Private Sector Federation
(PSF- Rwanda)

SECTOR SPECIFIC SKILLS NEEDS ASSESSMENT EDUCATION

FINAL DRAFT REPORT

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LIST OF ABBREVIATIONS AND ACRONYMS

GDP		Gross Domestic Product
NST		National Strategy for Transformation
GoR		Government of Rwanda
NSDEPS		The National Skills Development and Employment Promotion Strategy
TVET		Technical and Vocational Education and Training
ICT		Information Communication Technology
ECD		Early childhood development
ESA		Education Sector Analysis
STEM		Science, Technology Engineering and Mathematics
SDGs		The Sustainable Development Goals
EAC		East African Community
ESSP		The Education Sector Strategic Plan
NISR		National Institute of Statistics of Rwanda
SSA		Sub-Saharan Africa
DFID		Department for International Development
PSF		The Private Sector Federation
RDB		Rwanda Development Board
RBA		Rwanda Broadcasting Agency
REB		Rwanda Education Board
WDA		Workforce Development Authority
RP		Rwanda Polytechnic
HEC		Higher Education Council
UR		University of Rwanda
UNESCO		The United Nations Educational, Scientific and Cultural Organization
RNC		The National Examination Council
NCDC		National Curriculum Development Centre
SFAR		Student Financial Agency Rwanda
GIE		General Inspection of Education
TSC		Teacher Service Commission
IPRCs		Integrated Polytechnic Regional Centers
CMU		Carnegie Mellon University
PPP		Public Private Partnership
MIS		Management Information System
RISA		Rwanda Information Society Authority
BSC		Broadband systems corporation ltd.
OGN		One Government Network
HLI		Home Language International
SDMS		Schools Data Management System
UNICEF		United Nations International Children's Emergency Fund
IT		Information Technology
R&D		Research and Development
WHO		World Health Organization
SMEs		Small and Medium Enterprises

EXECUTIVE SUMMARY

The share of the education sector as a percentage of Gross Domestic Product (GDP) was 2% in 2020 compared to 3% in 2019. This means that the Rwandan education sector generated a net worth of 173 billion Rwf in 2020 in the country's economy, compared to 258 billion Rwf in 2019. Moreover, the government of Rwanda's (GoR) ambition is to transform the economy into a knowledge-based economy, which will move its labour force from subsistence agriculture into the productive service sector, aiming at turning the country into an upper-middle income country by 2035 and a high-income economy by 2050 (NST1). For the country to achieve the sustained and inclusive growth that will result from this audacious ambition, innovation, integration, agglomeration, and competition should be the primary driving forces, with a particular emphasis on human capital development, export dynamism, regional integration, well-managed urbanization, competitive domestic enterprise, agricultural modernization, and a capable and accountable public institution.

This sector skills assessment report provides information on the current performance of the education sector, its workforce, and the demand and supply, shortages, gaps, and skills required for sector expected performance. In the process of assessment, key skills issues have been identified, including the extent of skills mismatch, the drivers of change and their skills implications, and the future skills needs of the education sector. It also identifies areas to be prioritized for action in the short, medium, and long term.

The overall objective of this study was to assess the skills requirements of the education sector in Rwanda over the 2020-2030 period and to formulate recommendations to ensure that the future skills requirements of the sector can be addressed to the end of NST1.

For the methodology aspect of the assessment, a desk review coupled with consultations with sector stakeholders, field visits to educational institutions, a survey questionnaire administered to employers in the private sector establishments, and interviews with key informants, in both the public and private sectors, provided data and the basis for the recommendations made in this report.

The key identified drivers in the education sector include but are not limited to police and regulation, demographic and population change, economics and globalization, technological change and changing consumer demand.

According to the findings from the skills needs assessment revealed that, many of those leaving formal education do so without adequate foundational education. Those entering the market with acceptable levels of education are viewed by employers as not being adequately prepared for the world of work. The cause of this problem is double. First, problems within the schooling system mean that the foundational education base is low. Second, the skills system is not performing well.

It is imperative that improving the quality of teaching is a challenge facing the education sector and that improvement is needed at all levels. The values of strong leadership, a readiness to improve, effective self-assessment, and the use of feedback from learners have been cited as the main catalysts that have resulted into recommendation for the improvement of teaching quality which implies understanding of the curriculum and procedures manuals, childcare skills and close relationship and interaction between all education sector actors.

The study recommended the following in response to the above-mentioned challenges in the Rwandan education sector:

- Provide continuous professional development to the teachers, curriculum developers to enhance current skills levels, as well as develop the multi-tasking and flexibility that may be skills needed for the future.
- Teaching and learning in well understood languages is key. Reinforce skills development of language in which learners learn and teachers comprehend well
- Improving the early grade progression and learning and the transition to lower secondary school by using audio-visual materials for emergent literacy, numeracy, and science, as well as social skills, for preschool and early grade children, teachers, and parents.
- Improving learning infrastructure as well as more training for education operator's right from pre-graduation, on job training, as well as post-graduate trainings since it enhances learning and ultimately skills development. In addition, more efforts are needed towards English, mathematics, science, and digital literacy courses for Rwanda to become a STEM-based human capital development.
- Reinforce observations of skillset required for all occupation categories
- Participate in curriculum development and internship program design to strengthen the skills gaps in order to respond on the labor market's demand
- Schools managers should be trained in School management and curriculum interpretation
- Design exchange and internship programs as well as industrial attachment based on skills required across all sectors in and out of country
- Provide education at various different levels to create new generations of skilled personnel ready for the world of work (STEM education provided from primary to Post Graduate level)
- Finally, they pointed out that there is a need for peer exchange of teaching best practices with other developed countries.

CHAPTER ONE: INTRODUCTION

1.1 Background and Context

The global COVID-19 pandemic drove Rwanda's economy into its first recession since 1994 whereby its Gross domestic product (GDP) fell by 3.4% in 2020, compared to an expansion of 8% in the previous year (2019) (World Bank, 2021). On the other hand, the share of the education sector as a percentage of GDP was 2% in 2020 compared to 3% in 2019. This means that the Rwandan education sector generated a net worth of 173 billion Rwf in 2020 into the country's economy compared 258 Billion Rwf in 2019. Moreover, the government of Rwanda's (GoR) ambition is to transform the economy into a knowledge-based economy which will move her Labor force from subsistence agriculture into the productive service sector aiming at turning the country into an upper-middle income country by 2035, and a high-income economy by 2050 (NST1). For the country to have a sustained and an inclusive growth that will be realized from this impudent ambition, innovation, integration, agglomeration, as well as competition should be the key driving forces thereof focusing on especially human capital development, export dynamism and regional integration, a well-managed urbanization, a competitive domestic enterprise, a modernization agricultural, as well as a capable and accountable public institution.

Education is the country's critical sector that will facilitate the NST1, as well as its vision 2050's developmental pillar of human capital development, the share of the sector's tertiary graduates was about 12.62% of the entire tertiary graduates in the academic year 2018/2019 as per Mineduc data. The entire tertiary graduates in that academic year was eighty-six thousand two hundred six (86,206) students and in the education field they were ten thousand eighty hundred seventy-five (10,875) students.

Given that the country intends to transform its labour-force from a low productive agriculture sector to a high-productive service led-economy, there are different demanded skills and among them include; Information Technology specialists, Light design, Media Imaging, Video, Sounding, Web design, and Animation experts, Manufacturing Pathways & Engineers, Garment and shoe production experts, Data Scientists, Economists, Statisticians, Business and Financial analysts, Accounting experts, Human resource managers, Language translators and interpreters, Tourism, Event management, tour guide, Beauty, Sports, Fitness, and Recreation specialists, Construction, Ore and Metals, Aviation, Mobile phone, Biogas & biomass technology, Geothermal, Engineers, Programmers, Carpentry & Wood Technicians, Land Surveying, among others.

Despite the above-mentioned demanded skills, the National Skills Development and Employment Promotion Strategy, skills development, through education (TVET & university) and work experience, does not currently respond to labour market needs. TVET and university outcomes are hampered by the quality of the students inherently taken from secondary education. These institutions also are not effective in providing students with the skills required

on the labour market. Statistics show that only 20% of recently graduated TVET students got employed after graduation. And of those employed a few had high-level skills developed through direct work experience. Regarding the high-skill sub-sector, only 5% accounted for the total employment, showing that the pool of quality skills is small. Relatively high-paying occupations, such as professionals, managers and technicians represent less than 10% of the total employed labour force.

Since the study intended to assess the skills status in the Rwandan education sector, the National Skills Development and Employment Promotion Strategy (NSDEPS), (2019-2024) pointed out that, Rwanda's skills base is a constraint to growth of existing businesses, limited investment, as well as a rapid enabling factor to transform the country into a middle-income economy. Opportunities to grow skills through employment are too few; and once in a job there is little support to continue personal growth. This has an impact on economic growth and further job creation. Furthermore, the strategy focuses on demand-driven interventions, specifically skills development that fulfils the needs of current businesses and potential investors. To achieve this, there must be strong private sector engagement and leadership with an impact led monitoring and evaluation system focusing on employment outcomes. Given the need to focus on what is most effective, there must be flexibility to test and learn as well adapting to programming fast.

In addition, the study's primary data as shown in figure 4 below shows that there is needs gaps in languages skills, School Managers, ICT expertise, organizing and planning skills, Pedagogical skills, Business fundamental skills, Education technicians, Adaptability and Sustainability experts, Strategic thinkers, and Human resource managers. As per our study questionnaire and number of interviewed respondents, it was found out the number of missing skills as highlighted in the table in languages was 15, 11 for School Managers, 10 ICT expertise, and 9 in the organizing and planning skills. While it was 9 in the Pedagogical skills, 6 for the Business fundamental skills, and 5 as Education technicians, the Adaptability and Sustainability experts lacking were 5. Regarding, Strategic thinkers, 4 were in shortage and in the Human resource management only 1 was lacking. According to the World Bank's Quality Basic Education for Human Capital Development in Rwanda report (2018), out of 103 countries, Rwanda was lowest in terms of progression in schooling beyond grade 1 which consequently affects their learning. Despite the government's commitment to early childhood development (ECD), pre-primary was only allocated 2% of FY 2017/18 education budget. Consequently, there is insufficient access to early childhood education with only 21 % of children enrolled in pre-primary. There was also, high and frequent repetition in the first years of primary school and in the years preceding the transition to secondary school and the 2017 Education Sector Analysis (ESA) found out that 73% of pupil at this stage repeated. This repetition therefore, caused these kids to drop out of school and it was found out that Transition from primary to lower secondary is at 71%.

