RDB | RWANDA DEVELOPMENT BOARD

RWANDA SKILLS SURVEY 2012

CONSTRUCTION SECTOR REPORT

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List of Acronyms

GOR	Government of Rwanda
HCID	Human Capital and Institutional Development
HLI	Higher learning Institutions
IPRC	Integrated Polytechnic Regional Center
KIST	Kigali Institute of Science & Technology
NCHE	National Council for Higher Education
NSIR	National Institute of Statistics Rwanda
NUR	National University of Rwanda
RDB	Rwanda Development Board
TSS	Technical Secondary School
TVET	Technical Vocational Education and Training
VTC	Vocational Training Centers
NCCR	National Construction Council of Rwanda

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Special thanks to the National Institute of Statistics of Rwanda (NSIR), for providing the database of establishments from which the survey sample was drawn, as well as their invaluable input to the process.

The team of enumerators and data entry must also be thanked for their efficiency and professionalism in conducting the survey of all the establishments included in this research.

We would not, of course, have had the data on which the project is based without the many organisations throughout Rwanda which took the time to participate in this project.

Executive Summary

This Report presents the findings of the skills survey of the Construction Sector Establishments in the Private Sector in Rwanda. The focus is on skills profiles, proficiencies, and gaps in the construction Sector. The survey was commissioned by Rwanda Development Board as a national private sector skills survey targeting 8 priority sectors including ICT, Mining, Energy, Tourism, Manufacturing, Construction, Agriculture, Finance and Insurance. The survey was carried out in the five provinces in the country targeting large, medium, small and micro financial sector establishments in the Private Sector.

Principal Activities and Overall Labor Units in the Sector

The Construction establishments in the private sector in Rwanda have 13 principal activities, with most of them doing more than two activities. The main activities in the construction sector include site preparation, construction of buildings, construction of utility projects, electrical installation, building completion and finishing, real estate and construction of other civil engineering projects to mention but a few.

The principal activity that most establishments participate in is site preparation with a proportion of 29.4%, electrical installation 10.6%, and building completion and finishing 7.1%. The sector is dominated by medium establishments, which account for 44.6%. Large establishments account for 33.7%, whereas both small and micro establishments have a proportion of 10.8% each.

Current labour units

The construction sector in Rwanda had a total of 5,043 labor units employed as Managers, Professionals (Engineers), Liberal Professionals, Technicians and Artisans. The sector depends mainly on casual laborers, who accounts for 78.9% of the labor units. Managers accounted for 5.6%, Scientists 5.7%, Liberal Professionals 1.9%, and Technicians 7.9% of the labor units within the sector. There are large proportions of foreigners in key occupations in large establishments in the four key subsectors in the Construction industry, namely: Site Preparation, Construction of Utility Projects, Building Completion & Finishing and Construction of Buildings. Foreigners tend to dominate in key occupations including Scientist Professionals, Technicians and even Artisans. Women are underrepresented in all the occupations. In the large establishments, the industry lacks qualified Rwandans in the following professionals, and thus relies on foreign labor.

- Civil Engineers
- Mechanical Engineers
- Electronic Engineers
- Electrical Engineers
- Building Construction Artisans (Laborers).

Skills Gaps: - The construction sector in Rwanda had a total skills gap of 3,259 labor units accounting for 65% of the existing labor force. The skills gap in the sector is dominated by Artisans accounting for 86%, Technicians 8%, Scientists Professional 4%, Managers 3%, and Liberal

Professionals accounting for 1% of the of the total skills gaps. The skills gap among Technicians was dominated by Construction Supervisors (40%), Electronics Engineering, Technicians (18%), and Civil Engineering Technicians (17%). The occupations with the main gaps among Artisans are Building Construction Laborers (47.2%), Stonemasons (20.1%), odd-job persons 7% and Sweepers (10%) of the total artisan skill gaps. The existing employees also need training in soft skills like leadership, business communication, and innovation.

Supply of Skills by Training Institutions: - Training institutions in Rwanda offering construction related courses include universities, Integrated Polytechnic Regional Centers (IPRC), Vocational Training Centers (VTC) and Technical Secondary Schools (TSS).

Despite the increased demand of professionals in the construction industry in Rwanda, the number of students taking construction courses and graduating from universities is dismal. In the last two years less than 130 professionals have graduated in this field.

The development and supply of needed skills for the construction industry today and in future in Rwanda is experiencing many skills development challenges. One among them is the fact inadequate number of young Rwandans entering training institutions (polytechnics and universities) and taking construction related programs/courses.

