries in the World Bank Ease of Doing Business ranking. The country started introducing economic reforms and passed the Business Facilitation Act which enabled higher rankings every year. At the start of the reforms in 2006 Mauritius ranked 49th in the world and in 2010 it is ranked 17th. Mauritius also improved in other international rankings including the Mo Ibrahim Index of African Governance, the World Competitiveness Report and the Africa Competitiveness Report. As a result Mauritius has acquired a reputation for good governance, a business-friendly environment and solid social indicators.

The Ministry of Finance and Economic Development reported in its 2010 Budget Speech that Mauritius has become a business gateway to Africa for countries like China and India, and that since July 2005 Mauritius doubled the job creation capacity of the economy (ibid. p8). The corporate tax has recently been reduced to 15% to encourage non -resident companies to trade or invest through a permanent establishment or otherwise.

Regional integration is a core objective of the Mauritian economic strategy with Mauritius playing an important role in realizing the Economic Partnership Agreement (EPA) between the Eastern and Southern Africa group of countries and the European Community. Mauritius is a nucleus for activities that promote regional integration with countries of COMESA, SADC and IOC.

Despite the global economic downturn the Mauritian financial industry has come out relatively unscathed and Mauritius remains one of the few African countries whose international reserves still remain strong, despite some outflows in late 2009. Its domestic banks are profitable, well-capitalized and liquid and pro-active government measures helped limit job losses. The Africa Economic Outlook indicates that it is expected that the economy will return to its growth path of 5 percent and higher in 2011 (AEO 2011), while the Ministry of Finance and Economic Development predicted that it would grow by about 6 percent (MoFED 2010, p11).

Government is investing substantially in infrastructural development like roads as the traffic movement between the towns has been identified as one of the biggest impediments as it is slowing the development of Mauritius.

3. Knowledge Society Development

The Mauritian government, in its Education and Human Resources Strategy Plan(2009) recognizes that the Knowledge Economy demands a human resource development system that is pertinent to the needs of the workplace and that people have to have the intrinsic flexibility to adapt to changing demands through systematic training and retraining – itself an important appendage of lifelong learning. Research points to the fact that the more educated and skilled the people are, the better they are able to adapt to changes. Promoting human resource development in line with national economic and social objectives becomes critical and necessitates fostering a culture of training and lifelong learning at the individual, organisational and national levels for employability and increasing productivity. The Education and Human Resource Strategy Plan (EHRSP) 2008 -2020 advocates that paramount to the strategy is a new model of education and training, a model of lifelong learning that encompasses learning throughout the lifecycle, from early childhood through to retirement.

An analysis of the national policy documents and plans clearly indicates that education is highly regarded by Mauritians “as the key element of economic and social advancement, and to meeting labour force needs. An educated population was seen as a vital component of prosperity and so heavy investment was made in providing access to education and, where funds were not available by the State, the private sector was mobilized” (RoM 2009, p23)

The overall goal to make possible this “humanpowerment” is to build a creative and competent Human Resource base for Mauritius through human resource development and lifelong learning. The strategic goals of Human Resource Development during the period 2008-2020 are as follows:

- Transform Mauritius into a Knowledge Economy
- Build a world class human resource base
- Develop and implement a lifelong learning policy
- Foster Research & Development for effective HRD
- Provide professional orientation to prospective entrants in the labour market (ibid. p19).

Three Ministries are directly related to ICT development, namely Education and Human Resources; Tertiary Education, Science Research and Technology; and Information and Communication Technology. A National Computer Board (NCB) had also been established.

In its quest to leap forward on productivity and development in Mauritius, the government recognizes that policy-makers, operators and decision-takers would need “increasingly more information, in greater details, at low cost and that can be trusted. The payoffs in terms of higher productivity can be substantial” (MoFED 2011, p41). For that reason, as part of policy reforms and the strategy to make Mauritius an info-communications hub in the regions, a comprehensive reform of the Central Statistics Office is planned and the intention is to upgrade the office to Statistics Mauritius with wider powers to collect and disseminate data.

i. ICT Infrastructure

In the 2010 Budget Speech the Ministry of Finance confirmed that in the ICT sector the government would seek to maintain its emphasis on creating human resource and infrastructure capacity. In 2010 there was a significant reduction of 35 percent in the IPLC prices which allowed Internet Service Providers to offer consumers twice the speed for the same price. The government indicated that it would continue efforts to lower the prices even further in 2011 - the cost of traditional international bandwidth services (International Private Leased Circuit and Internet Protocol Virtual Private Network) will be decreased by an average of 16 percent to 24 percent as from the beginning of 2011 (MoFED 2011, p13).

The e-Government project has made significant progress and the ADB and the World Bank are providing technical support to the Ministry of ICT to link the Mauritius National Identity Card Project with the e-Government project. This will provide every Mauritian with a Smart ID card that accesses various Government services electronically and would also allow for receipt of funds and payment of fees (ibid. pp23-25).

According to the Budget Speech of 2011 government is working on a programme to give students and teachers access to the most modern tools of learning and teaching including IT. The programme will cover:

- The Sankoré project to equip classrooms with interactive projectors and laptops and e-learning materials
- Access to the use of laptops by teachers and needy students, and
- The implementation of a new school administration and management IT system.

The National Information Infrastructure has evolved from an obsolete network mainly used for data processing operations into a modern and fully digitized backbone. The SAFE (South Africa – Far East) cable system opened the gateway for Mauritius to the global information highway and provided a faster, more efficient trading channel with international markets. It is reported that Mauritius has one of the most efficient and up-to-date telecoms network in Sub Saharan Africa. Mauritius is linked via fibre optic cable to Madagascar and Reunion through the Lower Indian Ocean Network (LION) project. According to the Ministry of Finance (2010) the second phase will connect the three islands to an international gateway that will increase capacity and provide redundancy to support development of the ICT sector. A local consortium with SIC as a partner is now working on laying a third cable to Mauritius. The cable, when fully operational in 2011, will increase bandwidth several times at a lower cost (ibid. p23).

The National Computer Board (NCB) was established in 1988 by the National Board Act (Act No.43) to promote the development of Information and Communication Technologies (ICT) in Mauritius. It is a parastatal body administered by a Board of Directors and operates under the aegis of the Ministry of Information and Communications Technology. The NCB has recently redefined its strategies to respond more effectively to new national aspirations in view of multi-faceted challenges emerging in the wake of globalization and threatening the very resilience of the country's economy. Its core mission is now to accelerate the transition of Mauritius into a regional ICT hub and ensure the swift realization of government's objective to make of the ICT sector a fifth pillar of the economy (NCB 2011).

According to the SCO mobile density stood at 61.5% for 2006 (Chan-Meetoo 2007). Mauritius is on the verge of becoming a digital island according to the National ICT Strategic Plan (NICTSP) 2007-2011. The latest statistics show that Mauritius has a 29.6% internet penetration ratio with 380,000 internet users with a ranking of 51st on the network readiness index with a score of 4.07 based on the Global Information Technology Report 2008-2009 (Pudaruth *et al.*, 2010).

Table 1 below gives an overview of ICT infrastructure development between 2005 -2009:

Table 1: ICT Infrastructure Readiness

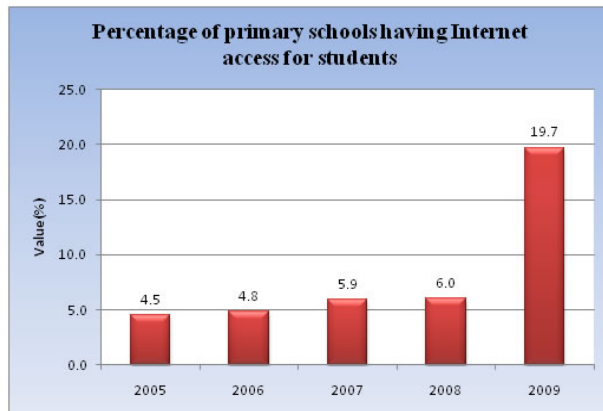
No	Indicator	2005	2006	2007	2008	2009
1	Number of Fixed telephone lines	357,500	357,340	361,185	364,536	381,702
2	Number of mobile phone subscribers (prepaid + Postpaid)	656,800	772,395	928,622	1,033,259	1,086,748
3	Fixed Telephone lines per 100 persons	28.6	28.4	28.6	28.9	29.9
4	Mobile phones per 100 persons	52.60	61.47	73.66	81.96	85.21
5	Number of Internet subscribers	128,555	143,479	166,059	199,511	285,970
6	Internet users per 100 persons	10.3	11.4	13.1	15.7	22.4
7	Population covered by mobile cellular telephony (%)	97.0	98.0	99.0	99.0	99.0
	Number of Internet Subscribers for dial-up (Analogue Dial-up)	77,114	56,326	46,950	42,125	31,546
8	Number of Internet Subscribers for Broadband	5,398	27,895	61,497	91,734	174,842
9	Broadband Subscriptions per 100 persons	0.4	2.2	4.9	7.3	13.7
10	Number of Mobile Internet Phone Subscribers: Subscribers to low and medium speed network: GPRS, WAP & Subscribers to high speed (3G) network	43,056	61,121	78,434	104,809	179,013
11	Number of Subscribers for ISDN	46	84	61	66	74
12	Other fixed broadband Internet subscribers (Frame Relay & Wireless)	225	9,364	12,984	5,994	6,739

From ICT Infrastructure Readiness (NCB 2010).

All primary schools in the Republic of Mauritius have been provided with scanners, printers, PCs, laptops and LCD projectors; the total number of PCs including laptops is around 5500. All

primary schools in Mauritius also have internet access. The figure below represents the number of primary schools providing Internet Access to their students divided by total number of primary schools.

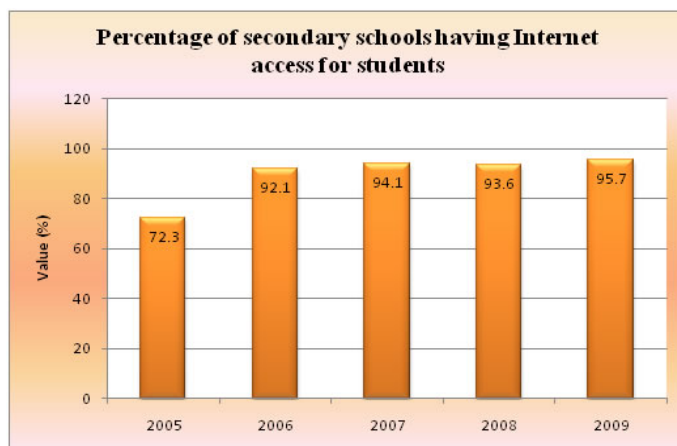
Figure 1: Primary schools providing internet access for students



Source: Mauritius ICT Indicators Portal (2010)

The percentage of secondary schools with internet access for students is depicted in the figure below representing the number of secondary schools providing Internet Access to their students divided by total number of secondary schools:

Figure 2: Secondary schools providing internet access to students



Source: Mauritius ICT Indicators Portal (2010)

It is reported that in the State Secondary Schools there are some 2700 PCs and 189 laptops and other ICT items such as printers and scanners. The Mahatma Gandhi Secondary Schools have

around 200 PCs. Private-aided secondary schools, under the aegis of the Private Secondary Schools Authority (PSSA) have 2301 PCs in Mauritius and 165 PCs in Rodrigues. The secondary schools are also provided with internet access facilities. In addition, 18 secondary schools have provided one classroom with interactive white board technology to enhance teaching and learning. (**Note:** The schools may have more ICT equipment than what is officially known since they get donations from private firms or the PTAs. Fee-paying schools are not included).