Regarding the learning outcome, the report (World Bank, 2018), postulated that there is weak foundation in lower primary which undermines learning at all subsequent levels and this is considered as the main contributing factors for low internal efficiency. National assessment results indicated that most children in primary school do not acquire age appropriate literacy and numeracy skills. The 2017 LARS22 assessment found that only 54 % of grade 3 pupils in Kinyarwanda and 59 % in mathematics reached expected grade-level benchmarks. Other recent assessments conducted by Department for International Development (DFID). It was evidenced that learning levels, especially at lower secondary level, is fragmented and insufficient. This was because Rwanda, like other most of Sub-Saharan Africa, secondary students' learning outcomes have not been systematically and widely documented making it difficult to make international comparisons.

Regarding the issue caused by Rwanda's move to English as Language for instruction in school, the reports highlighted a mixture of response and various impacts. It was observed that shift presented significant challenges for both students and teachers and though the switch may have not been expensive in the short term, the longer-term effects are expected be more cost effective, especially on textbook procurement (World Bank, 2018).

Furthermore, Teacher Training, Competence, and Professional Development, was found to be a critical factor for effective implementing any reform agenda into practice. From 2000, the number of teachers in Rwanda has grown by 1.5 times in primary, and 4.6 times in secondary education, the latter among the fastest rates in the SSA. However, this increment especially at the secondary level, has adversely affected the quality of the workforce (World Bank, 2018). In additional, Rwanda's aspirations for STEM-based human capital development by focusing on Mathematics and Science in Basic Education are faced with scarcity in qualified teachers. When tested on secondary school-level mathematics, physics, chemistry, and biology, the average teacher test's scores were ranked not satisfactory. This in turn poses a threat to Rwanda's science and technology development.

Finally, the study found out that School infrastructure that is to say learning environment, materials, and facilities were inadequate despite the government's efforts of setting targets for pupil to have qualified teacher at the ratio at 48:1 in primary level, and 29:1 in the secondary level. This has contributed to high repetition especially in early grades, where primary classrooms are overcrowded. The Government of Rwanda's estimate is that an additional 28,000 classrooms will be needed hence reducing the early grade enrolment bulge and repetition (World Bank, 2018).

In convergence to the World Bank's report, the study found out that increased training activity would appear to be an appropriate response as the main cause of skills gaps in the education sector employers. It was clear that either staff had only partially completed training or that they are new in their role.

The Rwandan educations system through the ministry of education, aspires to produce enough and appropriately skilled workforce as well as upgrading their already existing skills and competencies. The expected impact from a successfully delivering the above-mentioned ambition is to ensure that Rwandan citizens have sufficient and appropriate skills, competences, knowledge and attitudes to drive the continued social and economic transformation of the country and to be competitive in the global market (GoR, 2018). A productive workforce equipped with relevant and productive skills whose members have more chances to access stable jobs with middle-class incomes, is considered an essential ingredient for the success of an economic and social transformation.

In additional, Rwanda sees her education system as the main pathway with which her youth will contribute to her economic development agenda (World Bank, 2011). Therefore, through Rwanda's past vision 2020, teaching quality was one of the top strategic priorities of enhancing economic development. Also, vision 2050 whereby the Rwandan government envisages transforming the livelihoods of Rwandans into a high standard of living which according to Gatete (2016), will be achieved by improving the quality of the country's education system. This is because according to the human capital theory, quality education is a vital link to a higher economic growth (Laterite, 2021).

1.2 Rationale

The prime purpose of this study was to critically assess the required skills to successfully deliver within the transformed business environment and compare this to the existing skillsets with the aim to target our regional competitive edge in such a way that our capacity building funds are best used and contribute to private sector's growth. Additionally, the only way Rwanda's Private sector to contribute to Rwanda's economic transformation is by having the right skills that would enable them harness their competitiveness advantage to the international market.

1.3 Objectives and Scope of the Assignment

The overall objective of the study was to assess the skills requirements of the Education Sector in Rwanda over the period 2020-2030, and to formulate policy recommendations to ensure that the future skills requirements of the sector can be addressed out to the end of NST1. Specifically, the objectives of the study are many folds:

- Provides information on the current performance of the Education sector, its workforce and the demand and supply, shortage, gaps and required of skills for sector expected performance.

- Assessing the global drivers of change impacting on the Education Sector and the relevant consequences for future skills needs;
- Identifies areas to be prioritized for action in the short, medium and long term
- Forecasting the skills for the Financial Services Sector up to 2030 based on mid and long-term national development and specific targets to deliver on;

The study scope was to develop conceptual frameworks, review relevant literature, assess required sector specific needed skills, review verdicts and findings and ultimately develop drafts report thereof.

1.4 Methodological Approach

1.4.1 Approach

To conduct the Education sector skills needs assessment, the study employed different methods and approaches were used. A desk review was undertaken of relevant literature and documentation on the Education sector in Rwanda, including a review of documentation on skills assessments previously conducted, and capacity development options. The review also covered education statistics, reports, academic literature, articles on skills assessment and capacity building as well as reports issued by international bodies and professional firms. In addition, qualitative information was also collected via interviews with senior managers, heads of department in a representative sample of Primary, Secondary schools, TVES, Polytechnics, and Universities, apex bodies and government agencies. (A full list of interviewees is provided in Annex 1).

A quantitative survey of stakeholder institutions was carried out through Monkey survey, comprising questionnaire covering companies' profiles, skills specifications, qualifications and experience. More so, the survey data were then processed and analysed to form the basis of the current report, which highlights the key findings and recommendations for developing the skills in Rwanda's Education sector. The SSA report builds on an extensive existing literature, complementing it with online survey and on-site consultations and an updated statistical analysis of the National Institute of Statistics of Rwanda (NISR) and relevant stakeholders in the Education Sector.

1.4.1.1 Assessment Process

The achievements and challenges of the PSF since its creation in 1999 to facilitate and complement of the Education sector which enhances Rwanda's human capital development and substantially the economy's growth aspirations through the private sector were evaluated and assessed. Here, we compare the achievements in research and advocacy, governance and membership management, capability development, and support services. As such, we specifically review the PSF and its members' strategic skills need documents. The challenges were revealed based on desk review and individual interviews with the PSF leadership, staff, and its members in the financial services sector. Furthermore, the identified achievements and challenges helped

identify the demand and supply skills requiring effort among the future priority skills areas for the financial services sector.

1.4.1.2 Participative Approach

In assessing the required skills of the Education sector in Rwanda, PSF and its stakeholders (institutions providing Education services in Rwanda) were informed by a participatory approach. Therefore, it involved participation and consultations by senior management, staff, other relevant stakeholders, and some key PSF senior personnel. The survey covered the identified categories or a representative sample of the education sector and its subsectors including all actors in the education sector. In addition, the interviews participatory approach also covered the regulatory and supervisory bodies as well as institutions involved in education sector capacity building skills such as universities and specialized institutions for professional development.

1.4.1.3 Formulation of the Skills Assessment

This process involved reviewing different documents informing the specific sectoral skills needs assessment. Accordingly, policy and strategic documents outlining the education development goals at the international and national levels were reviewed. Furthermore, international conventions, good practices frameworks for workforce development on how companies have successfully addressed their skills gap, and national frameworks relevant to the education sector were thoroughly researched to inspire the current skills needs assessment.

1.4.2 Process

1.4.2.1 Desk Review and Research

The question here was **where is Rwanda's Education Sector today**? To have a sound understanding, we thoroughly reviewed existing information on assessing the skill requirements for financial services. The review analysis entailed understanding the structural framework under which Education Sector in Rwanda operate. In addition, we reviewed relevant policy documents, national statistics (official statistics reports), academic literature, skills assessment articles, and previous Education sector skills assessment reports developed by multi- and bi-lateral agencies. Findings from the desk research helped: (1) map out the required current skills; (2) identify the essential skills gaps and explore initiatives to help bridge those gaps. (3) Gain an understanding of the strengths and challenges, as well as policy gaps that need to be addressed. Illustratively, reference was made to several key policy documents, which include but not limited to:

- Rwanda Education Strategic Plan 2018-2024
- Rwanda labour force survey report (2018)
- Rwanda Economic Update (2019): Lighting Rwanda-World Bank Group;
- The National Skills Development and Employment Promotion Strategy, (2019-2024)

- Skills Area and Numbers of Priority Skills Required Across Rwanda-MIFOTRA;
- Annual Reports-PSF;
- Rwanda Education Services Sector Skills Survey-2012-RDB;
- Etc.

1.4.2.2 Key Informant Interview

Furthermore, this assessment used face to face or calls phone interviews with Key Informants using an interview guide. With this method, Key informants were identified in close collaboration with the client (PSF) from relevant stakeholders and/or members about its functioning and mandate. Anticipatively, the stakeholders were contacted (***listed in annex_1***) for a conversation aimed at helping the consultant team to gather relevant information about the subject under study. In developing this assessment report, different views were collected from different institutions. Participants in the interviews were purposively selected.

a) Response Rate

It was initially planned to conduct consultations with **176** Institutions from the seven identified categories of stakeholders in financial services (pre-primary, primary, secondary, Regulatory and Supervisory bodies, and Capacity Building Institutions/Universities).

1.4.2.3 Data Collection

Qualitative information was also collected via interviews with senior managers, heads of departments in a representative sample of financial institutions, institutions of learning, and regulatory or supervisory bodies. (*See Annex_1 for a list*)

A quantitative survey of key informants was carried out through Monkey survey, comprising a questionnaire covering companies' profiles, skills, job specifications, qualifications and experience.

In terms of sampling, stratified random sampling was used to maximize information accuracy. This consists of dividing the sample population into smaller groups, or strata, based on shared characteristics. A random sample is selected from each stratum based on the percentage that each subgroup represents in the population. Stratified random samples are generally more accurate in representing the population.