The following specific recommendations need to be implemented:

1. Establish a private sector led sector skills councils to address the skill challenges facing the industry
2. In the short term, improve the skill competency of the existing labor force
3. Mobilize and sensitize owners and employees to take training and enrichment of their employees as a strategy for profitability and quality improvement.
4. Enhance qualitative skills among employees in the private establishments.
5. Strengthen capacities of IPRCs and TVCs.
6. Establish an Incubation facility.
7. Promote private public Partnerships (PPP) for internships and attachment programs.
8. Develop a Demand Driven Strategic Plan to expand and strengthen the capacity of KIST and other related training institutions.
9. Promote stakeholder coordination, especially on specific TVET programs like industrial attachment, R&D and rewarding talent and quality service.
10. Mobilize additional financial resources through Training Levy

1.0 RWANDA CONSTRUCTION SECTOR

1.1 Sector Overview

The construction process is complex and starts with design and planning of what is to be constructed, the putting up the structure through to on going maintenance and refurbishment. Construction work is almost entirely done on a project-by-project basis. Main contractors usually draw together teams of professionals, technicians and laborers who often work for quite a short period of time and then move on to another location of disperse. Much of the work is managed by a main contractor who deals with the client but who subcontracts part of it to smaller firms who specialize in a particular aspect of the process. Construction is a labor–intensive activity with capacity to provide extensive employment with limited investment. The industry provides a point of entry into the labor market to some of the least educated and most disadvantaged section of the society.

Worldwide, construction is a major component of investment, as it is closely related to economic growth. Numerous studies have shown that construction output grows particularly fast, often exceeding the rate of growth of the economy as a whole, as countries put their basic infrastructure in place to facilitate development (*Strassmann, 1970; BERU, 1972; Edmonds and Miles, 1984; Wells, 1986;Bon and Crosthwaite, 2000*).

According to the International Standards of Industrial Classification (ISIC Rev 4), Classification of Construction is given in three categories as i. Construction of buildings, ii. Civil engineering (including construction of roads and railways, construction of utility projects and construction of other civil engineering projects); and iii. Specialized construction activities (Demolition and site preparation, electrical, plumbing and other construction installation activities, building completion and finishing, and Other specialized construction activities).

1.2 Policies and Role of Construction Industry in Rwanda

The construction industry is indispensable to the development of Rwanda's economy. It comprises the building, transport and civil engineering sub-sectors thereby providing the physical infrastructure, which is central to the development of the economy. The sector also facilitates peoples' life and ways of doing business. Its activities create business for suppliers and manufacturers and provide employment to professionals, semi-skilled and unskilled labor. More than 50% of the employment so created in the construction industry is in the unskilled labor market.

According to the Rwanda National Construction Industry Policy, 2009 the nation's construction industry was then underdeveloped and plagued with a number of problems which included insufficient project continuity due to inadequate affirmative public policies; insufficient access to finance and credit; inadequate relevant human resources in the public and private sector; unfavorable conditions for accessing donor credit; and lack of a database for performance indicators in the industry (Republic of Rwanda, 2009). To address the above challenges, the government policy objectives were formulated to:

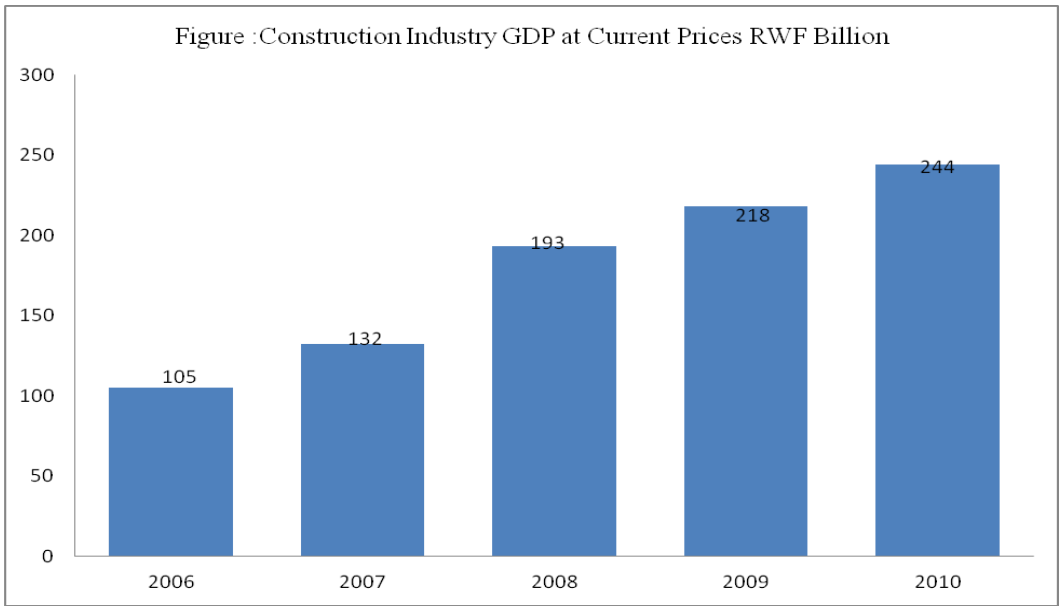
a) Harmonize the roles and responsibilities of the public and private sector for effective NCI management;
b) Establish a National Construction Council of Rwanda (NCCR);
c) Develop and strengthen local capacity for effective participation in the NCI;
d) Strengthen and support regulatory and professional bodies;
e) Promote use of appropriate technology;
f) Remove restrictive practices on women's participation in the NCI and protect Children from exploitation; and
g) Ensure that the NCI supports sustainable national economic and social development.

The policy was developed with the aim to enhance delivery, stability, performance, and the growth of local businesses and professions within an organized and continuously improving institutional framework. By mid-2020 it is estimated that 90% of all services in the construction industry would be provided by the private sector.