The computerization of primary schools has been accelerated through the School Information Technology Project (SITP), launched in 2000. This is implemented as a collaborative initiative between the Ministry of Information Communication Technology and the Ministry of Education and Human Resources. The SITP covers primary, secondary and vocational institutions. It consists of curriculum and infrastructure components and has a set of fixed goals.

ii. Education, ICT, STI and R&D Policies and Plans

Mauritius is poised to become a cyber- island and to serve as an info-communications hub in the region. The vision of an information society dates back to the early 1990s, but recent top level commitment coupled with the creation of an enabling environment has given Mauritius a new impetus. It is Government's declared policy to make ICT the fifth pillar of the economy alongside sugar, textiles, financial services and tourism (MoICT 2011). To this end, the government introduced a number of reforms supported by strong articulated policies and government commitment. The National Computer Board (NCB) was established to advise the government on the formulation of national policies for the IT sector and to promote an IT culture in the country. Data protection and privacy, electronic consumer protection and prevention of computer misuse and cybercrimes have been addressed through the Cybercrime Act of 2003 (Information and Communication Technology Authority 2004, pp 3-4). The Regional Multidisciplinary Centre of Excellence, involving a dozen regional and international organisations and development partners, has also been set up and is now operating in Mauritius.

Parliament passed the Information and Communication Technologies Authority Act in late 2001, effectively creating the ICT Authority (ICTA) which has the status of a body corporate. Operators who want to start or conduct telecom operations must apply to the ICT Authority for a licence.

The ICT Authority is also in charge of the Mauritian numbering plan and allocates number resources to telecom operators. ICTA replaced the Mauritius Telecommunications Authority and has overseen the full liberalization of the sector since 2003. The Authority adopted a simple, open and non-discriminatory evaluation protocol for granting operating licences and monitors operators and service providers to ensure that a competitive market is maintained. The Authority also investigates consumer complaints against service providers or operators related to violation of terms of service, disputed bills, maintenance and repairs. The Electronic Transactions Act (ETA) (2000) enhances the information security and data protection in e-services while making provisions on electronic signatures and their legal bindings.

The National IT Strategy Plan 2007 – 2011 (NICTSP) was developed under the auspices of the Ministry of Information and Communication Technology. Part I: describes the approach taken towards evolving the strategy for the NICTSP, including an assessment of the current state, brief coverage of the recommendations made and how they fit into the Strategic SCALE Model (**Support**; **Catalyze**; **Accelerate**; **Lead**; **Emerge**) with its 5 strategic thrust areas recommended for the NICTSP. In terms of **Support** : Set up a robust, transparent, equitable and progressive support structure for ICT; **Catalyze**: Catalyze economic activity in critical sectors through increased adoption and usage of ICT; **Accelerate**: Accelerate uptake of ICT in society by provision and adoption of ICT services/facilities of use to citizens; **Lead**: Aim for regional leadership by becoming a hub of ICT activity and a regional leader in niche areas; and **Emerge**: Emerge as a global point of reference for offshore services and a Gateway to Africa.

Five strategies have been developed for the Support thrust area:

Strategy S1: Maintain a consistent policy, legal and regulatory framework that is aligned with the needs of the ICT industry and promotes increasing uptake of ICT in economy and society through high levels of trust and confidence.

Strategy S2: Establish a culture of information security in businesses, government and society through sustained proactive interventions of awareness and capacity building and reactive emergency response systems.

Strategy S3: Facilitate the creation of a reliable, robust, affordable and scalable ICT infrastructure that aims at effectively harnessing emerging technological developments for the collective benefit of society.

Strategy S4: Facilitate sustained superior quality of talent pool in the country through interventions at the foundational levels of educational system using ICT as a tool and aimed at instilling a spirit of lifelong learning among students.

Strategy S5: Establish an effective, objective and transparent monitoring and evaluation framework that would serve as the basis on which to continually assess the progress of initiatives under the NICTSP.

Four strategies have been identified to attain the goals of the catalyze thrust area:

Strategy C1: Promote the adoption of ICTs in SMEs through awareness campaigns, capacity building, awards and incentives and support it with easy provision of relevant value-adding products and services.

Strategy C: Enhance existing levels of ICT use in the Health sector through coordinated planning that promotes collaborative working, knowledge sharing and harnesses appropriate technologies for the collective benefit of health workers and patients.

Strategy C: Adopt coordinated planning, design and implementation of ICT solutions in the Agriculture sector to bring about optimum utilization of agricultural resources and help policy planners and farmers take informed decisions.

Strategy C: Collaborate among various stakeholders in the Tourism sector and bring about an ICT offering that significantly enhances tourist convenience and facilitates a higher and inclusive growth of the sector.

Part II of the NICTSP covers the individual programmes and includes their description, their project composition, entities recommended to take up their implementation and measurement parameters on which to assess their progress, e.g. Support Programmes: c.f. Full Report of NICTSP page 51.

Part III is contained in two sub-parts, with the first part detailing the Implementation Framework required for the NICTSP, while the second sub-part describes the recommendation for an Institutional Framework required for the ICT sector following a scope review earlier done in the “Analysis” phase.

Implementation agents for NICTSP have been identified and the full report provides a matrix of implementation agencies (c.f. Mauritius Full Report of NICTSP07 11, p. 158) and critical success factors (c.f. Mauritius Full Report of NICTSP07 11, pp. 160+). A mid-term review of the NICTSP has been commissioned with the report due early in 2011.¹

The National ICT Policy 2007 - 2011 is a comprehensive ICT policy to realize the vision of government in the making of an information based economy and of an information society. It aims to lead ICT and ICT enabled development in Mauritius by ensuring better synergy between the public and private sectors and alignment with national goals. It aims to strengthen central ICT coordination and increasing consistency and collaboration in developing the information society. The policy sets out how Mauritius aims at attaining leadership in the information economy by developing local enterprise and by attracting best in class ICT companies and educational institutions (Ministry of Information, Technology and Communications 2007).

The inclusion of the Human Resources portfolio within the Ministry of Education was made to focus more holistically on the country’s education and training needs. The Education and Human Resources Strategy Plan 2008 – 2020 was developed with “the vision of providing a quality education for all and developing a Human Resource base to transform Mauritius into an intelligent nation state in the vanguard of global progress and innovation through the development of a culture of achievement and excellence. Central to this Plan is the universalisation of opportunities for quality education at all levels, right from pre-primary through to post-secondary education sub-sectors, and for the training sector. The drive is thus towards ensuring access to learning opportunities for all, fostering innovation and generating new knowledge for the socio-economic and sustainable development of the nation” (RoM 2009, p33).

iii. Education and Training

The Mauritian government views the role of education as a “service to society, to ensure upward social movement and as a source of the knowledge and expertise required for developing the economy” MoFED 2010, p25). As such the government is prepared to invest substantively in educational and human resource development programmes through grant and infrastructural development. An amount of Rs 50 million (approximately 1,83 million US dollars) has been allocated in the 2010 national budget to implement a new grant formula for private-aided primary schools to improve service delivery and value for money. Rs 1.3 billion has been allocated to improve primary and secondary school infrastructure and a new Rs 1 billion programme will be implemented to upgrade primary schools built over 50 years ago. It was envisaged that in 2010 the programme would have been launched with Rs 150 million to start upgrading for some 17 schools (ibid., p26).

Total expenditure on education in 2010 was: Secondary, 46%; Tertiary, 9%; Pre-primary, 1%; Primary, 27%; Other, 12%; Technical & Vocational, 4% (RoM 2010).

Mauritius enjoys full primary school enrolment ratio and a 73 % rate in secondary education, compared to 43.5 % for Africa as a whole. Tertiary education enrolment is 41 % while the adult literacy rate is 87.4 %. Public expenditure on education as a percentage of GDP is 3.2 %, against a 4.5 % African average while social security and welfare runs at 5.1 % (AEO 2011). However, the Education and Human Resources Strategy Plan (2009) acknowledges that “the issue of access to education has taken precedence over quality. The challenge for Mauritius now is how to balance access with quality so as to achieve high access and high quality” (op cit., p30).

The Education and Human Resources Strategy Plan (2008 – 2020) positioned Early Childhood Care and Education as a priority area. Pre-primary education caters for children of pre-school aged 3 to 5 years old to give them all means required for a sustainable education. The overall goal for primary education is to sustain equitable access to quality education, ensuring that all learners attain high levels of achievement in Literacy, Numeracy, Information and Communications Technology and essential Life Skills as the basis for both personal development and lifelong learning. Mauritius has achieved the goals of universal primary education and

gender parity in enrolment. Secondary education is geared towards improving completion rates at upper secondary level and minimizing wastage at secondary through improvement of all aspects of quality education through measurable learning outcomes.

In Mauritius, like in some other countries, TVET is more and more relied upon as a policy instrument to address the need for skilled human resources in both existing and emerging economic sectors to be able to compete globally. It is also called upon to play an active role in the fight against poverty. The overall goal of this subsector is to provide an efficient and effective TVET system responsive to the present and future needs by providing a skilled and flexible workforce for sustainable development.

The Mauritian Tertiary Education Sector has witnessed major expansion and diversification in recent years. From a small-scale provision by the College of Agriculture (established in 1924), the tertiary sector now consists of an expanded and diversified system which has evolved over the years with several institutions in both the public and private sectors. Some institutions provide all levels of tertiary education in a range of disciplines, while others focus their activities on only one or two areas at certain levels. A number of the institutions are overseas with their provisions made available through the distance education mode.

Within the public sector, there are two universities, namely the University of Mauritius and the University of Technology, which run both undergraduate and postgraduate programmes including at the level of PhD in a range of disciplines. The University of Technology was established in 2000 to cater more vigorously for the increasing demand for ICT and Management professionals in a country seriously committed to accelerate the realization of its ambition to become a major service provider in the field of Information Technology, Management and Finance, Sustainable Development and allied areas (UTM 2011). Other institutions are also included at tertiary level, namely the Mauritius Institute of Education, which is responsible for the training of teachers at the pre-primary, primary and secondary levels and for educational research; the Mahatma Gandhi Institute, which specializes in Languages, Performing Arts, Fine Arts, and Indian, Chinese and Mauritian Studies; and the Mauritius College of the Air, which delivers programmes at various levels through the distance mode in collaboration with overseas institutions. In 2002, the Rabindranath Tagore Institute was set up as a Centre of Studies of Indian Culture and Traditions.

iv. STI and R&D

The Mauritian government recognizes that to have a strategic advantage in education, training, research and innovation, research done in tertiary institutions must be connected to the needs of enterprises and Government. To this end, the Ministry of Tertiary Education is setting up a Committee to design and implement a Student Research Grant Scheme to encourage student research on all aspects of life in Mauritius that can result in innovative ideas and products (MoFED 2011, p37).