CHAPTER TWO: EDUCATION SECTOR PROFILE IN RWANDA

2.1 Introduction

The Rwandan government (GoR) has embarked on its development agenda that aimed at transforming the country into a middle-income country by the year 2020, since 1998. The country also anticipates transforming the economy targeting to have an upper middle-income and a high-income country by 2035 and 2050 respectively. The Vision 2020 (Vision 2050) are being implemented through a medium-term planning framework for successive five or seven-year periods. The National Strategy for Transformation (NST-1) (Republic of Rwanda, 2017) covering the period 2017 to 2024. It also aligns with Agenda 2063 (African Union, 2015), a strategic framework for the socioeconomic transformation of Africa over the next 50 years through existing initiatives in the continent for growth and sustainable development.

The elaboration of the long and medium-term strategies is an opportune moment for the full integration of global and regional planning commitments, including: The Sustainable Development Goals (SDGs), African Agenda 2063, and the East African Community (EAC) Vision 2050 (EAC, 2015). The Education Sector Strategic Plan (ESSP) has been produced in concert with NST-1 to ensure a comprehensive alignment of their goals and outcomes over the next seven years. The central policy proposition for this ESSP is to ensure Rwandan citizens have sufficient and appropriate competencies (skills, knowledge and attitudes) to drive the continued social and economic development of the country.

2.2 Education Sector Profile

According to Mouzakitis, (2010), for nations to embrace and compete on the global stage and successfully meet the globalization challenges, there is a need to make significant improvements in terms of maximizing the effectiveness of vocational education trainings. This is because we live in an era where renewed knowledge is and technology drives the world at an accelerating pace. Therefore, to respond to the resulting updated requirements that will spur economic growth our Technical and Vocational Education and Training (TVET) programmes are considered to be the most effective instruments of meeting globalization demands. Basically, this is because educational and training reforms have to be based on the market needs assessment identified by appropriate market research.

Also, according to Lin, (2004), higher education spurs country's economic development and especially those nations that emphasizes on engineering and the natural sciences disciplines. This can be supported by the work of Pillay (2011), who asserted that tertiary education is a major driver for economic competitiveness in an increasingly knowledge-driven global economy. This is basically because education drives human capital development hence sustainable growth and development.

Hanushek and Wößmann, (2007), explained that improved schooling plays a critical role for most development strategies, since expanding only school attainment does not guarantee country's improved economic conditions. This therefore, is a call for countries especially developing nations Rwanda inclusive, to focus on the quality of educational which then enhances cognitive skills of their labour-force population instead of only relying on improving more on school attainment.

For Bloom, Canning, and Chan, (2006), the tertiary education sector is critical towards impacting the Sab-Saharan African's economic growth and poverty reduction. This is in contrast with the common belief that only primary and secondary schooling catalyzes country's economic growth. This is therefore a call for African countries to increase their Expenditure on education since it is believed to be an engine in impacting their respective GDP (Ejiogu, Okezie, & Chinedu, 2013).

The Rwandan ministry of education (MINEDUC) is the prime institution responsible for policy formulation, educational planning, coordination and regulation, monitoring and evaluation (M&E), and setting norms and standards at the national level. The ministry's primary mission is to transform Rwandan citizens into skilled human capital for the socio-economic development of the country that will make sure equitable access to quality education with a focus on combating illiteracy, promoting science and technology, critical thinking, and positive values. MINEDUC works closely with semi-autonomous Government agencies and with other Government Ministries at central and decentralized levels including but not limited the Rwanda Education Board (REB), the Workforce Development Authority (WDA), the Rwanda Polytechnic (RP), the Higher Education Council (HEC), the University of Rwanda (UR) and the National Commission for UNESCO (CNRU). Under the control of the ministry there are different institutions related to the sector (Education), and among them are Rwandan Education Board (REB) which is the main delivery arm of MINEDUC created in 2011 and brings together a number of institutions which were previously standalone arms-length agencies. They include; The National Examination Council (RNC); National Curriculum Development Centre (NCDC); Student Financial Agency Rwanda (SFAR); General Inspection of Education (GIE); and Teacher Service Commission (TSC) among other.

The structure of Rwanda's basic education system is asymmetric, with many more students enrolled in the early grades than in the later grades. According to 2018 data from the Rwandan ministry of education (MINEDUC), student enrolment in primary one (1) about 517,243 pupils almost doubled the enrolment in primary six (6) about 260,060 pupils and eleven times the number of children in secondary level especially senior six (6) about 44,437 students. This lopsided structure is the result of a rapid increase in the intake of students at primary one level and the balance of progression, dropout and repetition observed in each cohort of students. All

these factors combined mean that predicting the number of students attending a grade next year is more complex than just moving a cohort along

Also, according to the National Institute of Statistics of Rwanda (NSIR, 2018) report, the total population of learners registered in the Rwandan education system was 3,626,362 with 94,699 staff and 13,012 schools/centres. This means that approximately 30% of the country's population were in school (a share of 12,089720 of the entire population by then). Regarding gender, while 50.6% of the learners were females, 40.4% were males. Table 2 below highlights the structure of the Rwandan education sector including the all levels and staff with their respective population.

Table 1: The Rwandan Education sector's profile

Levels		Students			Staff		
	School /Centres	Male	Female	Total	Male	Female	Total
Pre-Nursery	96	3,199	3,292	6,491	47	215	262
Nursery	3,210	112,044	114,662	226,706	1,457	5,721	7,178
Primary	2,909	1,259,344	1,244,361	2,503,705	20,539	24,005	44,544
General Secondary	1,416	264,782	314,115	578,897	17,143	8,000	25,143
TVET	360	57,643	44,842	102,485	4,856	1,751	6,607
General Tertiary	30	41,458	34,255	75,713	3,586	1,307	4,893
Adult literacy	4,991	51,220	81,145	132,365	3,822	2,250	6,072
Total	13,012	1,789,690	1,836,672	3,626,362	51,450	43,249	94,699

Source: *NISR, 2018*

Furthermore, on the profile of the Rwandan Education Sector, the 3 core objectives of the Education Pillar under the SRMP 1 was to utilize ICT for education as a tool to enhance quality teaching and learning among students. The 3 specific objectives included achieving knowledge-based economic development through education and human resources development and utilization, enhancing human resources at a national level, improving educational opportunities and access through expansion of information digitalization and e-learning programs as well as enhancing domestic human resources and social security through development of education and skills training.

The education projects included: developing a curriculum for student-centered ICT skills; World class research infrastructure (High performance computing center-HPC); Broadband connectivity in schools; E-book digital content; Computing devices for students in HLIs and IPRCs; Carnegie Mellon University (PPP); ICT in Education Master Plan; MIS for Education decision making; ICT education and promotion for bridging the digital divide for citizens and

government-related parties; Smart School Expansion; ICT training for teachers and head teachers.

Internet connectivity in primary schools is at 35% and 62% in secondary schools. While 83% and 84% of primary and secondary schools, respectively, have computers. The details on the level of achievement on each of the project under the Education pillar are provided in table 9 hereunder:

Table 2: Education Sectoral ICT profile

Project and key performance indicators	2012	2013	2014	2015	2016	2017	2018	2019	2020
Broadband connectivity in schools									
Percentage of schools connected to the Internet in Primary education	6%	6%	8%	10.30%	10.00%	25.00%	30.00%	34.80%	
Percentage of schools connected to the Internet in Secondary education	18%	14%	16.90%	16.10%	35.40%	41.30%	52.00%	61.10%	
Percentage of High Learning institutions connected to Internet in Tertiary education	100%	100%	100%	100%	100%	100%	100%	100%	100%
Develop curriculum for student centered ICT skills									
Percentage of schools adopted curriculum for student centered ICT skills						60.2	64.7		
Total number of TVET students enrolled in ICT-related programs	7,959	12,532	12631	15979	15324	19461	18683	13176	
Percentage of schools adopted curriculum for student centered ICT skills									
Number of Tertiary graduates in ICT						9, 309	7,540		
Primary education									
Computer to teacher ratio	1:17	1:08	1:08	1:06	1:07	1:09	1:15	1:14	
Computer to pupil's ratio	1:40	1:15	1:15	1:16	1:13	1:11	1:10	1:10	
Percentage of schools with computer	39%	49%	56.10%	58.80%	65.80%	69.20%	75.50%	83.40%	

infrastructure									

Source: *Skills development, (2013 - 2018)*

2.3 Education Sector Occupational Profile

Using the Labour force survey datasets, the study analyzes the Rwandan Education Sector's Occupational Profile as highlighted in table 3 below and the study considered only two years (2019 &2020) given the intensity of the data but we believe this gives a clear picture of the whole sector's employability profile. This is because we are able to see employability in the sector before the global Covid-19 and after it out break. It is strange and surprising that the total number of Rwandan employed population increased the Rwandan from **3, 273,921** in 2019 to **3,460,860** in 2020 (as per the labour force survey datasets of November 2020). However, the total proportion of the employed population in the Education sector reduced from of **118,626** people in 2019 to **107,624** in 2020. Therefore, the share of employment in the Education sector as a percentage of the total employment was 3.1% in 2020 compared 3.6% in 2019. This is a clear indication that the sector was affected most in terms of employment opportunities.