1.3 Industry growth

The Government of Rwanda is increasingly investing in the emergence, establishment, growth and development of an effective and sustainable national construction industry. Figure 1 shows that the GDP in the construction industry grew from RWF billion 105 in 2006 to RWF billion 244 in 2010. The sector contributed 6.1%, 6.5%, 7.5%, 7.3% and 7.4% of the total GDP in 2006, 2007, 2008, 2009 and 2010 respectively.

Figure 1: Construction Industry GDB at Current RWF Billion



Source: NISR/BNR, 2010

1.4 Major Construction Products

In Rwanda, the construction and public works industry's main products are cement, lime, clay bricks and tiles. Table 1 shows that lime production rose by 62.4% reaching 1,405 tons in the first nine months of 2011 from 865 tons in the corresponding period of 2010. Bricks and tiles also rose by 10% while cement decreased by 11%. The increase in housing needs in both urban and rural areas provided the boost following the reconstruction of war-damaged roads.

Table 1: Production of Major Construction Products, 3rd Quarters 2010-2011

Commodity	Unit	2010			2011
		Jan-Sept	4th Q	Total	Jan-Sept
Cement production	Tons	77,115	17,986	95,101	68,643
Bricks and tiles	Tons	39,127	9,017	48,144	43,033
Lime production	Tons	864	242	1,106	1,405

Source: National Bank of Rwanda, Statistics Division, and Quarterly Bulletin, 2011.

Data from the National Bank shows that the volume of import of construction materials rose from 243,263.8 tons in 2009 to 287,851.4 tons an increase of 18.3% while the value rose from US $ million 117.1 to US$ million 129 over the period 2009 to 2010 indicating an increase of 10.2%. In terms of productivity, the RIMS, 2005 found that the construction materials producing establishments had the highest median value added per worker of US$ 6,094 this being more than double the average of the whole manufacturing sector with US$ 2,749.

The total turnovers for construction sector significantly rose by 29.5% in the first nine months of 2011 compared to the corresponding period of the previous year. This was as a result of road rehabilitation work and construction of residential houses, which has been in a rising path in the country for the last decade.

2.0 CONTEXT OF THE SKILLS SURVERY

The Rwanda Development Board's (RDB) mandate is to promote private sector development though investment promotion. In order to attract the requisite investment, it's important to ensure that the country has the right quantity and quality do skills to support the emerging and growing industries. The Human Capital and Institutional Development (HCID) Department at RDB supports the private sector by developing mechanisms to ensure there is adequate and availability skills with the right quality. It is expected to address the human capital challenge both from an institutional and individual level, through sustainable interventions. Establishing and running such strategic interventions to fill skills gaps in the private sector requires evidence-based quantitative and qualitative data/information. HCID is committed to supporting interventions that would fill the potential gaps and reconcile both labor supply and demand in the private sector in Rwanda.

2.1 Rationale for the survey

Strategic and sustained investment in skills development requires credible and comprehensive labor market data and information in the private sector and training institutions. Presently, there is inadequate data and information on skills gaps in the private sector and the match and/or mismatch between the supply of skills by various training institutions (TVET and university institutions) and the labor market demand particularly in the priority sectors.

In addition, though RDB has a Labor Market Information system (LMIS), it is still new and hence difficult to know the actual skills needs and gaps of various sectors of development let alone identifying the labor/skills challenges and opportunities the various sectors are facing/having. It is also not possible to conduct medium and long-term labor force forecasting for the various sub-sectors in the private sector. This is mainly because of lack of a series of cumulative credible data and limited use of robust methodological a approaches. This skills survey is a strategic start towards building a credible skills database for decision making and planning.

It is from the above context that RDB-HCID commissioned a national private sector skills survey targeting 8 priority sectors including ICT, Mining, Energy, Tourism, Manufacturing, Construction, Agriculture, Finance and Insurance. A regional consultancy firm OWN and Associates Limited, working with the HCID team, was commissioned to lead this strategic national skills survey in the private sector in Rwanda. The survey was launched in August 2011.

2.2 Objectives

This national skills survey targeted the Private Sector in Rwanda, with a focus on:

- Establishing a robust methodology for strengthening Labor Market Information System (LMIS) and conducting periodical labor market forecasting and manpower surveys.

- Collecting, collating and reconciling both labor supply and private sector labor demand: establishing sufficient quantitative and qualitative information to identify the potential skills gaps in the private sector.
- Providing RDB/HCID with comprehensive empirical data on the existing and/or projected human capacity gaps against which training /capacity development interventions and performance can be based, including sustainable and cost effective interventions such as internships, trainings, and scholarships.
- To conduct a SWOT analysis of respective private sector companies with respect to human capital covering individual, institutional and environment.
- Provide prioritized recommendations and an action plan that the government and other key stakeholders should undertake to address these gaps.

2.3 Design and Methodology

To carry out a comprehensive, credible and informative skills survey in the selected sub-sectors a rapid assessment methodology, applying qualitative and quantitative techniques was used. The survey was national and carried out on appropriately selected sectors in all the 5 provinces of the country, reflecting both the urban and rural settings. The research team worked with the National Institute of Statistics Rwanda (NISR) to get the right sampling framework and sample size for the skills survey. The NISR Establishment Census 2011 was used as a basis for the selection of the organisations to be visited during the study.