A clear science and technology policy direction is vital for the socio-economic development of a country. Countries that have effectively leveraged science and technology have made significant progress. Science and research has now assumed a new dimension with the creation of a Ministry for Industry, Science and Research. The government earmarked Rs 22 million (approximately 0,81 million US dollars) in 2010 to the Ministry of Industry to develop a framework for Government to support Science, Technology and Innovation (STI). The framework will establish the process for improving the linkage between research and technological advances with industrial application, including by SMEs. Under this framework, a Science, Technology and Innovation Fund will be set up to finance market oriented research projects and support creativity with regard to invention and innovation (MoFED 2010, pp6-7). Mauritius has already established a number of science and technological institutions with good infrastructure and they provide up-to-date technological training to their students. The Rajiv Gandhi Science Centre (RGSC) has been given the mandate for the popularization of science and technology in Mauritius in order to assist in the realisation of government's developmental aims.

The Ministry of Tertiary Education, Science, Research and Technology has embarked on a process to develop a science and research policy framework. After the elaboration of a draft document on science and research, a national conference on science and research will be held with stakeholders after which the framework will be finalised. The framework is envisaged to respond to such issues as: lack of innovative capacity, poor levels of investment in research and development, poor flow of knowledge and technology from science to industry and society and lack of support system with appropriate funding (Mauritius Science Portal, 2011).

The Mauritius Research Council (MRC) acts as a central body to advise Government on S&T issues and to influence the direction of technological innovation by funding research projects in areas of national priority and encouraging strategic partnerships. The MRC has several research funding schemes designed for academia, private sector companies, employees in the public sector and parastatal bodies, graduates undertaking studies leading to an MPhil or PhD and the public in general.

v. Professional development in Education, ICT and STI

The Education and Human Resources Strategy Plan (2009) cites 'inefficiencies' of the current education system in Mauritius as the still relatively high (although falling) percentage of students failing and/or repeating the CPE, and an alarming percentage of young children leaving school, barely numerate and literate (RoM 2009, p37). It is reported that there is a 30 percent failure rate at the CPE which would need rebalancing of the system in order to remove the bottleneck for secondary and tertiary enrolment rates. To achieve the national long-term goal on tertiary education and on social integration and justice would necessitate that all children are given a fair start in the education system, something which the government intends to address as demonstrated through the various reviews of strategy plans and policies to articulate them more closely to the realities on the ground (MoFED 2011, p17).

The Mauritian government fully realizes that low education and skills attainment is the biggest cause of unemployment and that these set a limit on the capacity of the workforce to fully benefit from the wealth the country is generating. It is therefore necessary to upgrade the knowledge and skills to what are relevant, current, adaptable to the changing needs of the economy, and sought after by employers. This requires a shift of human resources to higher value-added sectors to not only create more wealth but also prosperity for all (ibid. pp33-34).

In order to respond to the challenges the government has embarked on a number of initiatives, which are aimed at equipping teachers with the necessary knowledge and skills to bring about the changes required. The Mauritius Institute of Education (MIE) is the only teacher-training institution in Mauritius, but there are five institutions that offer courses leading to certificates, diplomas, and degrees in ICT. All the teachers joining the education sector (new entrants) are

normally ICT literate since all of them acquire ICT knowledge and skills in schools and at tertiary level or at the Mauritius Institute of Education (MIE). In-service training on ICT knowledge and skills for teachers are also provided by the MIE. In this regard the Teachers' IT License (acquisition of licenses by serving teachers, passing the license requirements for new entrants) is offered.

The Ministry of Education and Human Resources (MOEHR) signed an MOU with Microsoft Indian Ocean Islands Limited for the implementation of the Partners in Learning (PiL) programmes. Under the PiL programme, Microsoft trained 40 Education Officers on a Training of Trainers (ToT) basis thus helping the Ministry to create and host school websites. The project started with 20 secondary schools whose web sites are being created. Working on a cluster basis, each school will then pass on the knowledge and experience gained to other teachers in the group of schools. In this way the mentoring effect will be cascaded to cover all schools.

Microsoft also trained 25 other teachers to be more innovative in the teaching /learning process through technology. The aim is to make these teachers act as trainers for others.

Many teachers are using the internet to participate in the Partners in Learning Africa Network; moreover, all schools are affiliated to the International Network for Educational Transformation (iNet) platform. An iNet Educator Online Conference took place from 15-22 March 2010.

Under the aegis of the National Computer Board (NCB) the Universal ICT Education Programme (UIEP) was introduced in 2006. Through the UIEP, the government is aiming to train 400,000 trainees over four years to obtain the internationally recognized Internet and Computing Core Certification (IC3). This programme will create a significant pool of ICT professionals. The programme delivers an IC3 basic computing skills course in 59 training centres that are situated in schools across Mauritius. Becoming IC3 certified demonstrates that one possesses the knowledge required for basic use of computer hardware, software, and the Internet, which are nowadays prerequisites for virtually every placement opportunity (Isaacs 2007, p6).

vi. Information Literacy

The government introduced the Universal ICT Education Programme (UIEP) offered under the aegis of the NCB to align Mauritius to international benchmarking in ICT literacy. The NCB also introduced other programmes to impart ICT skills to students, workers, the unemployed and the general population and to provide the facilities for such services, e.g. the Cyber Caravan project (customized to meet the needs of all people with few or no ICT skills); IT Empowerment Programme for the Unemployed; the Community Empowerment Programme (facilitating the process for the community to make use of ICT to fully participate in the socio-economic development of the country); ICT Literacy Training for Women and the ICT Service on Your TV Set Programmes (ibid. pp6-7).

vii. Key Actors for Knowledge Society Development

Strong institutions with clear mandates and policy frameworks, coherent strategies and robust operational plans are a prerequisite for building a sustainable knowledge society. The following represent some of the key actors contributing to KS development in Mauritius.

In the public sector the Knowledge Society domains of Education, ICT and Science, Technology and Innovation the key public players are:

- Prime Minister's Office
- Ministry of Education and Human Resources <http://ministry-education.gov.mu>
- Ministry of Tertiary Education, Science, Research and Technology
<http://www.gov.mu/portal/site/tertiary>
- Ministry of Information Communication Technology
<http://www.gov.mu/portal/site/telcomit>
- Ministry of Finance and Economic Development <http://mof.gov.mu>
- Ministry of Public Infrastructure, National Development Unit, Land Transport and Shipping <http://publicinfrastructure.gov.mu/>

Tertiary Education institutions:

- The University of Mauritius <http://www.uom.ac.mu/>
- The Mauritius University of Technology <http://www.utm.ac.mu/>
- Mahatma Gandhi Institute <http://www.mgirti.org/>
- Mauritius College of the Air <http://www.mca.ac.mu/>
- Institut Supérieur de Technologie <http://pages.intnet.mu/ist/>
- Rabindranath Tagore Institute <http://www.mgirti.org/>
- Swami Dayanand Institute of Management <http://www.sdim.ac.mu/>

Other institutions/statutory bodies:

- Information and Communication Technologies Authority <http://www.icta.mu/home/>
- National Computer Board <http://www.gov.mu/portal/sites/ncbnew/main.jsp>

Key parastatal bodies are:

- Mauritius Research Council <http://www.mrc.org.mu/>
- Rajiv Gandhi Science Centre <http://www.gov.mu/portal/site/rajiv>
- The Mauritius Institute of Education <http://www.mieonline.org/home>
- Human Resources Development Council <http://www.hrdc.mu>
- Mauritius Qualification Authority <http://www.mqa.mu>
- The Regional Multidisciplinary Centre of Excellence
- Mauritius Institute of Training and Development <http://www.ivtb.mu>

5. Desk Research Analysis: Overview of KS, Education, ICT and STI Status in Mauritius

The deliberate policy direction of substantive and continued investment in free education, visionary economic reforms coupled with the necessary adjustments in the education sector and establishment of strong institutions to support the implementation of the government policies and reforms have stood Mauritius in good stead. This is evident in Mauritius' international rankings by among others the World Bank, the World Economic Forum and the Mo Ibrahim indices. The government recognized that the Knowledge Economy demands a human resource development system that is pertinent to the needs of the workplace and put in place institutions and mechanisms for lifelong learning and systematic training and retraining. Sectors such as seafood processing, information technology and medical tourism are rapidly developing. A key element in the national strategy is a focus on higher value-added services such as information and communications technology and the government is giving top priority to the development of ICT to make it the fifth pillar of the economy.

i. Education

Research points to the fact that the more educated and skilled the people are, the better they are able to adapt to changes. Promoting human resource development in line with national economic and social objectives becomes critical and necessitates fostering a culture of training and lifelong learning at the individual, organisational and national levels for employability and increasing productivity. The Education and Human Resource Strategy Plan (EHRSP) 2008 -2020 advocates that paramount to the strategy is a new model of education and training, a model of lifelong learning that encompasses learning throughout the lifecycle, from early childhood through to retirement. The EHRSP recognizes that the Knowledge Economy demands a human resource development system that is pertinent to the needs of the workplace and that people have to have the intrinsic flexibility to adapt to changing demands through systematic training and retraining – itself an important appendage of lifelong learning.

Considerable investment of resources, both human and material, has been put into the education sector and impressive progress has been achieved in terms of free, universal, compulsory primary education, free textbooks, free secondary education and a fairly wide range of higher education courses at the University of Mauritius. The national policy documents and plans clearly articulate that education is highly regarded by Mauritians “as the key element of economic and social advancement, and to meeting labour force needs. An educated population was seen as a vital component of prosperity and so heavy investment was made in providing access to education and, where funds were not available by the State, the private sector was mobilized” (RoM 2009 p23).

The Mauritian government views the role of education as a “service to society, to ensure upward social movement and as a source of the knowledge and expertise required for developing the economy” (MoFED 2011, p25). As a result, successive Governments have kept on with the policy of massive investment in modernizing the education system with ICT being seen as a key driver for innovation and creativity as well as a tool to improve teaching and learning processes (Information & Communication Technologies Authority 2004). However, field interviews revealed that teacher education seemingly has not kept pace with the demands of the rapidly evolving new economy and seems to have mainly remained rooted in the old “grammar of schooling” and has not been aligned with the imperatives of 21st century learning. While there have been attempts at reforms at institutional levels, the interview data indicates that the mindsets and attitudes of teacher educators themselves may not have evolved to the extent required by the reforms. While the University of Mauritius has taken the lead in proposing and developing innovative teacher education programmes in ICT integration for teaching and learning, the fees remain too high for the courses to be accessible to a wider number of educators.