Table 3: The Rwandan Education Sector's Occupational profile

Employed population	**2019**			**2020**		
	Total	Male	Female	Total	Male	Female
	3273921	1838353	1435568	3460860	1938268	1522592
Agriculture, forestry and fishing	1225151	563414	661737	1399907	650361	749546
Mining and quarrying	71205	64553	6652	57379	50842	6537
Manufacturing	208956	109653	99304	201555	119607	81947
Construction	315022	261402	53619	435720	351559	84162
Wholesale, retail trade, repair of motor vehicles, motorcycles	485871	230492	255379	466569	212858	253711
Transportation and storage	170913	165498	5416	146260	139343	6917
Accommodation and food service activities	96982	49085	47896	91495	45034	46461
Information and communication	11515	7923	3592	8962	6697	2265
Financial and insurance activities	35051	18869	16182	35728	20503	15225

Real estate activities	4260	3641	619	4098	2918	1180
Professional, scientific and technical activities	27111	18324	8787	21249	15698	5551
Education	118626	60497	58129	107624	55189	52435

Source: *NISR, 2020*

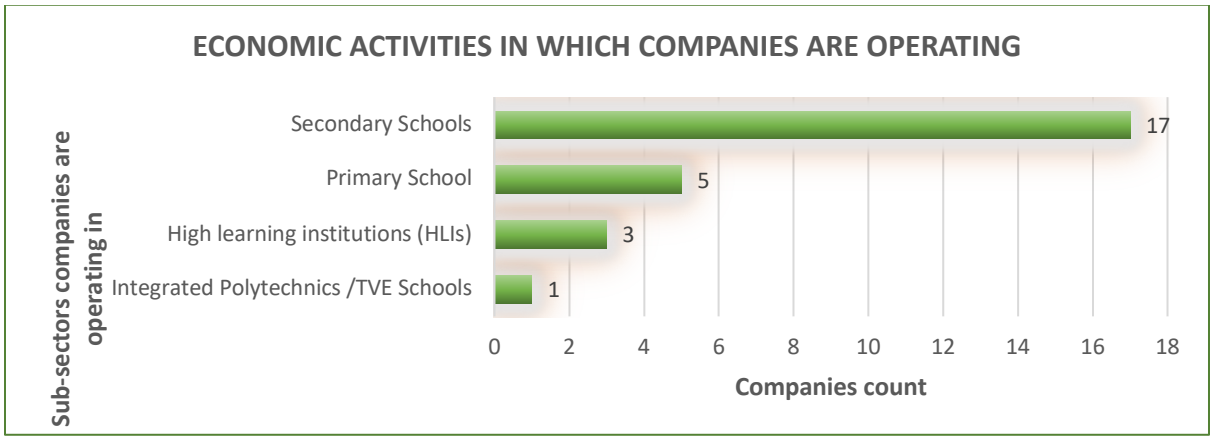
Table 4 below shows the total sector's employment by the level of education against the location. It is clear that share of employment increases as the level of education increase. This can be seen that the share of employment is high with the university level with 338,030 population compared to 27,671 for non-educated population. Whereas, it was clear that the urban area employs more people than the rural for all levels of education, the male employees still dominate their female counterparts for all levels of education and in both rural and urban areas.

Table 4: The Sector's Occupational profile by Levels of Education

	Rwanda			Urban			Rural		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total (16+ yrs.)	63,291	75,415	47,126	147,432	173,798	111,277	35,121	41,947	26,104
age group									
16-24 yrs.	29,442	33,383	24,559	39,955	52,014	30,460	25,901	28,708	21,838
25-34 yrs.	72,530	83,961	56,398	153,880	168,144	130,914	39,388	47,002	29,197
35-54 yrs.	81,174	97,269	59,351	213,826	231,228	182,846	39,379	48,586	27,891
55-64 yrs.	65,151	86,150	40,687	257,907	318,931	171,094	32,777	42,821	21,456
65+yrs	47,007	61,904	19,010	188,848	221,186	36,036	25,694	30,388	17,813
Education level									
None	27,671	33,686	20,538	35,901	46,908	23,597	26,567	31,968	20,113
Primary	35,561	44,752	22,538	48,657	67,107	26,291	32,010	39,184	21,398
Lower secondary	54,769	66,426	34,546	74,290	94,988	39,161	40,152	45,338	31,006
Upper secondary	80,334	87,812	69,110	103,299	111,017	90,040	59,382	64,378	52,732
University	338,030	368,854	289,413	394,594	441,360	326,217	170,805	177,611	157,258

Source: *NISR, 2020*

Figure 1: Characteristics of the Education Sector



Source: *Customized from primary data collection, 2020*

Technical and Vocational Training (TVET) has emerged as one of the most effective human resource development strategies that Rwanda has embraced in order to train and modernize the technical workforce for national development. Since its development in 2008, the Government put efforts regarding the expansion of the TVET that will attract foreign investments and produce competent labour force. Furthermore, TVET infrastructure' expansion has been the country's top priority through the construction of new TVET schools as well as the renovation/expansion of existing ones. The private sector is considered the top partner towards the development of TVET and has been mobilized to increase their investments thereof. This can be seen from an increase in number of TVET schools from 63 in the year 2010 to 369 in 2019 which have led an increase in TVET students from 51,773 in 2010 compared to 107,167 of 2019. Also, the employability rose from 70.3% in 2010 to 75%in 2019 as per the TVET tracer surveys. However, there is still a lot to be done in order to overcome existing challenges towards the quality TVET hence a need of unconventional approaches and innovative initiatives to enhance the existing TVET system that will accelerate the attainment of a knowledge-based economy envisaged by the government of Rwanda.

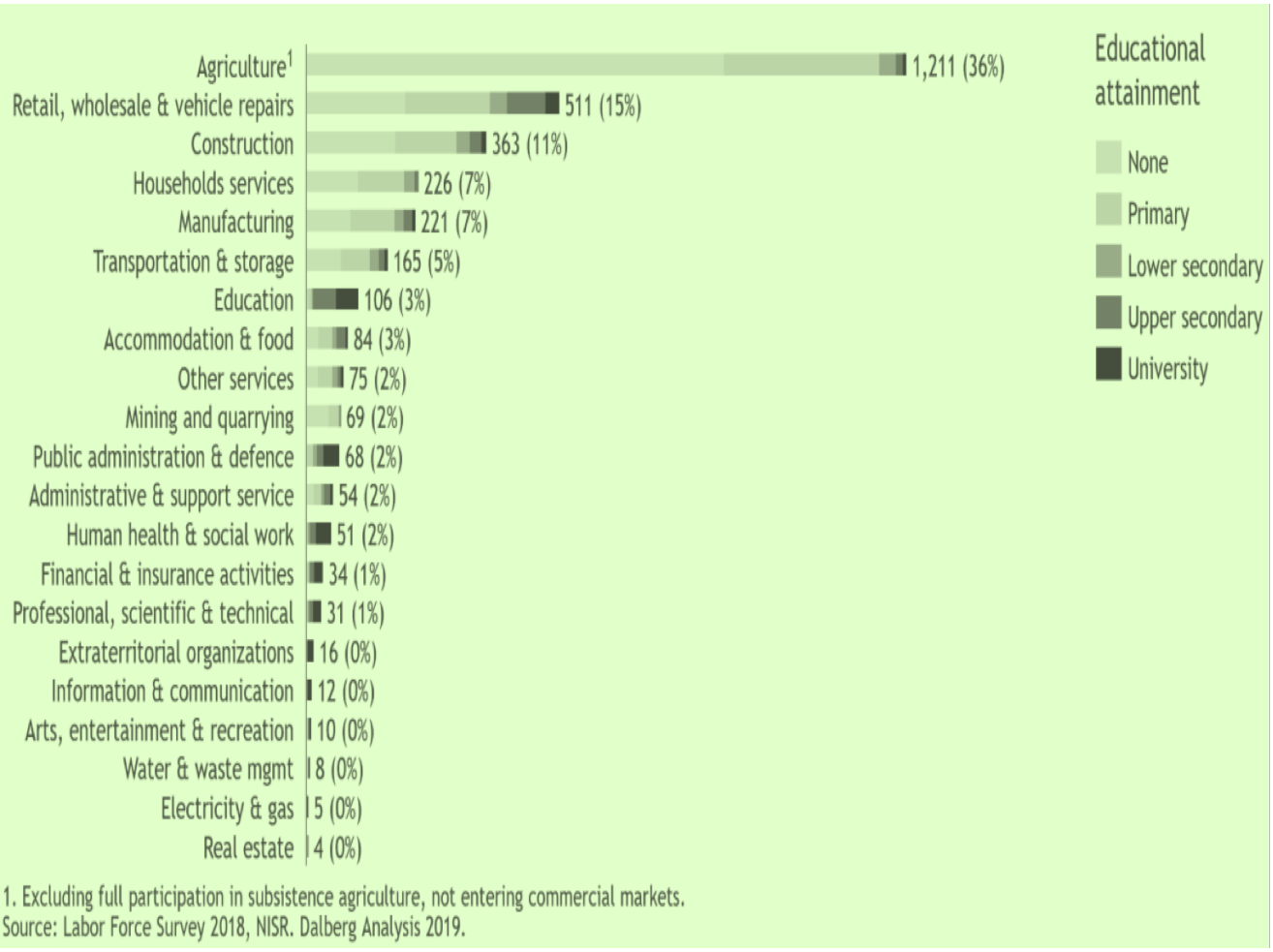
The upcoming fourth industrial revolution brings also new developments which regularly affect the way we learn, the way we teach and the way we live and work. We therefore have to regularly adapt ourselves and align our skills development approach to this drastic technological and digital transformation. It is also imperative to note that TVET institutions, practitioners and Policy makers have to work with modern industry to prepare the workforce for the challenges of the future, and to develop the right policies, approaches and programs in response to the digital economy and industrial transformation. Therefore, collecting and disseminating information on the quality of skills providers and the returns to different skills would improve quality and encourage participation in high-return programs

2.4 Employment and Labour market features and trends

Rwanda's largest sub-sectors employ few educated workers while high-skill sub-sectors are still relatively small. In Agriculture, Retail and Construction, educated workers, defined as having at

least completed upper secondary education, represent less than 25% of total workers. On the other hand, no high-skill sub-sector accounts for more than 5% of total employment.

Figure 2 : Employment by sub-sector and level of education attainment (2018, thousands %)



Source: NISR, 2020

2.5 Occupational profile

Table 5: Occupational profile

Broad occupational group	Sector occupations
Managers, senior officials and managers in services	• Senior management • Director level positions (including principals, chancellors and vice chancellors); • Head teachers; • School business managers; • Site managers; • Financial managers; • Heads of training; • ICT managers; • R&D managers; • Heads of departments
Professionals	• Teachers; • Lecturers; • Tutors; • Trainers; • Careers guidance specialists and advisors
Associate professional and technical occupations	• Education support staff • classroom assistants • Technicians employed by schools, colleges or universities including lab, electrical, building, engineering technicians; information officers; • IT user support technicians; • care advisors; • personnel and industrial relations officers; • personal assistants
Administrative and secretarial occupations	• Accounts and wage clerks; • book keepers; • general office assistants; • stock control clerks; • receptionists

Source: Customized from primary data collection, 2020

2.6 Gender in Education sector

Gender strategies and initiatives have had positive impact on the enrolment of females. In 2019, the percentage of female was 51.5% and that of male was 48.5% when compared to Rwandan demographic trend of population aged between 16 and 18 years, female represents 50.6% while male represents 49.4%. Concerning staffing the percentage of female was 54.3% and male was 46.7% in 2018. Strengthening the existing policies and strategies is needed to uplift the proportion of male.