The key respondents during the survey were; employers (owners or/CEOs), employees, and representatives of academic departments of training institutions in Rwanda. The results of the "Establishment Census 2011" conducted by the Ministry of Public Service and Labor, Ministry Commerce and Industry, National Institute of Statistics Rwanda and the Private Sector Federation[1] were used as the framework to determine the sample sizes of the respective sectors for the National Skills Sector Survey.

Based on the Establishment Census 2011 data, NISR worked with the research core team and used a stratified sampling method to select the establishments for the survey across the country. The respondents were stratified using the following 3 criteria:

1. Sectorial activity,
2. Firm size,
3. Geographical location

[1] *Republic of Rwanda. (June 2011). Establishment Census, 2011: Final Results. Kigali: Ministry of Public Service and Labor, Ministry of Commerce and Trade, National Institute of Statistics Rwanda, and Private Sector Federation.*

The stratification by firm size divides the population of firms into a 4 strata as in the Establishment Census, 2011: i.e.

- Micro firms (1 Employee)
- Small Firms (2-3 Employees)
- Medium Firms (4-9Employees)
- Large Firms (10+Employees)

A geographical distribution is defined to reflect the distribution of the economic establishments across the country within the different provinces i.e. Kigali, Southern, Eastern, Northern and Western Provinces.

Sector activity was based on the eight (8) priority sector identified by RDB as part of the terms of reference.

2.4 Sampling framework

The sectors identified by RDB were categorized within the economic activities of the establishment census as shown in Table 2.1 below. Suing the formulae below the sample size was determined for each sector.

Using Yamane (1967:888) $n = \frac{N}{1 + N(e)^2}$

Where N is the population size

n- Sample size

e -level of precision: a precision of 5% was assumed for the skills sector surveys

Weights

To ensure that all sample estimates are reflective of the population parameters, weights for the different strata against the respective sample sizes have been tabulated. These have been reported in the respective sections. Weights have been computed using $w = n/N$, the reciprocal of which will be used to weight the sample results to get the overall population skills status magnitude. All weights have been incorporated in the databases.

Table 2: Sector Survey Sampling Framework

Sector*	Population**	Sample Size	Sample%
ICT (Information and Communication)	558	223	40
Energy	360	250	69
Mining	50	50	100
Construction	117	117	100
Tourism	33,305	476	1
Manufacturing	4,559	439	10
Agriculture	675	282	42
Finance & Insurance	970	330	34

This population is based on the NISR **Establishment Census, 2011 Report

2.5 Data collection

Through a collaborative process between the research core team, RDB and NSIR, a questionnaire was developed which had a core set of questions along with a series of sector specific modules which directly related to the footprints of each of the sectors. The core set of questions which examined generic recruitment issues, skills gaps, resources for training and future skills needs were drawn form to the international skill survey instruments.

For each of the sectors an individual set of questions (or modules) were developed which varied depending upon the priorities of that particular sector. The importance of such an approach was twofold. First, it allowed each of the sectors to gather specific workforce data on organizations which fell into their footprint. Second, it captured the duality of functions that employees often fulfill within private organizations and that would have otherwise not been captured through the more generic core questions.

Given the complexity of the questionnaire and the need to ensure that as many as possible establishments and training institutions within the sector were included in the research, focus groups and telephone interviews were deemed to be the most appropriate, manageable and cost effective method. The interviews were conducted by trained bilingual enumerators.

The number of respondents from the organizations and training institutions are shown in table 3. Experts from RDB HCID, sectoral department, and key stakeholders in each sector validated the survey instruments and were also involved in focus group discussion and/or interviews

Table 3: Sector Survey Respondents per Sector

Sector*	Establishments	Training institutions
ICT (Information and Communication)	211	31
Energy	243	31
Mining	41	31
Construction	83	33
Tourism	476	33
Manufacturing	439	33
Agriculture	310	19
Finance & Insurance	310	19

2.6 Report structure

While the surveys were conducted over three phases with at least 2 sectors being analyzed at a time, the reports have been developed separately for each of the eight sectors under review.

The following sections of this report present the **Construction sector** finding and recommendations.

The findings are divided into two parts.

Part 1 (Section 3) focuses on principal activities in the Construction establishments in Rwanda, as well as employment by categories of occupation (labor profiles), skills proficiency, skills gaps, and capacity building issues.

Part II (Section4) deals with supply of skills for the Construction sector (capacities of training institutions) including: courses offered, enrolment and output from HLIs, equipment/training facilities and academic staff.

Section 5 of the reports presents the implications of the findings and specific recommendations that need to be studied and implemented to bridge the skills gaps in the industry.

3.0 PART I: FINDINGS OF THE SKILLS SURVEY IN CONSTRUCTION ESTABLISHMENTS IN THE PRIVATE SECTOR IN RWANDA

This section focuses on the findings on principal activities in the Construction establishments in Rwanda, as well as employment by categories of occupation (labor profiles), skills proficiency, skills gaps, and capacity building issues.