It has been reported that Mauritius has been in a perpetual beta process of educational reforms for more than a decade. Successive governments have realized that the education system had to be reviewed in depth if Mauritius was to become a knowledge hub comparable to the likes of Singapore. However, the information obtained through the field work and desk study suggests that most reforms until now have been either structural (building new schools) or reverted back and forth due to changing Ministerial policies (following change of Governments) rather than

being pedagogical. While new schools have been built the teacher to student ratio has more or less remained the same. Another element of high concern for the Government is the issue of a high failure rate for the end of the primary school education cycle- an issue that the Government is trying to address through the EHRSP.

ii. Information and Communication Technology (ICT)

The National Information Infrastructure has evolved from an obsolete network mainly used for data processing operations into a modern and fully digitized backbone. The SAFE (South Africa – Far East) cable system opened the gateway for Mauritius to the global information highway and provided a faster, more efficient trading channel with international markets. Mauritius is linked via fibre optic cable to Madagascar and Reunion and in 2010 there was a significant reduction of 35 percent in the International Private Leased Circuit (IPLC) prices which allowed Internet Service Providers to offer consumers twice the speed for the same price. The government indicated that it will continue efforts to lower the prices even further in 2011- the cost of traditional international bandwidth services (International Private Leased Circuit and Internet Protocol Virtual Private Network) will be decreased by an average of 16 percent to 24 percent as from the beginning of 2011 (MoFED 2011, p13).

Government is working on a programme to give students and teachers access to the most modern tools of learning and teaching, including IT. However, while schools have received some equipment, more needs to be done in terms of action and implementation. The field interviews revealed the problem of overlapping responsibilities between ministries and the confusion over which Ministry needs to drive a particular project, with a case in point the project of equipping students and/or teachers with laptops. There does not seem to be clarity as to whether it is the Ministry of Education or the Ministry of ICT that needs to drive the project and how it will be dealt with if the Ministry of Finance does not find in it a viable project. The implementation of Government vision, policies and objectives may be constrained by what appears to be a lack of coordination, communication and the element of being in-phase in terms of coherence.

On the other hand, in terms of policy the establishment of key institutions by Government such as the National Computer Board, Central Informatics Bureau, Information and Communication

Technology Authority and laws related to ICT shows the drive and commitment to making Mauritius a modern country with strong foundations of the knowledge society. Mauritius is on the verge of becoming a digital island according to the National ICT Strategic (NICTSP) Plan 2007-2011. The latest statistics show that Mauritius has a 29.6% internet penetration ratio with 380,000 internet users with a ranking of 51st on the network readiness index with a score of 4.07 based on the Global Information Technology Report 2008-2009 (Padaruth *et al.* 2010). Despite all these measures, internet access cost is still perceived to be relatively high and not affordable to many Mauritians. However, the Government, through institutions like the National Computer Board and other organisations has taken some pragmatic initiatives such as providing nearly free internet access in community centres and post-offices.

Training in ICT is also an important element towards the establishment of a knowledge society. The former Mass Computer Proficiency Programme and the current universal ICT Programme aim at mass training, at very affordable cost, of the citizens in the use of information technology and the internet. This is seen as a driver towards making Mauritius a cyber-island and to promote the e-government concept. However, on the professional side the perception of the private sector is in general less positive, as there is still a lack of qualified human resources for the various emerging sectors in ICT-related fields such as call-centres, BPOs, telecommunications and software development industry. However, the private sector does not seem too keen to participate in the educational processes related to ICT training from a finance and funding perspective. This is a controversial element that can be seen from the field observation where, as counter-argument to the critique of the private sector, the public education institutions highlight the short-term, changing and diverse needs of the private sector players, and that Government needs to focus on long term education of its citizens as it prepares them for life.

iii. Science, Technology and Innovation

Science and Technology has largely improved over the years and has given a new dimension to the development of the country as a whole. The Government of Mauritius confirmed its determination to effectively steer the country into the global economy by developing a diversified, sustainable, knowledge-based economy and a highly trained and adaptive workforce

in the 21st century. A scientifically literate population is seen as an essential element in attaining this objective. Mauritius is determined and geared to continue to invest in “human resource development, science, technology and innovation to build the competitive competence that the country needs to be among the fast globalises; accelerate our plan to build the infrastructure of tomorrow; consolidate the progress we have made in giving greater access to education, from pre-primary to tertiary levels” (MoFED, 2010, pp6-7). In this respect, the Ministry of Tertiary Education, Science, Research and Technology has embarked on a process to develop a science and research policy framework.

An action plan (MRC, 2004) for the teaching and learning of Science in Mauritius Schools was drafted in 2004 by the Mauritius Research Council. From what is reported it appears as if most of the recommendations of the report do not seem to have been implemented to date (e.g. specialist teachers to teach Science, Mathematics and Technology; creation of a professional association for Science and Technology educators; ‘mauritianising’ of Science syllabus up to Form V, etc.). However, field observation reveals that strategies are slowly being put in place to promote science teaching and learning in schools as well as innovations (business-related) through the setting up of Science and Technology incubators. While such initiatives or closely similar ones had been taken in the recent past, once again the outcomes from such activities are not readily apparent.

There is consensus though that Science plays a vital role in socio-economic development of a country by raising the standard of living and improving the quality of life of the people. Countries that have been able to master Science and leverage Technology, register higher economic growth. In this respect the **Rajiv Gandhi Science Centre (RGSC)** has been given the mandate for the popularization of Science and Technology in Mauritius in order to assist in the realisation of government’s developmental aims (Mauritius Science Portal, 2011). The Mauritius Science Portal hosted under the aegis of the Ministry of Tertiary Education, Science, Research and Technology contains a number of useful resources on science and scientific literature. However, actual usage and access to the site or frequency of content updates cannot be verified (the site appears mainly to be a static website), save for the News section which has last been updated in February 2011.

While Mauritius has some advanced Science and Technology research activities on-going in areas such as Astrophysics (Mauritius Radio Telescope), polymer sciences, biological sciences, educational technologies and in the agricultural sector, it is unanimously felt from field data gathered, that there is an urgent need to focus on local authentic problematic with respect to scientific research and related technological innovations that can drive the economy forward.

Despite these developments Mauritius is concerned about the decreasing interest of its young citizens in scientific areas. The Government has been taking a number of measures in the recent past such as the setting up of the Rajiv Gandhi Science Centre as well as the introduction of Science subjects early in the school curriculum. The Mauritius Research Council has also been playing an active role in implementing the objective of the Government in terms of increasing awareness and interest in Science education. Other initiatives such as the Mauritius Science Portal have been undertaken as part of this endeavour.

While the policy frameworks do exist to provide an environment that is conducive to strengthening the knowledge society (KS) pillars, a number of challenges and problems still exist in all the three KS sectors of education, ICT and STI, viz. the relatively unacceptable failure rate at primary school level, growing socio-economic issues such as poverty and crime, universal access to information and communication technologies and attracting young Mauritians towards Science Education.

6. Field Research: Summary of Findings

i. Interviews Findings

The interviewees viewed KS as mainly related to education, with emphasis being laid on more and more people to become educated through higher studies. ICT was viewed as a main enabler for this to happen. Online distance learning was seen as being a key measure to be taken for achieving KS. It is worth mentioning, however, that there have been discussions about an Open University project for the past ten years, yet it is still not operational.

From the interviews, it was clear that through the mandates of the organisations the Government has clear policy and objectives for building a knowledge society. It was also realised that the private sector has an important role to play in the process of creating a knowledge society in a multi-fold capacity (funder, driver, producer and consumer). The interviews highlighted what appeared to be some kind of confusion as to mandates and responsibilities between different Ministries particularly in relation to education, ICT and funding. There are situations and cases where the roles of each of them are not quite clear and this is often blamed on a lack of communication and negotiation skills between interlocutors.

In terms of capacity building needs and leadership skills, despite a number of initiatives that are taken by the government (such as continuous training of educators, mass computer proficiency training and other lifelong learning programmes), it is believed that there is a need for more focused training and leadership competency development programmes. The main gap is seen in terms of research and development in the science and technology field where Mauritius is seen as a 'late player'. Also, some interviewees emphasised the lack of skill or willingness to acquire or properly distribute funding for the whole STI sector. One interviewee highlighted what he perceived as a main flaw in the current education system: that the Ministry of Education and Human Resources is at the same time the policy maker, regulator and implementer of education in the country. There is the feeling that the Ministry cannot be 'judge and party' at the same time as it imposes constraints on the education system with regard to innovation, creativity and reform.

Furthermore, field interviews and the focus group discussions revealed that there is the perception that either the ICT investment is not enough or the type of investment and the approaches of the policy makers are not well-thought through. For instance, the policy of providing one laptop per student prompted at least one interviewee to question whether the laptop was the central element of the initiative or the learning content that will be on the laptop was the key. Another example where Government policy was put into question is the element of building campuses around the island. For one interviewee, building a campus is not necessarily a viable project, but a project that will improve the learning experience can be more interesting. There is the perception from the field research that although a number of initiatives have been taken in the past such as the establishment of the ZEP (Priority Education Zones) schools, literacy and numeracy programmes and presently the enhancement programme, the expected outcomes are not achieved. Among the reasons given by interviewees to explain the lack of success of certain initiatives figured the tendency for a few Ministers to rush in to try to implement government projects overnight without taking into account the views and apprehensions and potential problems brought to them by the technical experts.

ii. Focus Group Findings

At middle manager level, out of the four focus groups carried out, the perspectives of the operational workers were quite different from the senior management levels. Communication problems between the senior management and the rest of the organisation are quite common as observed in most of the focus groups, just as the possibilities of things stagnating because of vested interests.

Performance-management is another aspect where issues have been noted. The focus groups comprising academics of the University were highly critical of the model of Key Performance Indicators (KPIs) which is imposed. According to their point of view this is perceived mainly as an end in itself and as being routine administrative work to be done to secure funding from the Government. The project-based budgeting has also been criticized by the middle managers whose units face reduced funding to sustain their activities that they deem essential to building a knowledge society. Political interferences to some extent and in some cases lack of transparent approaches have resulted in the staff being left with apprehensions of the

leadership abilities of their organisation. Lack of proper expertise and experience such as project management skills are also factors that contribute to the actual problems faced by these people.

The focus group discussions clearly point out problems at the implementation level of policies related to funding, training, resistance to change, the absence of the right people at the right places and to some extent political interference and turf war issues.

iii. Leadership Competency Importance-prioritisation Survey Findings

During the field research a Leadership Competency importance-prioritization survey was conducted with senior level and middle level officials in Ministries visited. 21 questionnaires were completed and returned to the field team on the days of the visits. The questionnaire is provided in Annex 3. Table 2 presents a profile of the respondents.