CHAPTER THREE: DRIVERS OF CHANGE AND THEIR SKILLS IMPLICATION

3.1 Introduction

The demand for skills is driven by a variety of factors including economic, political, social, technological and environmental changes. The five drivers of change among others are:

- Policy and Regulations
- Demographic and population change
- Economics and globalisation
- Technological change
- Changing consumer demand

3.2 Policy and Regulations

The Education sector to be more success relies more on the government policies that influence private investment to take a lead in that particularly. Despite the intended support by the government policies, some challenges may hamper private investment in the Education sector skills development within the sector are not available to level of satisfaction and expectation of external investors.

3.3. Demographic and population change

Demographic change can be an important influence on skills needs because it can affect labour supply through population change and location of different sources of labour. The increase in the number of young people may require a rapid increase in the number of all school categories from primary to University levels, increasing demand for all school categories teachers and staff, along with the need to improve standards in poor-performing schools to make them more attractive.

With a change in the demographic profile, employers will be faced with challenges, such as retaining employees and their vital skills; attracting and retaining young people; providing a positive image and career pathways, and adapting to more flexible ways of working.

3.4. Globalization

The relation of the education sector to society and industry is increasingly complex, with the sector being affected by marketization in recent years. The sector is now faced with increased competition for students and staff and the quality of instruction is subject to increased monitoring and visibility.

Learning experiences are now available from a variety of sources both domestic and international, and students are demanding more personalisation of their programmes. These changes are creating a sector

that must adapt its approach to the business aspects of education while maintaining its ultimate purpose of producing skilled and capable citizens for the country and the world.

Economic drivers continue to have a significant impact on the skills needs and operations of many organizations across the sector.

Leaders in schools, colleges and universities will require developing new skills and expertise as they respond to this new policy landscape and remain financially independent and sustainable. Managers believe that young people need training in basic skills, management skills and communication skills in order to start work successfully. Their poor opinion of current skills levels among young people indicate that teachers may not have the necessary skills themselves to provide the appropriate instruction to learners.

3.5. Technological change

Technology can be utilized to improve teaching and learning and helping students be successful. Through the use of learning management systems (LMS) students can access online resources to get assistance on demand beyond the physical reach of their teacher and extend education in another way.

The development of technologies may create demands for skills at higher levels in research and development, while there may also be skills needs requirements in supporting consumers to use new technologies.

Technological advancements have a direct impact on the requirement for education professionals to have relevant skills to use digital technology effectively in order to help deliver creative and inspiring learning experiences. The role of technology to support improvements to learning across the sector remains central. Learners of all ages use technology for informal learning, recreation and entertainment. This is matched by rising expectations from learners, parents and employers to make good use of technology to support education and training. Achieving a modern world-class education and skills system that embraces all parts of the sector is essential to ensuring the global competitiveness.

The usage of technology not only allows for more effective and personalized teaching; it allows for a more dynamic learning experience. It also enables professionals to share expertise and resources within and beyond their own institutions.

Although there is evidence of significant integration of technology across the curriculum, the range of uses remains fairly limited and practitioners rarely realize the full benefits of technology in supporting learners. Use of digital resources and tools is regarded as optional in many cases, suggesting a need to ensure professional standards and requirements, and cultures of practice, are in place which recognize the technology as a core tool in a modern education and skills system.

In order to make the most of new technology, leaders and managers have to keep pace with the rapid changes and implement a continuous system of training to ensure that the workforce are appropriately skilled at any point in time.

Technology is acknowledged as a key driver in future economic success and quality of life and an important part of developing robust, evidence-based policy across all of a Government's responsibilities. Technology is seen as an enabler in the education sector, contributing to improvements in delivery of content and engagement with learners in the classroom, in employment or at home.

3.6. Changing consumer demand

Demand and supply are the two main factors which drive the direction of the education industry. Changes in the population and a decreasing jobs market indicate an agenda for wider participation in education as non-traditional learners seek new or better qualifications. Learners who may have been marginalized in the past are also seeking entry to the sector and the opportunities increased education provides. For example, consumers that uses digital technology (such as video calls, online social networks, file, photo, and document sharing, and micro blogging) as part of their everyday lives will demand new ways of learning which involve the usage of digital media and diverse learning platforms.

Such changes in consumer requirements mean that the workforce in the education sector needs to be flexible in order to respond to demand. This required flexibility will probably stimulate demand for blended learning delivery skills (via traditional and 'new'/online routes) as the new learner's demand different (or broader) access to learning. Basic employability skills such as communications and customer service will become more relevant to education sector staff. Such skills will be vital, so that the education workforce is able to respond to changing consumer demands in an appropriate manner.

There is also a need for clarity of professional standards, qualifications, initial training, performance management and continuing professional development across the different levels of the education workforce, so that the public are assured that all education professionals have similar high standards of professional conduct and competence.

However, as consumers, student's expectations about the education service they receive are likely to rise, placing greater emphasis on the pedagogical skills of academic teaching staff.

3.7 CHANGING WORKFORCE DEMANDS

Due to rising global competition, capacity for generating stable, well-paying jobs for a large number of workers is at risk.

The generation of workers entering the workforce is substantially smaller than those retiring. Employers are seeking efficient ways to upgrade skills of existing employees to fulfill human capital needs. Many adults will need to pursue additional job training or continuing education to remain employable.

There is a high demand for professional and continuing education programs that provide accessible, affordable, flexible, relevant, and convenient opportunities for full-time employees to continue their education.

The demand drivers of education sector include (**See Annex2**):

1. Householder disposable income
2. Cost of education
3. Opportunity cost of education
4. Cultural mindset
5. Government boost

The supply drivers of the industry include:

1. Availability of quality work force
2. Government funding
3. Changes in social outlook: Campus Universities Vs Colleges online

CHAPTER FOUR: SKILLS STATUS IN RWANDAN EDUCATION SECTOR

4.1. Introduction

According to NST1, the government of Rwanda aspires to transform the country from a predominantly agrarian-based, low-income economy to an industrial upper middle-income nation by 2035 and ultimately a high-income country by 2050. This vision is premised on the ability of Rwanda's education system to produce enough and appropriately skilled workforce capable of realising this aspiration, as well as upgrading the skills and competencies of the existing workforce. Also, the government of Rwanda recognizes the need for qualified and skilled human resources to address the imbalance in the supply and demand of skilled labour and is committed to ensuring that there are skilled workers available on the labour market to meet the actual labour market demands. Whereas progress has been made over and over in the areas of education and skills development in Rwanda, significant barriers still remain, creating challenge of matching of skills and opportunities in the labour market.

The National Skills Development and Employment Promotion Strategy, (2019-2024) pointed out that, Rwanda's skills base is a constraint to growth of existing businesses, limits investment, and is not enabling a rapid transition to a middle-income economy. Opportunities to grow skills through employment are too few; and once in a job there is little support to continue personal growth. This has an impact on economic growth and associated job creation. Furthermore, the strategy's aim to support this long-term vision through five themes. It focuses on demand-driven interventions, specifically skill development that fulfils the needs of current businesses and potential investors. To achieve this, there must be strong private sector engagement and leadership with impact led monitoring and evaluation system focusing on employment outcomes. Given the need to focus on what is most effective, there must be flexibility to test and learn as well adapting to programming fast. The strategy is built on 3 pillars, covering skills development, employment promotion, and matching. The proposed programs are the product of an in-depth analysis about the current skills development and employment status in Rwanda.

Moreover, there is a range of causes of changes in demand for skilled labour, new products, new technology, new workplace arrangements and shifts in the composition of industry associated with globalization. Supply of skills can change for reasons such as the ageing of the workforce, changed attractiveness of particular employment, and changes in the numbers entering and completing training. Shortages therefore can be caused or removed by changes in a number of factors affecting supply and demand, one of which is training. The appropriateness of changing the level of provision of training as a response to a shortage depends on the type of shortage, the level of its severity and the factors causing it. Skills imbalances lead to sub-optimal production and, depending on the technology, may substantially inhibit production. Shortages may also make a country less competitive in a fast-moving global economy.

4.2.1 Current Skills Demand and their Economic Implication

There is broad range of soft skills essential for successful school to work transitions in sub-Saharan African (SSA) Rwanda inclusive. The most often highlighted by both education institutions and employers as necessary thereof in SSA, include but not limited to (soft skills) self-confidence, motivation, aspiration, communication, trustworthiness and responsibility, presentation skills, business language skills, networking, information seeking including social media and digital literacy, understanding employment and employers, and entrepreneurship skills (Laterite, 2019).

In a study to assess what makes a good teacher by Laterite in 2021, qualifications and knowledge, classroom practices, teacher disposition, understanding the whole learner and assessing student were found out to be the leading factors affecting quality of education that is performances were identified as the qualities and actions that make up the key foundations for teacher quality. Therefore, fore these trainers to transmit their knowledge which then affect the skills development in other sectors, the above-mentioned factors are critical thereof.