3.1 Principal Activities & ownership

A total of 83 Construction establishments were visited during the national skills survey. This is 80 per cent of the targeted sample. The survey indicates that there are 13 principal activities in the construction sector in Rwanda, with most of them doing more than two activities. As indicated in Table 4, the main activities in the construction sector include site preparation, construction of buildings, construction of utility projects, electrical installation, building completion and finishing, real estate and construction of other civil engineering projects to mention but a few. The principal activity that most establishments participate in is site preparation with a proportion of 29.4%, electrical installation 10.6%, and building completion and finishing 7.1%.

Table 4: Construction Establishments Principal Activities

Principal Activity	Percent
1. Site Preparation	29.4
2. Construction of Buildings	4.1
3. Construction of Railways	0
4. Construction of Utility Projects*	10
5. Construction of Other Civil Engineering Projects**	2.4
6. Real Estate	4.7
7. Demolition	5.3
8. Electrical Installation	10.6
9. Plumbing heat and Air Conditioning	7.6
10. Other Construction Installation***	8.8
11. Building Completion and Finishing	7.1
12. Other Specialized Construction Activities++	6.5
13. Construction Sale	3.5
Total	**100**

** Including urban pipeline, communication and power lines; water lines, reservoirs and sewer system.*

***Including construction of industrial facilities, except building, including refineries, chemical plant; construction of waterways dams, land division with additional roads and utility infrastructure.*

***Including installation in building or other projects of: Elevators & escalators, automated doors, lighting conductors, vacuum cleaning system, and thermal, sound or vibration installation.*

++*Including construction of foundation including pile driving; damp proofing & water proofing works; steel bending; brick laying & stone setting; roof covering for residential houses; and erection of chimney & industrial* ovens.

The construction establishments are mainly located in urban areas with 80.7% of them located in Kigali, 8.4% are in the Southern province, 4.8% in Northern and Western Province, and 1.2% in Eastern province (Table 5).

Table 5: Location of Construction Establishments

Province	Frequency	Percent
Kigali	67	80.7
Northern	4	4.8
Southern	7	8.4
Western	4	4.8
Eastern	1	1.2
Total	**83**	**100**

In terms of legal status, 59% of the construction establishments reported to have been sole proprietorship, 19.3% limited liability by share capital, 14.5% legally established partnership, and 3.6% were unregistered

Figure 2: Legal Status of Construction Establishments

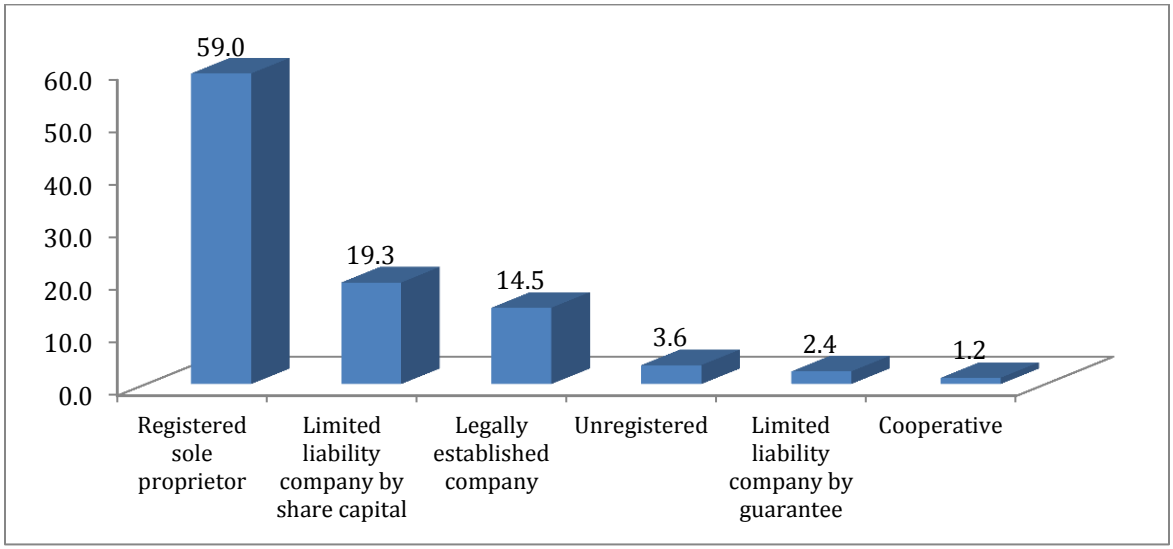


Table 6 shows the ownership of establishments, which is dominated by those that are fully owned Rwandese (74.7%), 12% are private with Rwandan majority sharing holding, whereas 6% are private and owned by foreigners