Table 2: Profile of the respondents (N=21)

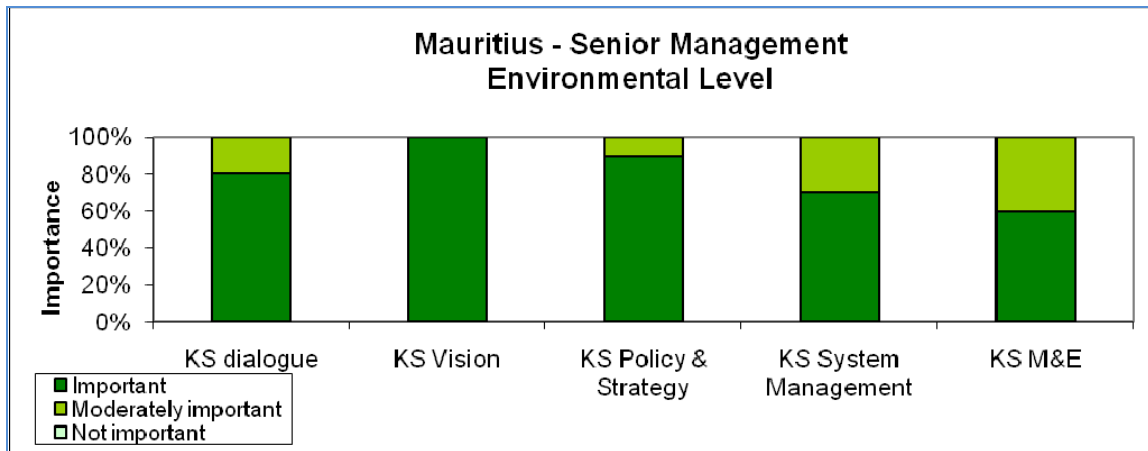
Profile	No of Respondents
Senior Level Management	7
Middle level Management	14

The survey involved two questions.

- In the first question, the senior and middle level officials were asked to indicate their perceived level of importance on each of thirteen ICT & KS competency standards for leaders drawn from the three environmental, organisational & individual level domains of the ALICT leadership framework. They used a three-point Likert scale (1 for unimportant, 2 for moderately important and 3 for important) to rate the competencies.
- In the second question, senior and middle level officials were asked to identify three leadership competencies that would require priority development for the pilot phase. For this question, the officials used numbers (No. 1 for 1st priority, No. 2 for 2nd priority and No. 3 for 3rd priority) to identify their priorities.

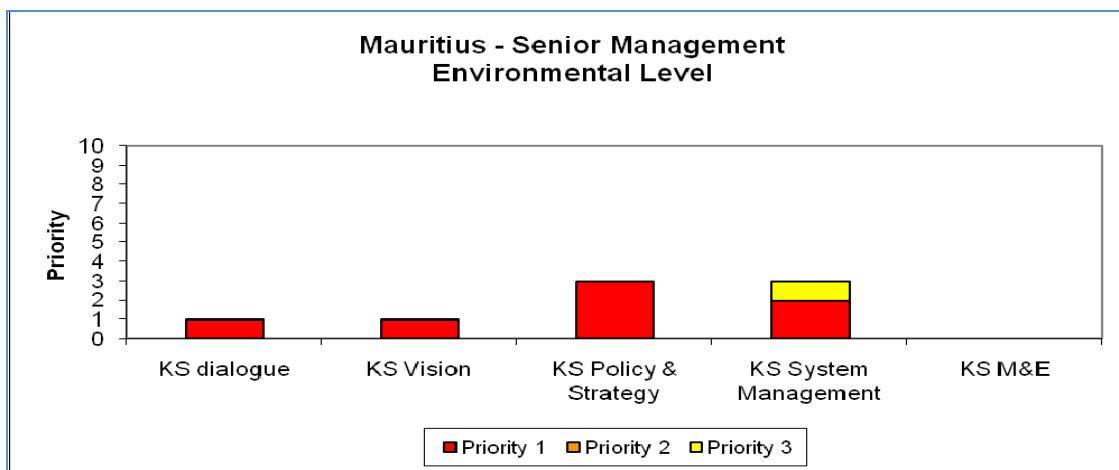
In Mauritius the survey data reveals that at the environmental level, senior management views Knowledge Society vision (90%), policy and strategy (100%) as being more important than other environmental level issues. This is quite normal at this level. Vision is usually associated with Government objectives while at the level of institutions senior management would be more concerned with the formulation of the right policies and strategies to support the government vision (Table 3).

Table 3: Senior level official importance-rating of leadership competencies at environmental level



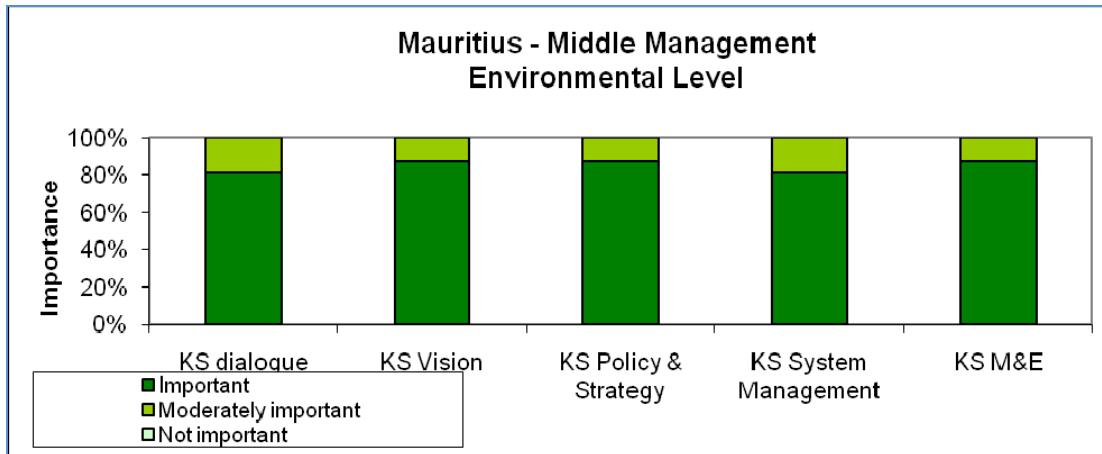
Senior level officials further rank policy and strategy to be a main priority for capacity building at this level (Table 4).

Table 4: Senior level official priority-rating of leadership capacity building at environmental level



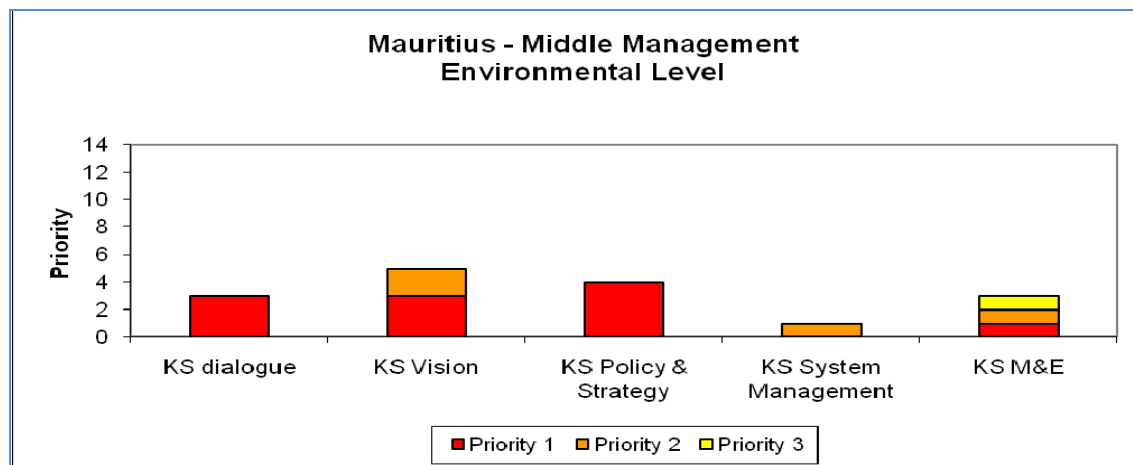
Looking at the data gathered from the middle level officials, all the elements from Knowledge Society Dialogue, Vision, Policy and Strategy, KS System Management and KS M&E are deemed important at the environmental level (mean > 80%). (Table 5).

Table 5: Middle level official importance-rating of leadership competencies at environmental, level



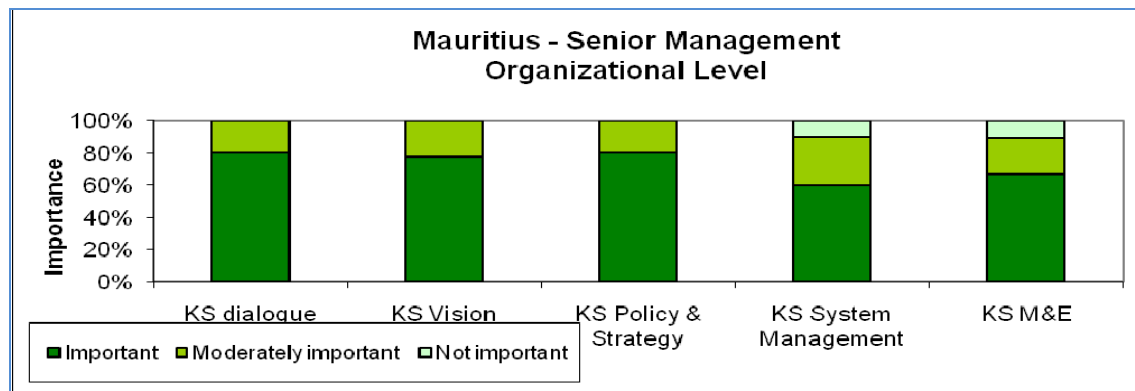
However, opinions seem to be divided in terms of priority where KS Dialogue, Vision, Policy and Strategy are ranked almost equally in frequency as high priority areas for capacity building (Table 6).

Table 6: Middle level official priority-rating for leadership competency capacity building at environmental level



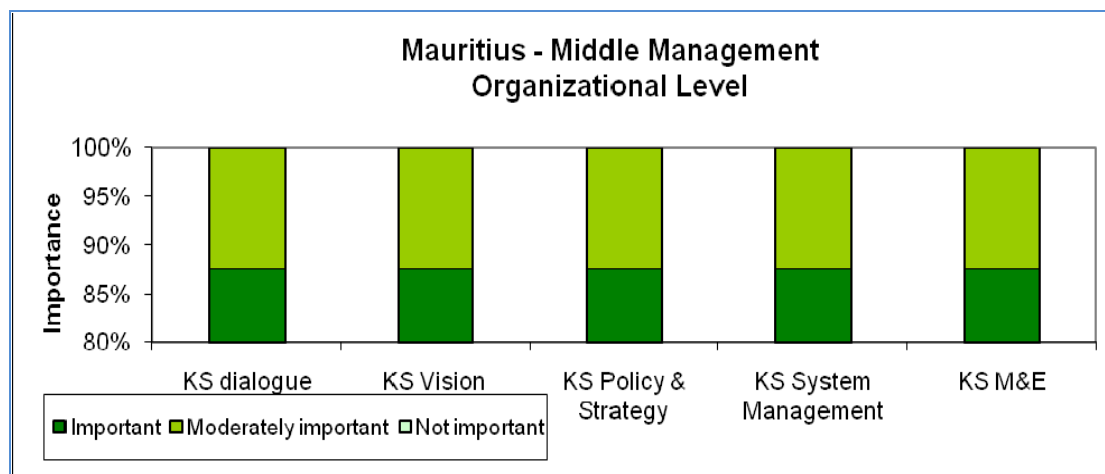
On the organisational level, with respect to senior officials, 90% of them find most of the elements from KS dialogue to KS system management to be important/ moderately important skills (Table 7).