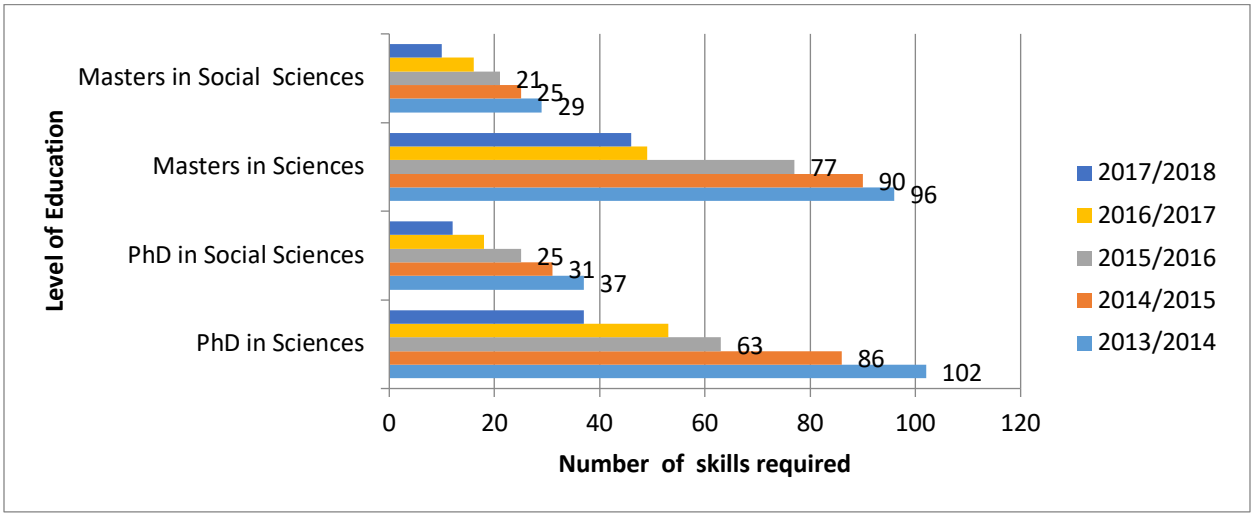
With Rwanda's ambition of becoming an ICT hub, knowledge base-economy, service led-economy, that will transform the country into a middle-income and high-income nation by 2035 and 2050 respectively, the education sector is expected to play a critical role towards skills development. The main priority sectors being Service, Industry, and Modern Agriculture, and since the sector is the sole source of skills development, the identified demanded skills cutting across different sectors include the following;

Given that the country intends to transform the its labour-force from a low productive agriculture sector to a high-productive service led-economy, there are different demanded skills and among them include; Information Technology specialists, Light design, Media Imaging, Video, Sounding, Web design, and Animation experts, Manufacturing Pathways & Engineers, Garment and shoe production experts, Data Scientists, Economists, Statisticians, Business and Financial analysts, Accounting experts, Human resource managers, Language translators and interpreters, Tourism, Event management, tour guide, Beauty, Sports, Fitness, and Recreation specialists, Construction, Ore and Metals, Aviation, Mobile phone, Biogas & biomass technology, Geothermal, Engineers, Programmers, Carpentry & Wood Technicians, Land Surveying, among others.

Furthermore, in an attempt to improve the Agriculture sector, the demanded skills include the following but not limited to Agricultural Economics and Agribusiness specialists, Animal and Livestock Production specialists, Soil, Water, and Environment Management experts, Dairy production and meat scientist, Agriculture Mechanization experts, Crop Production & Horticulture specialists, Forestry and Nature Conservation specialists, Rural development and Agribusiness etc. It is however, unclear of what number is required of these demanded skills in

all the priority sectors except what is observed in the Rwandan skills development strategy which then affected this study in understanding the demanded number against the supplied number. According to the Five-year program for priority skills development to deliver EDPRS II (2013 - 2018) in 2013, the following are the number and specific skills required to overcome the issue of skills gap:

Figure 3: Skills and number of skills required in Education sector



Source: Five-year program for priority skills development to deliver EDPRS II (2013 - 2018), 2013

4.2.2 Current Skills Supply and their Economic Implication

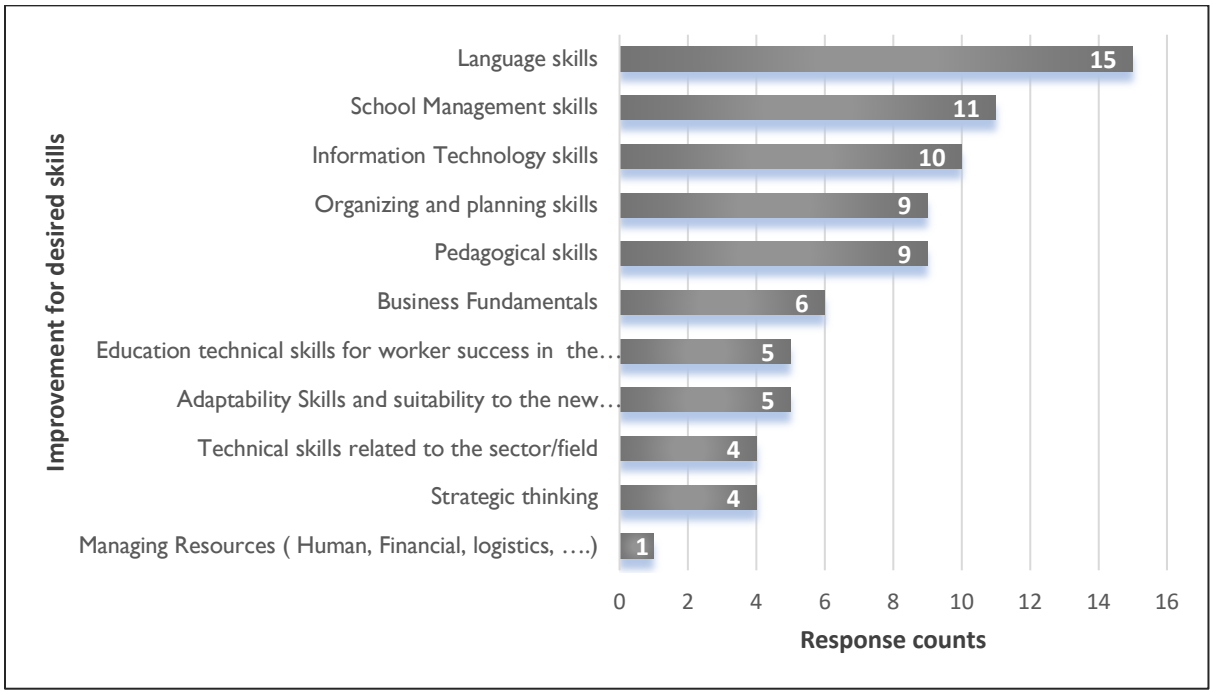
Given the above-mentioned demanded skills, it is believed that the Rwandan education sector through its different learning institutions, the required skills are provided through different courses. Both TVETs and universities offer different courses thereof.

According to the strategy, (The National Skills Development and Employment Promotion Strategy) skills development, through education (TVET & university) and work experience, does not currently respond to labour market needs. TVET and university outcomes are hampered by the quality of the students inherently taken from secondary education. These institutions also are not effective in providing students with the skills they need for work. Statistics show that only 20% of recently graduated TVET students got employed after graduation. And of those employed a few had high-level skills developed through direct work experience. Regarding the high-skill sub-sector, only 5% accounted for the total employment, showing that the pool of quality skills is small. Relatively high-paying occupations, such as professionals, managers and technicians represent less than 10% of the total employed labour force.

4.3 Skills Gaps, Anticipated Skills Demand, and their Policy Interventions by 2030

The study's primary data as shown in figure 4 below shows that there is needs gaps in languages skills, School Management skills, ICT expertise, organizing and planning skills, Pedagogical skills, Business fundamental skills, Education technicians, Adaptability and Sustainability experts, Strategic thinkers, and Human resource managers. As per our study questionnaire and number of interviewed respondents, it was found out the number of missing skills as highlighted in the table in languages was 15, 11 for School Managers, 10 ICT expertise, and 9 in the organizing and planning skills. While it was 9 in the Pedagogical skills, 6 for the Business fundamental skills, and 5 as Education technicians, the Adaptability and Sustainability experts lacking were 5. Regarding, Strategic thinkers, 4 were in shortage and in the Human resource management only 1 was lacking.

Figure 4: Identified Skills gaps in Education sector



Source: *Customized from primary data collection, 2020*

4.4 Main barriers to the closing skills gap

According to the World Bank's Quality Basic Education for Human Capital Development in Rwanda report (2018), Out of 103 countries, Rwanda was lowest in terms of progression in schooling beyond grade 1 which consequently affects their learning. Despite the government's commitment to early childhood development (ECD), pre-primary was only allocated 2 % of FY 2017/18 education budget. Consequently, there is insufficient access to early childhood education with only 21 % of children enrolled in pre-primary. There was also, high and frequent repetition in the first years of primary school and in the years preceding the transition to secondary school and the 2017 Education Sector Analysis (ESA) found out that 73% of pupil at

this stage repeated. This repetition therefore, caused these kids to drop out of school and it was found out that Transition from primary to lower secondary is at 71%.

Regarding the learning outcome, the report (World Bank, 2018), postulated that there is weak foundation in lower primary which undermines learning at all subsequent levels and this is considered as the main contributing factors for low internal efficiency. National assessment results indicated that most children in primary school do not acquire age appropriate literacy and numeracy skills. The 2017 LARS22 assessment found that only 54 % of grade 3 pupils in Kinyarwanda and 59 % in mathematics reached expected grade-level benchmarks. Other recent assessments conducted by Department for International Development (DFID). It was evidenced that learning levels, especially at lower secondary level, is fragmented and insufficient. This was because Rwanda, like other most of Sub-Saharan Africa, secondary students' learning outcomes have not been systematically and widely documented making it difficult to make international comparisons.

Regarding the issue caused by Rwanda's move to English as Language for instruction in school, the reports highlighted a mixture of response and various impacts. It was observed that shift presented significant challenges for both students and teachers and though the switch may have not been expensive in the short term, the longer-term effects are expected be more cost effective, especially on textbook procurement (World Bank, 2018).