Table 6: Ownership of Construction Establishments

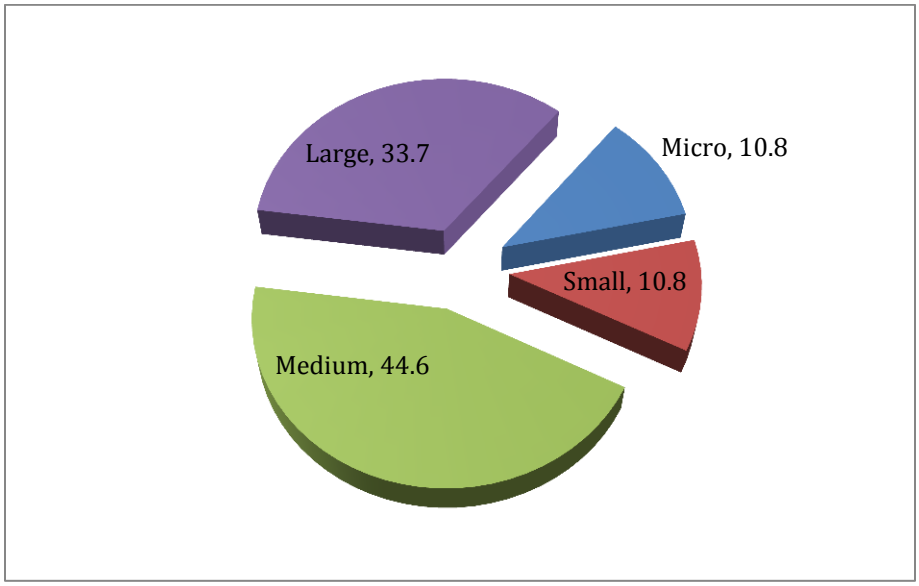
Ownership Structure	Frequency	Percent
Private, fully Rwandese owned	62	74.7
Private, Rwandese majority owned	10	12.0
Private, Fully Majority Owned	6	7.2
Private, Fully Foreign Owned	5	6.0
Total	**83**	**100.0**

a) Categories of Construction Establishments by Size

The size of the establishments was adopted from the establishment census that was done by the National Institute of Statistics which defined micro establishments as employing one labor unit, Small (1-4) labor units, medium (5-9) and large (10 plus).

Figure 3 below indicates that medium establishments, which account for 44.6%, dominate the construction establishments surveyed. Large establishments account for 33.7%, whereas both small and micro establishments have a proportion of 10.8% each.

Figure 3: Categories of Construction Establishments by Size



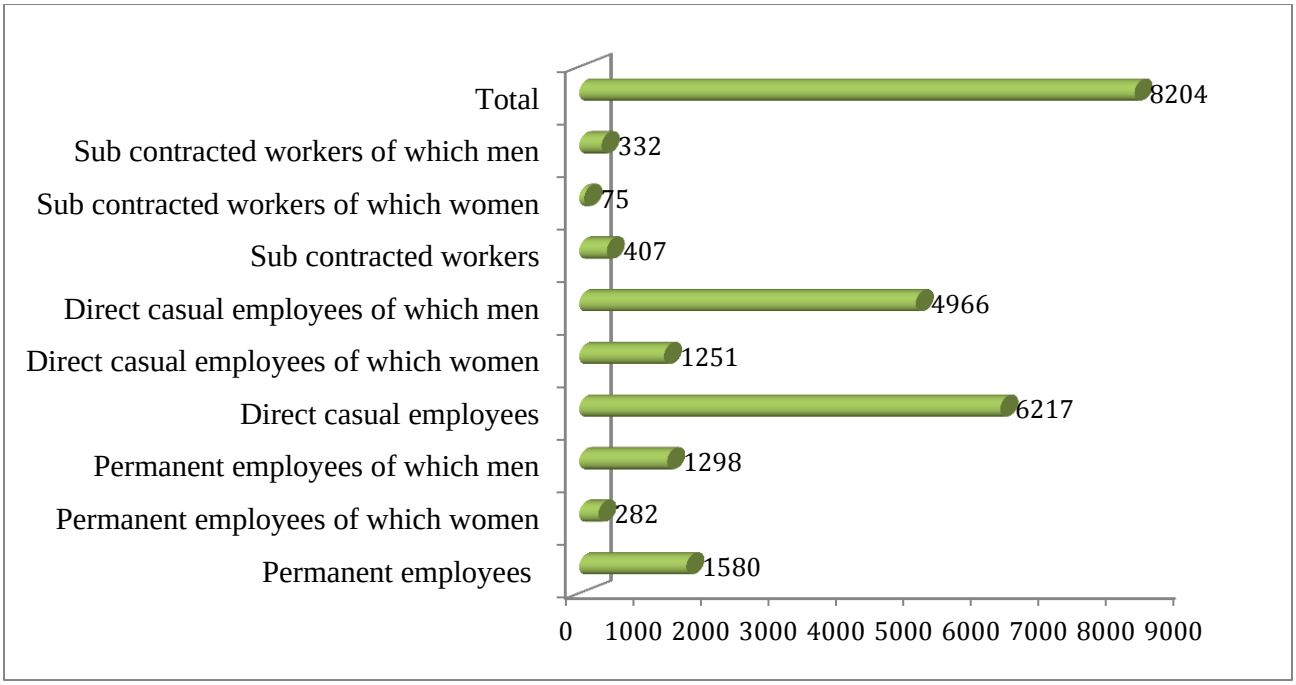
3.2 Employment by Categories of Occupation

3.2.1 Overall Labor Profiles

The survey indicates that the total labor force of the construction sector at the time the study was done was reported to be 5,043 labor units. Due to the fact that the sector depends mainly on casual laborers, the survey indicated that the labor force usually ranges from of 1,580 to 8,204 labor units. These included 19.2% permanent employees, 75.8% direct casual employees and 5% sub contracted employees.