Table 7: Senior level official importance-rating for leadership competencies at organisational level



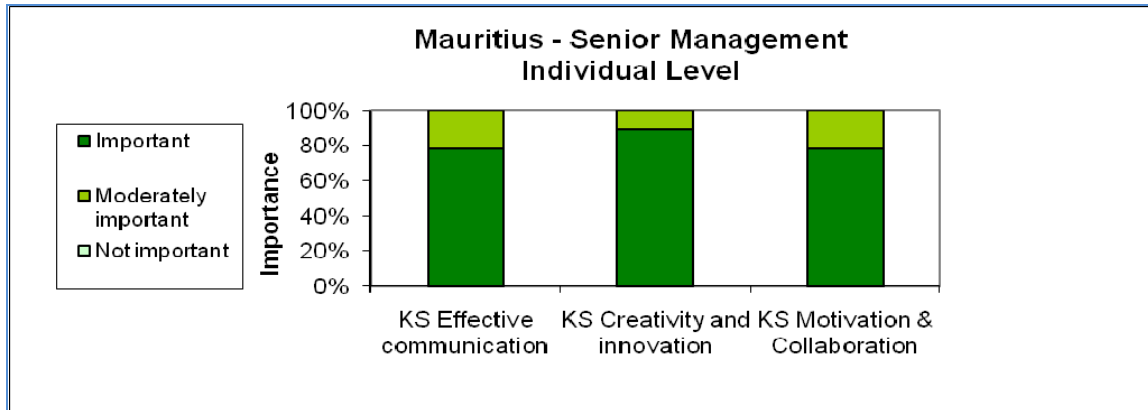
The same trend is seen to be adopted by middle level managers where 90% of respondents find all the elements from KS Dialogue to KS System Management to be important to moderately important skills. These tally with field interviews and focus group discussions where participants have been emphasizing the ability of organisational leaders to help transform policy frameworks into operational models. At this level field interviews highlighted elements such as the ability to communicate, collaborate and sharing to be the main characteristics of leaders for achieving the KS objectives (Table 8).

Table 8: Middle level official importance-rating of leadership competencies at organisational level



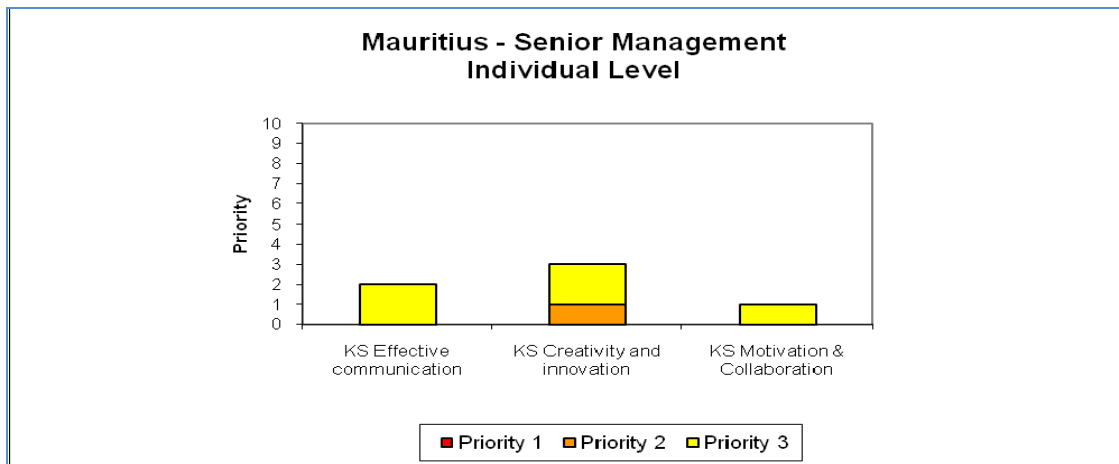
At the individual level, more than 70% of the senior managers rank communication, collaboration and creativity/innovation to be important abilities (Table 9).

Table 9: Senior level official priority-rating for leadership competencies at individual level



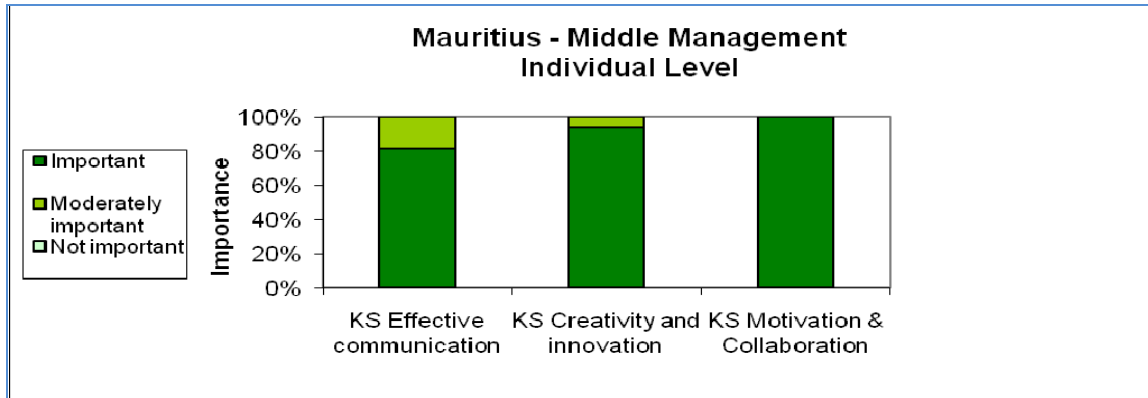
However, not all of the senior manager find these competencies as high priority areas in terms of immediate capacity building needs in the country (Table 10).

Table 10: Senior level official priority-rating for leadership competency capacity building at individual level



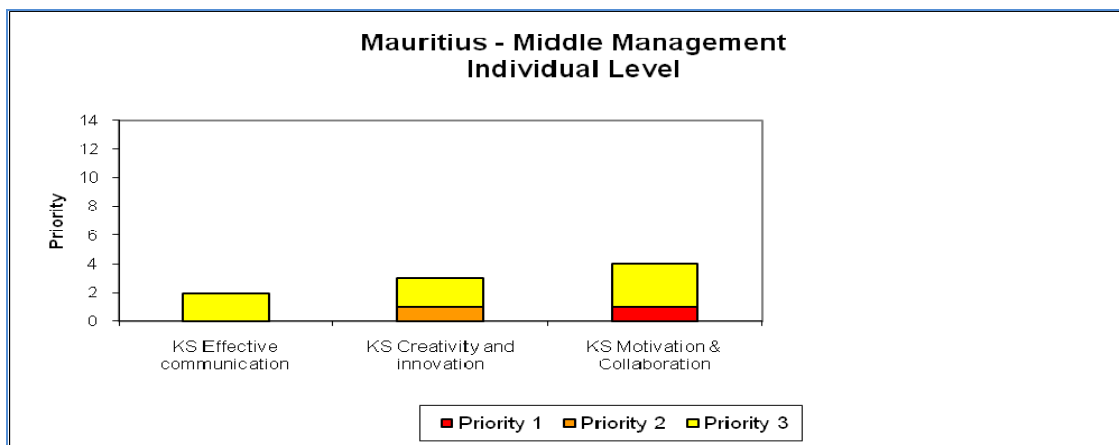
At the middle manager level, the respondents had similar opinions with more than 80% ranking all the elements as important (Table 11).

Table 11: Middle level official priority-rating for leadership competencies at individual level



Interestingly enough most of them were also of the view that these were not high priority areas in terms of capacity building needs (Table 12).

Table 12: Middle level official priority-rating for leadership competency capacity building at individual level



Please refer to Appendix 4 “Importance – Prioritization of Leadership in ICT & KS Competency Analysis” for a detailed summary tables analysis of the collected data.

7. Field Research Analysis

Mauritius is perceived to be doing fairly well in terms of KS development as evidenced by international rankings and found by the desk research and through field data, although there is room for improvement. As a “late player” in the knowledge society arena, there is the advantage to learn from the mistakes of others, although there is also the need to catch up lost time. The national vision, policy frameworks and strategy plans as well as the economic and education reforms and investments in R&D and STI provide the conducive environment and a firm foundation for sustainable KS development. Opportunities in research and development at local level have been created where innovative solutions can be developed and marketed on a global basis. In order to nurture and protect the innovations and foster a culture of innovation, schemes for protecting intellectual capital and industrial designs (in sectors such as jewellery design and manufacture where Mauritius is competent) need to be developed.

There is also a need to tap into and manage informal knowledge and expertise which are not really captured as the focus tends to be mainly on the formal education system, which is currently undertaking many projects that create opportunities to improve dissemination of formal knowledge in Mauritius, thus taking it one step closer to an inclusive knowledge society. Still, there are needs to further democratize access to education and ICT as well as to train people in research and development. There is a need to strengthen industry-academia links, while a number of projects such as the “business angels” forum and other collaborative Mauritius initiatives already provide opportunities for catalyzing development through the efficient capture, use and reuse of knowledge and, overall, for bringing about a more focused direction coupled with policy coherence between different sectors.

8. Conclusions and Recommendations

Summary Findings

Mauritius has made considerable progress with regard to KS development and is considered to be a leader in this regard on the African continent (ref. WEF Global IT Report 2010 -11), though a number of challenges remain to be addressed in the KS pillars of education, ICT and STI. The government recognizes the critical importance of human resource development aligned to the needs of the economy (both existing and emerging), investment in lifelong learning (including systematic training and retraining) and skills development, and ICT as an enabler of socio-economic development and has started to put the institutions and regulatory frameworks in place to create the environment for KS development. There is a high level of commitment and political will to make Mauritius a “Cyberisland” and the ICT leader in the Region, strengthening it as a business gateway to Africa for countries like China and India. Furthermore, its reputation for good governance, a business-friendly environment and solid social indicators has attracted investment and investor trust which will further facilitate development.

Mauritius has taken a number of measures from policy to implementation frameworks which have helped its advancement towards a Knowledge Society in a significant way. Free education from pre-primary up to tertiary level (free tuition undergraduate courses only at the University of Mauritius), increased access to improved telecoms network and reduction of internet access fees, and strategies to promote science, technologies, research and development are vivid examples of the achievement towards a Knowledge Society. There is however potential to achieve much more than the current status such as the need to further reduce the digital divide and the need to make Science, Technology and Innovation the main drivers of the Knowledge Society.

Most of the respondents of the interviews and participants of the focus groups agree on the considerable progress Mauritius has made and about its vast potential to realise its objectives of being a knowledge society. From their perspective the missing elements (gaps) are:

- Resources in terms of technical expertise in some areas
- Financial means to implement the projects related to the KS pillars

- The political will for real, tangible and measurable outcomes to occur given the relatively short life-span (mandate-wise) of political leaders
- The lack of a coordinated and coherent inter-organisational model of collaboration, communication and common vision of the KS pillars
- The lack of autonomy of some institutions and their high degree of coupling where it is unclear which specific roles any particular organisation, department or ministry has in a project.