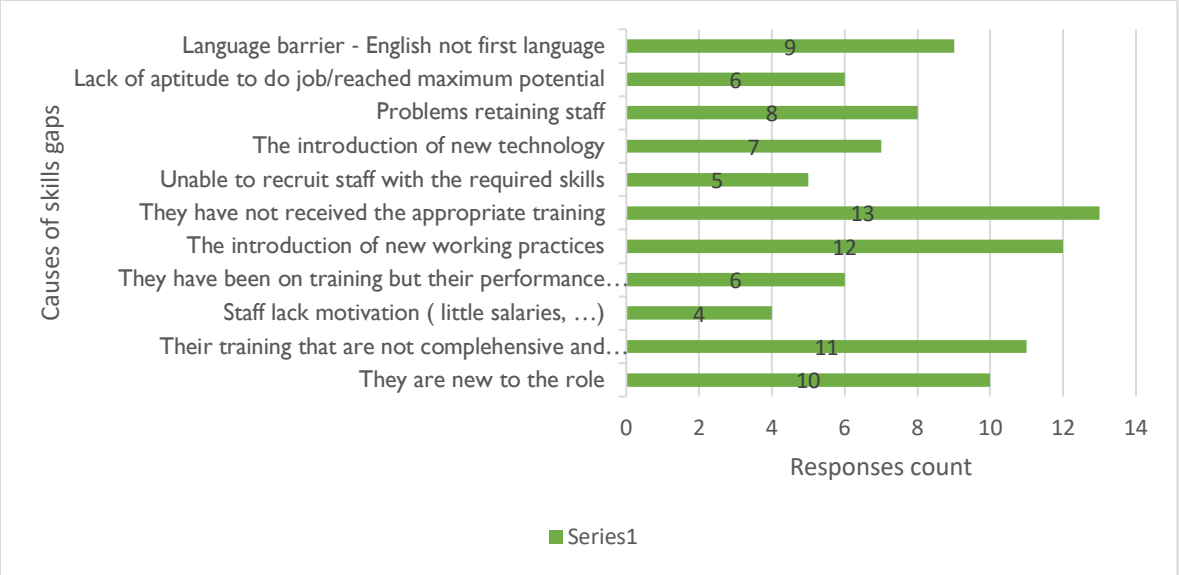
Furthermore, Teacher Training, Competence, and Professional Development, was found to be a critical factor for effective implementing any reform agenda into practice. From 2000, the number of teachers in Rwanda has grown by 1.5 times in primary, and 4.6 times in secondary education, the latter among the fastest rates in the SSA. However, this increment especially at the secondary level, has adversely affected the quality of the workforce (World Bank, 2018).

In additional, Rwanda's aspirations for STEM-based human capital development by focusing on Mathematics and Science in Basic Education is faced with scarcity in qualified teachers. When tested on secondary school-level mathematics, physics, chemistry, and biology, the average teacher test's scores were ranked not satisfactory. This in turn poses a threat to Rwanda's science and technology development.

Finally, the study found out that School infrastructure that is to say learning environment, materials, and facilities were inadequate despite the government's efforts of setting targets for pupil to have qualified teacher at the ratio at 48:1 in primary level, and 29:1 in the secondary level. This has contributed to high repetition especially in early grades, where primary classrooms are overcrowded. The Government of Rwanda's estimate is that an additional 28,000 classrooms will be needed hence reducing the early grade enrolment bulge and repetition (World Bank, 2018).

In convergence to the World Bank's report, the study found out that increased training activity would appear to be an appropriate response as the main cause of skills gaps in the education sector employers. It was clear that either staff had only partially completed training or that they are new in their role (Figure 4).

Figure 5: Causes of skills gaps in Education sector



Source: *Customized from primary data collection, 2020*

The study found out that language issues, poor attitude and motivation (salary issues) to teaching, lack of training by teachers, limited knowledge on advanced technology, challenges related to new teaching practices among others.

Rwanda has chosen the English as the language of learning from P4 onwards, and so it is essential that the standard of English of every teacher is brought to the necessary level of proficiency for them to teach effectively. While teachers of English have a major responsibility in this respect, every teacher from the beginning of upper primary must have a high level of expertise in English in addition to expertise in their own particular specialist subject(s).

CHAPTER FIVE: SECTOR SKILLS RESPONSE TO ADDRESSING THE IDENTIFIED SKILLS GAP

5.1 Introduction

Rwanda's revised national employment policy shows that Rwanda's working age population by level of education shows that 49.7% has not attended or finished primary school, 29.6 % has finished primary school, 8% has finished low secondary education, 8% has finished secondary education and 4% has finished university studies. This is a clear indication that a big number of Rwandans have no formal qualifications yet the government aspires to transformation of the country from a predominantly agrarian-based, low-income economy to an industrial upper middle-income nation by 2035. This vision is premised on the ability of Rwanda's education system to produce enough and appropriately skilled workforce capable of realising this aspiration, as well as upgrading the skills and competencies of the existing workforce.

5.2 Ways to Bridge the Identified Skills Gap

The study recognizes Rwanda's commitment towards an early childhood development (ECD), however, there is a need for an improvement early grade progression and learning and the transition to lower secondary school. This by developing and use audio-visual materials for emergent literacy, numeracy, and science, as well as social skills, for preschool and early grade children, teachers, and parents.

Also, a lot has been done in providing essential school infrastructure package with an aim of improving learning conditions and transition to lower secondary school, but given more efforts are needed thereof given that the ratio of classroom attendance is believed to be high as observed in the study.

5.2.1 Participation in Curriculum Development

Five years ago, Rwanda shifted from a knowledge-based to competence-based curriculum. The main purpose was to enable school graduates to cope with job related demands and enable them to become problem solvers. The ambition to develop a knowledge-based society and the growth of regional and global competition in the jobs market has necessitated the shift to a competence-based curriculum to address the issue of the shortage of appropriate skills in the Rwandan education system. That means shifted from knowledge and skills acquisition learning to critical thinking, creation and innovation, research and problem solving, communication, cooperation, interpersonal life skills and lifelong learning competencies. Finally, in convergence with data collection, this study as per the respondent's ideas as in **figure 6,** education operators suggested that they should be allowed to participate in curriculum development at the national level in order to be more efficient and effective.

5.2.2 Design Apprenticeships & internship program with capacity building institution

The skills assessment pointed out that there is a need in collaboration between those who design internship programs and the capacity building institutions as well as skills suppliers (learning institutions) in order to strengthen the skills gaps in order to respond on the labor market's demand.

Internship program who is supposed to supply a hands on training to the internees, have not building skills and matching talent to its fullest potential. This is reflected in a relatively low employment rate for recent interns, neighboring 60%.[1] This is explained by five main pain points:

First, internships are often not resulting in the envisaged learning effects, with interns performing clerical tasks without upgrading and developing their skills. One of the reasons for the latter is the lack of an internship culture in Rwanda, which leads to a limited understanding of both companies and interns in terms of the meaning of a successful internship. There are internship guidelines, which were developed in 2018, and are meant to set out expectations and guiding principles for successful internships. However, it is not clear to what extent they are taken into account by hosting institutions and follow-up is limited.

Second, private sector is not sufficiently involved in the program, with the public sector taking the lead.

Third, matching between interns and employers could greatly improve; as it often follows a first come basis (a new online tool could be used to support this process).

Fourth, monitoring is not performed closely enough as to identify best practices to replicate across internships.

Fifth, the internship program team lacks technical support and resource to solve these issues.

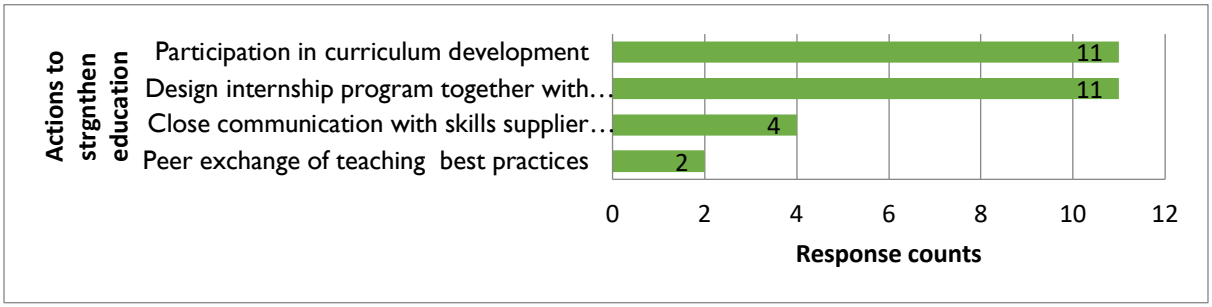
5.2.3 Peer exchange of teaching best practices

Educational and teaching expertise is a powerful gift, especially when shared[2.] Peer exchange of teaching best practices will provide opportunities for new teachers to benefit from the knowledge of colleagues with more experience, who in turn might gain new ideas and fresh perspectives. This will help teachers to improve their subject knowledge, think about teaching strategies in different ways and learn new ideas to try in the classroom.

[1] RDB Internship Evaluation Report, 2017
[2] https://blog.irisconnect.com/uk

In fact, teachers have to learn more from each other than with mentors or in traditional classes and workshops. Teachers using collaborative practices are more innovative in the classroom, hold stronger self-efficacy beliefs, and have higher job satisfaction. Sharing good practice will build a teachers' reputation as a leader in schools and increases professional value. Rather than telling people they're an expert, sharing lets other teachers discover it for themselves in a way that helps them to raise their own level of expertise. Finally, respondents pointed out that there is a need for peer exchange of teaching best practices with other developed countries.

Figure 6: Ways to strengthen skills in education sector



Source: *Customized from primary data collection, 2020*

CHAPTER SIX: CONCLU SION AND RECOMMENDATIONS

6.1 Conclusion

Improving teaching quality and skills especially in private schools and High learning Institutions is Rwanda's ambition since it can be done through outstanding training providers, on the values of strong leadership, readiness to improve, effective self-assessment, and the use of feedback from learners highlighted as the main catalysts to improving teaching quality and skills.

6.2 Recommendations

N⁰	Stakeholders	Stakeholders responsibilities and areas of collaboration	Time frame
1	**MINEDUC, Skills providers institutions**	• Provide continuous professional development to the teachers, curriculum developers to enhance current skills levels, as well as develop the multi-tasking and flexibility that may be skills needed for the future. • Teaching and learning in well understood languages is key. Reinforce skills development of language in which learners learn and teachers comprehend well	Short and Long term
2	**Ministry of Public Service and Labour (MIFOTRA)**	• Reinforce observations of skillset required for all occupation categories	Short term
3	**PSF**	• Engage and coordinate all stakeholders in implementation of skills development programs	Short and Long term
4	**MINEDUC, Skills providers**[3]	• Participate in curriculum development and internship program design to strengthen the skills gaps in order to respond on the labor market's demand	Short and Long term
5	**REB**	• Schools managers should be trained in School management and curriculum interpretation	Short and Long term
6	**RDB**	• Design exchange and internship programs as well as industrial attachment based on skills required across all sectors in and out of country	Short and Long term
7	**Academic Institutions/ Skills providers(TVET, IPRCs, Universities)**	• Provide education at various different levels to create new generations of skilled personnel ready for the world of work (STEM education provided from primary to Post Graduate level)	Short and Long term

[3] Private Sector/ Chambers to collaborate in curriculum development

6.3 Lesson learnt

1. Kenya

Kenya has a skills development funding mechanisms include the Industrial Training Levy Fund, established under the Industrial Training Act, which requires employers to register and contribute to the industrial training levy. Only employers in the Hotel and Restaurant industry (registered under Hotels and Restaurants Act Cap 494 of Kenya) are exempt since they pay the hotel and catering levy. The funding from the industrial training levy has intensified skills development efforts. Under existing funds such as the Youth Enterprise Development Fund (YEDF), Women Enterprise Fund (WEF), UWEZO Fund and various County Government Funds, there are skills development components that are funded.