The total number of employees employed within 12 months prior to the study was 8,204 (Figure 4). But at the time of the survey the establishments reported a labor force of 5,043. The reduction in the number was a result of the sector's dependence on direct casual workers that are called on, at times of work existence.

Figure 4: Employees Numbers by Type



The skills set (labor profile) of the sector is composed of managers, construction scientists (graduates in construction courses), liberal professionals (graduates in non-construction courses, technicians (diploma & certificate holders in construction related courses) and artisans (skilled and unskilled labor). The managers accounted for 5.6%, scientists 5.7%, liberal professionals 1.9%, technicians 7.9% and artisans 78.9%. In terms of ratios, for every 1 scientist, there are 1.4 technicians; and for every 1 technician there are 12.2 artisans. Thus the ratio of scientists to technicians to artisans is 1:1.4:12.2, as opposed to

international standards of 1:5:30. The implication is that construction technicians and artisans are still lacking in the industry for efficient and effective performance and competitiveness.

a) Managers

Table 7 indicates the categories of managers in the construction industry. There are 281 managers employed in the sector with majority working as managing directors, construction managers, finance managers and Human resource managers to mention but a few. Women constitute 16.4% of the managers employed in the sector with most of them working as finance managers and managing directors. Expatriates on the other hand constitute 12.8% of the managerial employed in the sector with most working as managing directors.

Table 7: Categories & Numbers of Managers

Occupation Managers	Numbers: Labor Units	Women	Expatriate
Managing directors and chief executives	97	14	13
Construction managers	72	3	8
Finance managers	47	13	3
Human resource managers	21	6	3
Sales and marketing managers	11	1	5
Supply, distribution and related managers	8	3	0
Policy and planning managers	5	0	1
Business services and administration managers not elsewhere classified	5	3	1
Research and development managers	5	0	0
Advertising and public relations managers	4	0	1
Health services managers	3	2	1
Real estate agents and property managers	2	1	0
Retail and wholesale trade managers	1	0	0
Total	**281**	**46**	**36**

b) Scientists/Sector specific Professionals

Table 8 shows the number and categories of construction scientist professionals. There are 286 scientists working in the sector with a majority working as civil engineers, mechanical engineers, building architects and electrical engineers. The sector employs a very minimal number of women with only 14 labor units (4.9%) employed as scientists. Expatriates constitute 16.4% of the scientists in the sector and they are working mainly as civil engineers and mechanical engineers.

Table 8: Number & Categories of Construction Scientists Professionals

Occupation Scientific Professionals	Numbers: Labor Units	Women	Expatriate
Civil engineers	149	8	27
Mechanical engineers	31	0	8
Building architects	30	2	3
Electrical engineers	26	0	6
Engineering professionals not elsewhere classified	17	1	0
Electronics engineers	11	0	0
Environmental engineers	8	2	1
Landscape architects	8	0	2
Town and traffic planners	4	0	0
Cartographers and surveyors	2	1	0
Total	**286**	**14**	**47**

c) Liberal Professionals

Table 9 below shows the number and categories of liberal professionals within the construction establishments visited. There are 98 labor units employed as liberal professionals in the sector. These are mainly accountants and training/staff development professionals. Women constitute 18.4% of the liberal professionals with most working as accountants. Expatriates constitute 5% of the liberal professionals with all of them working as accountants and lawyers.

Table 9: Number & Categories of Liberal Professionals

Occupation Liberal Professionals	Numbers: Labor Units	Women	Expatriate
Accountants	46	16	4
Training and staff development professionals	20	0	0
Employment agents and contractors	9	0	0
Lawyers	8	1	1
Information and communications technology sales professionals	5	0	0
Financial and investment advisers	3	0	0
Financial analysts	3	1	0
Management and organization analysts	1	0	0
Environmental protection professionals	1	0	0
Advertising and marketing professionals	1	0	0
Social work associate professionals	1	0	0
Total	**98**	**18**	**5**

d) Technicians

Table 10 below indicates the number and categories of technicians within the construction establishments visited. There are 397 labor units employed as technicians in the sector, as civil engineering technicians, construction supervisors, electrical engineering technicians, mechanical engineering technicians, electronics engineering technicians and draughts persons dominating the skills areas. Women constitute 4.2% of the technicians with the majority working as civil engineering technicians. Expatriates constitute 18% of the employed technicians with the majority working as electronics engineering technicians, electrical engineering technicians and mechanical engineering technicians.

Table 10: Number & Categories of Technicians in Construction

Occupation Technicians	Numbers: Labor Units	Women	Expatriate
Civil engineering technicians	106	8	8
Construction supervisors	83	1	3
Electrical engineering technicians	74	2	15
Mechanical engineering technicians	55	4	15
Electronics engineering technicians	51	0	30
Draughts persons	25	2	0
Chemical engineering technicians	3	0	0
Total	**397**	**17**	**71**

e) Artisans and Unskilled Support Workers

Table 11 below shows the artisans (skilled and unskilled workers/laborers) in the construction establishments surveyed. As already reported, the sector depends mainly on artisans (casual laborers). They are the majority, with a labor force of 3,981. This includes building construction laborers, stonemasons, odd job persons, civil engineering laborers, house builders, plumbers, carpenters, and lifting truck operators. Women artisans are few, constituting only 4.3% of the labor force. The majority of women are working as building construction laborers, stonemasons and sweepers. Expatriates constitute approximately 9% of the artisan's labor force with majority working as building construction laborers, bricklayers and floor layers and tile setters.