Opportunities, needs and gaps – with a particular focus on drawing out capacity building needs and leadership competency priorities

- Public and Private institutions can strengthen their partnerships to tackle emerging needs and propose innovative solutions
- There is a need to recognize informal knowledge. Frameworks do exist such as recognition of prior learning, but they are lagging behind in terms of operation.
- Research and Development activities should be more focused on pragmatic and down to earth issues related to the Mauritian context.
- The need for training in many areas to create the critical mass of professionals who can lead the movement towards the Knowledge Society.

Recommendations for Leadership Development

Based on the gaps/challenges identified through the field work, the following recommendations are made for leadership development:

- Build the capacity of leaders to enable and facilitate consultation, collaboration, coordination and communication processes across the public sector. This will include issues related to convening multi-stakeholder forums, cross-sectoral coordination, planning (including financial planning) and preparation for implementation and effective

communication within the organisation and its institutions but also with the external partners. Build capacity to develop coherent and mutually beneficial partnerships between government institutions but also between government and the private sector to more effectively implement projects in pursuit of skills development and lifelong learning.

- Enhance the understanding of how the pillars of the knowledge society interrelate and impact on one another with the view to develop the necessary mechanisms to create synergies and leverage opportunities across the pillars
- Build the capacity to assess industry and community requirements for socio-economic development and to re-engineer the education and training system to equip students/graduates with the required 21st century skills as demanded. This will have to address the issue raised with regard to teacher education which has (as reported in focus group discussions) not been aligned with the demands of 21st century learning.
- Develop the ability of organisational leaders to transform policy frameworks into operational models for improved implementation of programmes.
- Develop capacity to address the gaps identified in terms of research and development in the science and technology field where Mauritius is seen as a 'late player', including the lack of skill or willingness to acquire or properly distribute funding for the whole STI sector. This may include change management dimensions to change mindsets and attitudes.

Specific Recommendations for Module Development for First Pilot

- A core module for all participants (not only for those from Mauritius) should focus on change management as a critical element of the course. Change management should be dealt with at the individual, organisational and environmental level for leaders to understand the interplay between these levels and what would be required at each level to bring about transformation from the current state of affairs to the desired state. This

should be one of the first modules with theoretical and practical elements, because unless the participants understand the change process and why it is necessary to change, and can recognize the opportunities and obstacles inherent in such processes, they will not benefit much from the other components of the programme and not much change will take place.

- Another core module should be on the Knowledge Society to build a common understanding of what it entails and how the different pillars should work together in a synergistic way to build sustainable and inclusive knowledge societies appropriate for the different contexts.
- The modules should be structured in a way to include both theory and practice to build understanding of phenomena and issues and to apply the knowledge and insights gained from the theory practically to address real problems faced in the execution of their daily activities in terms of planning, budgeting, implementation and evaluation. In this regard the technology tools to facilitate the more efficient execution of such tasks should be integrated in the module.
- A collaborative/team assessment of issues hindering implementation of projects in a particular country: including gathering of data to support decision making; developing appropriate strategies to operationalize policies and overcome hindrances; identification and assigning of roles and responsibilities to the various Ministries/institutions and the development of responsive M&E systems to keep implementation on track. This would facilitate a common purpose, clarity of mandates and effective coordination across Ministries and their institutions. In the individual assignments each participant in a team would focus on solving a particular element of the issue as it relates to his/her specialisation/sphere of work, they would have to have a common understanding of the issue, the requirements from each sector and therefore the responsibilities of each sector as well as the consequences of the intervention.
- Modules should therefore build foresighting, forecasting and scenario building skills in all participants.

Implementation Scenarios

- In order to ensure that countries benefit optimally from the course, a few participants per country from across the Ministries/sectors targeted should be identified. They should participate in the course as a team working to build shared understanding and provide the critical mass for organisational and environmental change.
- Process and content should be equally important in structuring the course and assessment requirements.
- Collaborative activities (but perhaps with individual assignments based on the participants' area of work) focusing on real problems experienced by the participating Ministries/sectors to build the competence for team analysis, team strategic planning and development of solutions using technological tools should form the basis of the course.

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Appendices

Appendix 1: Interview List

i. Ministries

- Mr. Kelvyn Ng Wong Hing, Director, Ministry of Education and Human Resources (k-ng-wong-hing@mail.gov.mu)
- Mr. Ricaud G.D. Auckbur, Director, Ministry of Tertiary Education, Science, Research and Technology (rauckbur@mail.gov.mu)
- Mr. Vishnu Dutt Bassant, Director, Ministry of Finance (vbassant@mail.gov.mu)

ii. Parastatal bodies

- Mr. Oomandra Nath Varma, Deputy Director, Mauritius Institute of Education (omvarma@mieonline.org)
- Prof. Soodursun Jugessur, Chairman (also Pro-Chancellor of University of Mauritius and Chairman of its Council), Mauritius Research Council (s.jugessur@uom.ac.mu)
- Mr. Pradeep Kumar Joosery, Deputy Director, Mauritius Institute of Training and Development (pjoosery@mitd.mu)
- Mr. Vik Bhoyroo, Manager, National Computer Board (gbhoyroo@ncb.mu)

iii. Institutes of Tertiary Education

- Prof. Soodursun Jugessur, Pro-Chancellor and Chairman of Council (also Chairman of Mauritius Research Council), University of Mauritius (s.jugessur@uom.ac.mu)
- Mr. K. Saurty, Assistant Manager, Swami Dayanand Institute of Management (ksaurty@sdim.ac.mu)
- Prof. Roshan Dubarylall, Head of Distance Education, Mauritius College of the Air (mcade@mca.ac.mu)

iv. Private sector organisation

- Mr. Khalid Feddoul, Director/General Manager, Chesteroc Ltd.
(khalid.feddoul@chesterocLtd.com)

Focus group discussions were conducted in the following organisations:

- Mauritius Institute of Development and training (Parastatal body), www.mitd.mu
- Mauritius Institute of Education (Parastatal body), www.mieonline.org
- National Computer Board (Parastatal body),
<http://www.gov.mu/portal/sites/ncbnew/main.jsp>
- University of Mauritius (Tertiary education), www.uom.ac.mu

Appendix 2: Leadership Capacity Questionnaire

African Leadership in ICT (ALICT) Survey on Leadership Competencies

The table below lists three Leadership competency domains for *national environmental, organisational and individual levels* which are based on inputs from stakeholders as well as inputs from the leadership development literature.

Importance – Prioritization of Leadership in ICT & KS Competency

Domains

1. How important are each of the Leadership in ICT & KS competencies? (Please tick as appropriate).
2. Identify the *top three priorities* you would like the African Leadership in ICT (ALICT) programme to focus on in the pilot phase
(Write the no. 1 beside the 1st priority competency; the no. 2 beside the 2nd priority competency; and the no. 3 beside the 3rd priority competency)

Leadership in ICT and Knowledge Society (KS) Competency Domains		Important	Moderately important	Not important
National Environmental Level	KS dialogue National leadership capacity to establish inter-ministerial & inter-sectoral coordination mechanisms on KS pillars of Education, ICT and STI			
	KS Vision National leadership capacity to develop, communicate and give direction to Knowledge Society (KS) vision, mission and values			
	KS Policy & Strategy National leadership capacity to develop inter-related policies, strategies and plans on the KS and its pillars of Education, ICT and STI			
	KS System Management National leadership capacity to manage implementation of inter-related plans, strategies, and programmes on KS and ICT, Education and STI pillars			

Leadership in ICT and Knowledge Society (KS) Competency Domains		Important	Moderately important	Not important
Organisational Level	KS M&E National leadership capacity to use M&E systems and practices as an evidence-based foundation for planning, decision-making and learning on inter-related ICT, Education and STI policy and strategy			
	KS dialogue Organisational leadership capacity to manage dialogues and relations with key internal and external stakeholders on KS or its pillars (ICT, Education, STI) inclusively and constructively			
	KS Vision Organisational leadership capacity to develop its vision, mission and values based on national Knowledge Society (KS) vision and policy			
	KS Policy & Strategy Organisational leadership capacity to translate the KS (ICT or Education or STI) vision, mission, value framework into strategic (medium term) and operational (concrete and short term) objectives and actions			
	KS System Management Organisational leadership ability to design, establish and manage a system for measuring financial and operational performance for delivering on KS (ICT, Education & STI) goals and objectives			
	KS M&E Organisational leadership capacity to use M&E systems and practices as an evidence-based foundation for planning, decision-making and learning on inter-related ICT, Education and STI policy and strategy			
Individual Level	KS Effective communication Leadership ability to develop key messages about the significance and parameters of KS pillars of ICT, Education and STI for organisational and national development			
	KS Creativity and innovation Leadership capacity to plan, manage and encourage organisational modernization, creativity and innovation related to KS and pillars of ICT, Education and/or STI			
	KS Motivation & Collaboration Leadership capacity to create organisational environment that is conducive to achieving KS progress in pillars of ICT, Education and /or STI			

Appendix 3: Importance – Prioritisation of Leadership in ICT & KS Competency Analysis

During the field research a Leadership Competency importance-prioritization survey was conducted with senior level and middle level officials in Ministries visited. 26 questionnaires were completed and returned to the field team on the days of the visits. Table 1 presents a profile of the respondents.