2. South Africa

The National Skills Fund (NSF) is an entity established in 1999 and reports with the mission of providing fund for skills development initiatives that are identified by the National Skills Development Plan 2030 as national priorities, are related to the achievement of the Skills Development Act 97 of 1998, or considered to be an activity undertaken by the Minister to achieve a standard of good practice in terms of skills development.

The NSF's funding focus and skills development portfolio is two-pronged: a significant allocation of the NSF's annual and medium-term budget is aimed towards education and training initiatives such as bursaries and scholarships, learnership and skills programmes, and workplace-based learning; and NSF funding is also aimed at improving the post-school, education and training system, with a focus on capacity building, investing in skills infrastructure, research and innovation.

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ANNEXES

Annex1: Institutions sampled

Kayonza Modern School
Fawe Girls' School
Kagarama Secondary School
Ecole Secondaire Kanombe/EFOTEC
College Saint Andres
Lycée de Kicukiro /APADE
Ecole Francaise Antoine de Saint Exipery (French School)
École Belge de Kigali
Excella School
Hope Academy Rwanda
International School of Kigali
Kigali International Community School
Blooming Buds School, Kacyiru, Kigali
College Ami Des Enfants
College de l'Espoir de Gasogi
College Saint Andre
La Colombiere School
Doves Montessori school
The Earth School, The International Montessori School of Rwanda
Fruits of Hope Academy
Green Hills Academy, Kigali
Groupe Scolaire ADB
Groupe Scolaire Apred Ndera
GS Aiper Nyandungu
Saint Paul International School (SPIS)
College ACEJ karama
Collège Adventiste de Gitwe
Ecole autonome de Butare
Ecole des Sciences St Louis de Montfort Nyanza (EScN)
Ecole sociale de Karubanda
Groupe Scolaire st Joseph Kabgayi
Petit Seminaire Baptiste
Petit Seminaire de Butare
Petit Seminaire st Leon Kabgayi
College Methodiste Unie de Rushashi (CMUR)
E A V Rushashi
Ecole des Sciences de Musanze
Ecole Islamique de Musanze

Ecole Primaire EER muhoza
Ecole Secondaire de Buhuga
Ecole Primaire Muhoza 1
Ecole séminaire de Nyarutovu
Excel School
Groupe Scholaire de Nyundo I
Groupe scolaire APAPEDUC Bungwe
Groupe Scolaire de Nemba I
Groupe Scolaire Gakoro
Groupe Scolaire Notre Dame du Bon Conseil Byumba
Groupe scolaire Rugali
Groupe scolaire Shashi
Inyange Girls' School of Science
Petit séminaire Saint Jean Nkumba
Regina Pacis School, Ruhengeri
Sonrise High School
Wisdom school
OPAPEP Nursery & Primary School
Ecole Primaire Notre Dame de Fatima
ETO Mibirizi
Ecole agricole et veterinaire de Ntendezi
Lycee Notre Damme de Nyundo
Gisenyi Advantist Secondary School (GASS)
Ecole de Sciences de Gisenyi (ESG)
Groupe Scolaire Saint Joseph Birambo
Groupe Scolaire Gihundwe
Ecole secondaire Gishoma
Groupe scolaire Rwinzuki
St Joseph Nyamasheke
Butambamo secondary school
Nkombo Secondary school
St Matthew's School_Rusizi
St Matthew's School_Nyamasheke
Groupe Scolaire Nyabagendwa
Groupe Scolaire Remera Catholique
Groupe Scolaire Rilima
Groupe Scolaire Saint Aloys, Rwamagana
Maranyundo Girls School
Montfort Secondary School/ Bugesera
Nyamata Bright School
Gashora Girls academy
Petit Seminaire St Kizito Zaza

- Groupe Scolaire Karenge
- Groupe scolaire ruhunda
- Ecole secondaire de rukira
- Kayonza Modern School
- Protestant Institute of Arts and Social Sciences

University of Tourism Technology and Business Studies
UNILAK
ULK
Adventist University of Central Africa
Akilah
UTAB
Carnegie Melonie
Private School Association
REB
NEDA
Rwanda Politechnic

Annex 2: More of the Drivers in the Education Industry

Just like any other industry, Education industry is also dependent on the forces of demand and supply. These two forces drive the growth of the education industry. There are different drivers under both the forces which drive the industry. Let us understand these business drivers in detail. Business drivers are influences, both internal and external, that significantly impact the direction of an industry. The education industry has following key business drivers:

Household Disposable Income/ Cost of Education: Household disposable income is the amount of income left to an individual household after taxes have been paid, available for spending and saving. People with higher disposable income opt for expensive educational institutions like international schools, world schools etc. It's a well-researched conclusion that cost is a big constraint associated with school attendance, thus lower the cost of education, higher is the literacy rate. If the cost of education is high in a country, fewer people can afford it, if the cost is average more people enroll into the system.

Increased Disposable Income: It has been established by way of various research studies conducted in past that people with higher education levels have an improved chance of earning a high income and resulting in labor market success. If for a given country we are successful in significantly increasing the quantity of schooling, then individuals' earnings rise as a result. Typically, rates of return to education are higher in lower income countries and thus, increasing schooling attainment should increase labor market earnings in the future. Those who have completed a professional program are more desirable to many employers, and fewer educated people are unemployed. Generally speaking, the higher your level of education, the higher your earnings will typically be. The rate of return year to an additional year of schooling is significant in many developing countries, especially low-income countries.

Opportunity Cost of Education: In economics, "opportunity cost" refers to the next best use of a resource. We think about opportunity costs every day as we decide how to spend our time or money. This is the cost of education measured in terms of value to the next best alternative forgone like employment. This is a key concept in economics and generally comes into picture at professional levels. Opportunity cost of education could comprise of foregone wages, tuition, textbooks and additional living expenses and may include the additional cost associated with a reduction in years of future labor force participation. If the value derived from pursuing education by sacrificing one's job is greater in terms then people opt for further studies. Similarly, when it comes to government spending on educational reforms, the opportunity cost is the other ways that government could use the taxpayers spend on the educational program, as well as the time teachers and administrators spend implementing it.

Cultural Mindset: Since the demand for schooling is often influenced by economic, political, social and cultural factors, in many cases it is not sufficient merely for a school to exist in order for parents to enroll children to schools. Even free education may not entice poor families. Cultural mindset plays an important role here and refers to the awareness amongst people for the need of education. For example, female education is not given due importance in remote areas. Even the level of parental education is a key determinant of their children's educational attainment.

Government Boost: This refers to the role played by the government to boost education amongst masses by offering incentives, awareness programs, free female education, education grants, education loans at minimal interest rates etc. Governments around the world spend significant resources on education. While such outlays have led to a tremendous expansion of schooling, to further ensure macro-economic stability, as well as to promote equitable economic growth and literacy rates, countries need to maintain public spending at a level consistent with their long-run financing ability while, at the same time, establishing transparent budget mechanisms that allocate and manage public resources equitably for education reforms. Education expenditure by governments should pay considerable attention to the productivity and efficiency of the education sector. Determining how governments and families can best finance and allocate scarce resources to produce quality education and the skills that individuals need for success, is an integral task that impacts and drives this sector. There is a need for governments to integrate education into a country-wide perspective focusing on how education ties into the macro-economic context.

Some of the factors that drive education industry with respect to government boost are; how much is spent on education and what is the share of the government's expenditure, how governments finance the education sector and what do they finance and if the spending is adequate and sustainable.

Demand Side Financing: Demand-side financing is the principle of channeling education resources through students and their parents or basing school funding on enrolments or attendance, has been proposed for a number of reasons in different countries. Supply-side financing usually refers to funding inputs such as human and material resources based on formal sector planning by technical planners and managers. However, ensuring the supply side is, in many cases, not enough. Thus, there may be good equity and access reasons to consider demand-side financing. The focus is on putting the resources in the hands of those who demand education and not those who supply it. The goal is to bring down the barriers that prevent children from continuing their education. Some examples of demand-side financing programs are scholarships, targeted vouchers and conditional cash transfers.

Qualified Workforce: Establishing a strong education system requires availability of qualified workforce who can impart quality education to the people. It is useful to combine with quality interventions such as compensatory education, teacher training, or female empowerment, among other interventions. Lifelong learning gives people access to a basic formal education, and then provides them with opportunities to update their skills and knowledge. Institutions are set up so they can quickly adapt to changing educational needs. Lifelong learning fulfills two key objectives. First, it produces a large number of people with a standard level of knowledge, which is vital for a nation to stay competitive economically. Second, it allows each person's knowledge base to grow. This is necessary in an economy where things change at a rapid pace.

Educational Infrastructure: To accommodate school going population, it requires a strong educational infrastructure in order to keep pace with the developing economy/population and provide it with quality manpower. Education can accelerate economic growth and investment is a key indicator to expand and improve quality of education. Thus, education requires investment on creating educational infrastructure, which can lead to good quality education.

Huge investments are required to establish rich infrastructures. With the help of government funding, it becomes easier to build affordable education centers.

Information Technology: With the onset of online methods of education, social outlook has shifted focus from concrete structure to virtual and online education. Higher education and research institutes have imbibed IT because their level of sophistication demands high level of automation and IT infrastructure. IT solutions offer advanced campus Management System is like a digital campus, where admin can monitor everything from faculty to infrastructure on a daily