Table 1: Profile of the respondents (N=26)

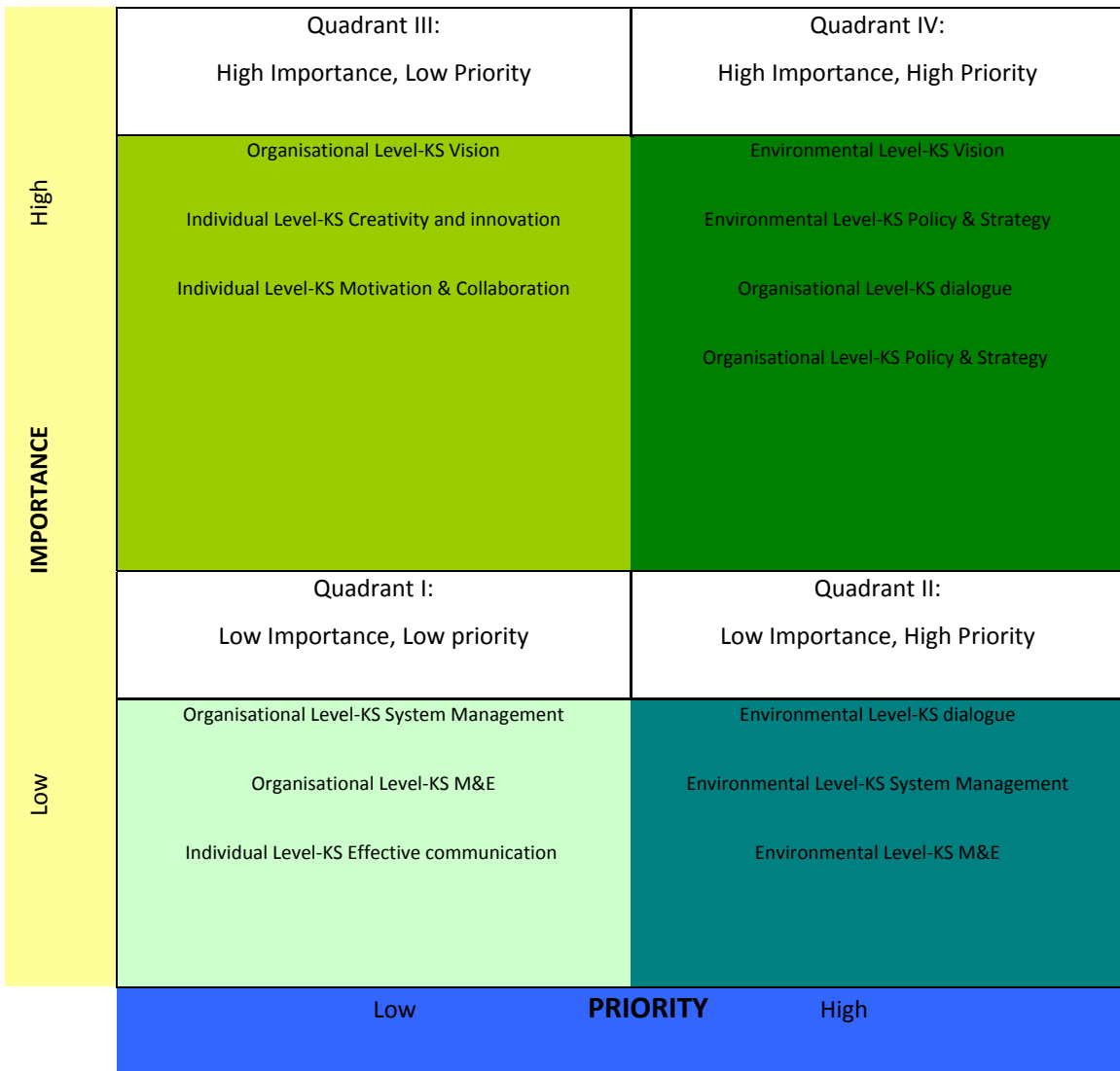
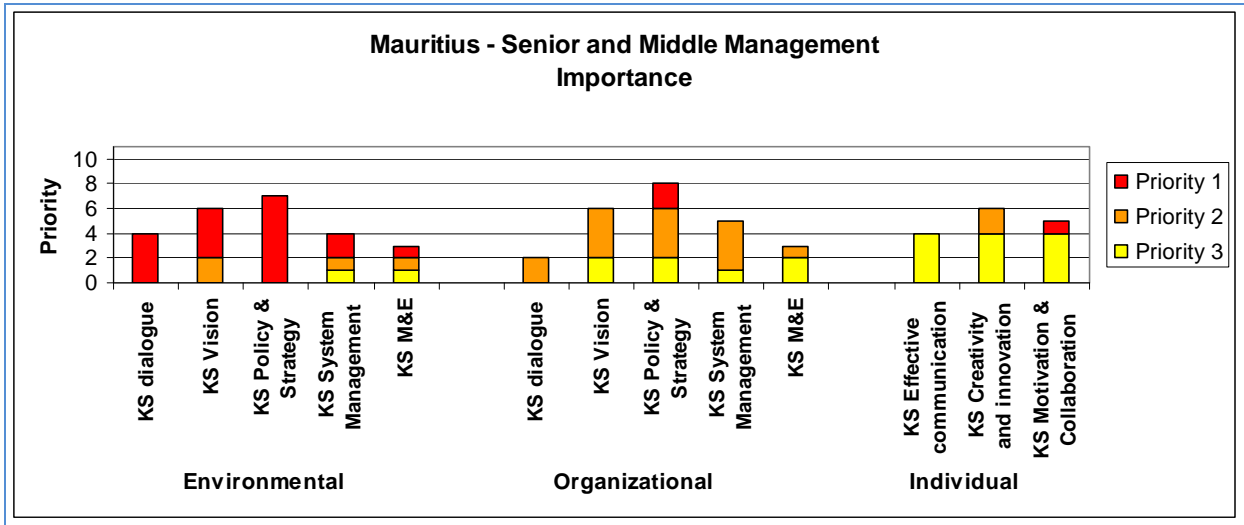
Profile	No of Respondents
Senior Level Management	10
Middle level Management	16

The survey involved two questions.

- In the first question, the senior and middle level officials were asked to indicate their perceived level of importance on each of thirteen ICT & KS competency standards for leaders drawn from the three environmental, organisational & individual level domains of the ALICT leadership framework. They used a three-point Likert scale (1 for unimportant, 2 for moderately important and 3 for important) to rate the competencies.
- In the second question, senior and middle level officials were asked to identify three leadership competencies that would require priority development for the pilot phase. For this question, the officials used numbers (No. 1 for 1st priority, No. 2 for 2nd priority and No. 3 for 3rd priority) to identify their priorities.

Competency areas of the KS	Senior Level Officials				Middle Level Officials			
	Mean	SD	Overall Rank	Rank (out of 13)	Mean	SD	Overall Rank	Rank (out of 13)
Environmental	2.80		2		2.85		3	
KS dialogue: National leadership capacity to establish inter-ministerial & inter-sectoral coordination mechanisms on KS pillars of Education, ICT and STI	2.80	0.18		4	2.81	0.16		11
KS Vision: National leadership capacity to develop, communicate and give direction to Knowledge Society (KS) vision, mission and values	3.00	0.00		1	2.88	0.12		3
KS Policy & Strategy: National leadership capacity to develop inter-related policies, strategies and plans on the KS and its pillars of Education, ICT and STI	2.90	0.10		2	2.88	0.12		3
KS System Management: National leadership capacity to manage implementation of inter-related plans, strategies, and programmes on KS and ICT, Education and STI pillars	2.70	0.23		10	2.81	0.16		11
KS M&E: National leadership capacity to use M&E systems and practices as an evidence-based foundation for planning, decision-making and learning on inter-related ICT, Education and STI policy and strategy	2.60	0.27		11	2.88	0.12		3
Organisational	2.69		3		2.88		2	
KS dialogue: Organisational leadership capacity to manage dialogues and relations with key internal and external stakeholders on KS or its pillars (ICT, Education, STI) inclusively and constructively	2.80	0.18		4	2.88	0.12		3
KS Vision: Organisational leadership capacity to develop its vision, mission and values based on national Knowledge Society (KS) vision and policy	2.78	0.19		7	2.88	0.12		3
KS Policy & Strategy: Organisational leadership capacity to translate the KS (ICT or Education or STI) vision, mission, value framework into strategic (medium term) and operational (concrete and short term) objectives and actions	2.80	0.18		4	2.88	0.12		3
KS System Management: Organisational leadership ability to design, establish and manage a system for measuring financial and operational performance for delivering on KS (ICT, Education & STI) goals and objectives	2.50	0.50		13	2.88	0.12		3
KS M&E: Organisational leadership capacity to use M&E systems and practices as an evidence-based foundation for planning, decision-making and learning on inter-related ICT, Education and STI policy and strategy	2.56	0.53		12	2.88	0.12		3
Individual	2.81		1		2.92		1	
KS Effective communication: Leadership ability to develop key messages about the significance and parameters of KS pillars of ICT, Education and STI for organisational and national development	2.78	0.19		7	2.81	0.16		11
KS Creativity and innovation: Leadership capacity to plan, manage and encourage organisational modernization, creativity and innovation related to KS and pillars of ICT, Education and/or STI	2.89	0.11		3	2.94	0.06		2
KS Motivation & Collaboration: Leadership capacity to create organisational environment that is conducive to achieving KS progress in pillars of ICT, Education and /or STI	2.78	0.19		7	3.00	0.00		1

Note: The mean scores in bold represent the weighted average of competencies for each domain



Appendix 4: Factors Enabling & Constraining Development Towards a Knowledge Society in Mauritius

<i>Factors</i>	<i>Enabling Features / Opportunities</i>	<i>Constraining Features / Challenges</i>
Knowledge Society	The overall goal is to build a creative and competent Human Resource base for Mauritius through human resource development and lifelong learning	Upgrade the knowledge and skills to what are relevant, current, adaptable to the changing needs of the economy, and sought after by employers which requires a shift of human resources to higher value-added sectors to not only create more wealth but also prosperity for all.
Infrastructure	<p>The government is giving top priority to the development of ICT to make it the fifth pillar of the economy</p> <p>The National Information Infrastructure has evolved from an obsolete network mainly used for data processing operations into a modern and fully digitized backbone</p>	<p>Universal access to information and communication technologies.</p> <p>While schools have received some equipment, more needs to be done in terms of action and implementation. Overlapping responsibilities between ministries and the confusion over which Ministry needs to drive a particular project, with a case in point the project of equipping students and/or teachers with laptops</p>
Education	<p>The Mauritian government views the role of education as a “service to society, to ensure upward social movement and as a source of the knowledge and expertise required for developing the economy.</p> <p>The Education and Human Resource Strategy Plan (EHRSP) 2008 -2020 advocates that paramount to the strategy is a new model of education and training, a model of lifelong learning that encompasses learning throughout the lifecycle, from early childhood through to retirement.</p> <p>Considerable investment of resources, both human and material, has been put into the education sector and impressive progress has been achieved in terms of free, universal, compulsory primary education, free textbooks, free secondary education and a fairly wide range of higher education courses at the University of Mauritius.</p>	<p>The Education and Human Resources Strategy Plan (2009) acknowledges that “the issue of access to education has taken precedence over quality. The challenge for Mauritius now is how to balance access with quality so as to achieve high access and high quality” (op cit., p30).</p> <p>Relatively unacceptable failure rate at primary school level,</p> <p>Early Childhood Care and Education as a priority area.</p> <p>Teacher education seemingly has not kept pace with the reforms required for 21st century learning</p>
ICT In education	Government is working on a programme to give students and teachers access to the most modern tools of learning and teaching, including IT.	<p>While schools have received some equipment, more needs to be done in terms of action and implementation.</p> <p>The private sector does not seem too keen to</p>

<i>Factors</i>	<i>Enabling Features / Opportunities</i>	<i>Constraining Features / Challenges</i>
	The Government of Mauritius confirmed its determination to effectively steer the country into the global economy by developing a diversified, sustainable, knowledge-based economy and a highly trained and adaptive workforce in the 21st century	participate in the educational processes related to ICT training from a finance and funding perspective
Science and Innovation	<p>There is consensus though that Science plays a vital role in socio-economic development of a country by raising the standard of living and improving the quality of life of the people</p> <p>The Ministry of Tertiary Education, Science, Research and Technology has embarked on a process to develop a science and research policy framework.</p>	<p>Decreasing interest of youth in scientific areas, and the resulting need to attract young Mauritians towards Science education</p> <p>Urgent need to focus on local authentic problematic with respect to scientific research and related technological innovations that can drive the economy forward..</p>