Table 11: Number & Categories of Artisans in Construction

Occupation Artisans	Numbers: Labor Units	Women	Expatriate
Building construction laborers	1228	56	300
Stonemasons, stone cutters, splitters and carvers	1013	20	0
Odd job persons	431	4	0
Sweepers and related laborers	356	49	0

Occupation Artisans	Numbers: Labor Units	Women	Expatriate
Civil engineering laborers	195	4	0
House builders	128	5	0
Concrete placers, concrete finishers and related workers	96	0	0
Bricklayers and related workers	72	0	20
Plumbers and pipe fitters	46	0	1
Lifting truck operators	44	3	4
Security guards	41	1	1
Heavy truck and lorry drivers	40	0	1
Carpenters and joiners	39	0	0
Messengers, package deliverers and luggage porters	37	1	0
Locomotive engine drivers	27	0	0
Roofers	22	5	0
Floor layers and tile setters	18	0	13
Secretaries (general)	17	7	1
Plasterers	15	2	0
Welders and flame-cutters	13	0	8
Painters and related workers	9	0	0
Receptionists (general)	8	6	0
Insulation workers	7	0	0
Building structure cleaners	7	0	0
Building and related electricians	7	0	0
Electrical mechanics and fitters	7	0	0
Crane, hoist and related plant operators	6	0	4
Interior designers and decorators	5	0	0
Information and communications technology operations technicians	5	0	0
Building frame and related trades workers not elsewhere classified	5	0	0
Metal working machine tool setters and operators	5	0	0
Earthmoving and related plant operators	5	0	0
Office supervisors	4	2	0
Administrative and executive secretaries	4	2	1
General office clerks	4	2	0
Legal secretaries	3	2	0
Glaziers	3	0	3
Spray painters and varnishers	3	0	0
Electrical and electronic equipment assemblers	3	0	0
Building caretakers	1	0	0
Electronics mechanics and servicers	1	0	0
Mechanical machinery assemblers	1	0	0
Total	**3,981**	**171**	**357**

3.3 Labor Force by sub-Sector

3.3.1 Site preparation

The sub sector employs 3260 labor units, with 80% working in large establishments, 18% in medium establishments, and 1% in small and micro establishments. Women constitute 7% of the labor force whereas expatriates or foreigners constitute 15%.

a) *Large Establishment*- The large establishments' employ 2, 599 labor units, of which 79.1% labor units are working as artisans: namely building construction laborers and civil engineering laborers (Table 11). Women constitute approximately 6% of the labor force, whereas expatriates constitute 18% of the labor force with 300 working as building construction laborers. This constitutes 28.2% of the laborers.

Table 12: Large Establishments - Site Preparation Labor Force

Occupation	Existing No	Women	Expatriates
Managers			
Managing directors and chief executives	31	7	4
Finance managers	28	7	2
Human resource managers	12	4	2
Policy and planning managers	1	0	1
Business services and administration managers not elsewhere classified	3	1	1
Sales and marketing managers	2	1	0
Advertising and public relations managers	1	0	1
Research and development managers	3	0	0
Construction managers	24	0	6
Supply, distribution and related managers	7	3	0
Health services managers	1	0	1
Sub-total Managers	***113***	***23***	***18***
Scientists Professionals			
Civil engineers number	91	6	23
Mechanical engineers number	17	0	8
Engineering professionals not elsewhere classified	5	1	0
Electrical engineers	11	0	5
Electronics engineers	4	0	0
Building architects	14	1	2
Landscape architects	7	0	2
Town and traffic planners	0	0	0
Cartographers and surveyors	1	1	0
Sub-total Scientists professionals	***150***	***9***	***40***
Liberal Professionals			
Accountants	18	8	1
Financial and investment advisers	2	0	0
Financial analysts	1	0	0
Management and organization analysts	1	0	0
Lawyers	4	1	1

Sub-total Liberal professionals	**26**	***8***	***2***
Technicians			
Civil engineering technicians	65	7	0
Electrical engineering technicians	45	1	15
Electronics engineering technicians	39	0	21
Mechanical engineering technicians	39	3	15
Draughts persons	3	1	0
Construction supervisors	52	0	2
Employment agents and contractors	1	0	0
Administrative and executive secretaries	3	1	1
Interior designers and decorators	4	0	0
Information and communications technology operations technicians	3	0	0
Sub-total Technicians	**254**	***13***	***54***
Artisans			
Secretaries (general)	7	5	1
Receptionists (general)	5	3	0
Security guards	28	0	0
House builders	72	5	0
Bricklayers and related workers	50	0	20
Stonemasons, stone cutters, splitters and carvers	3	20	0
Concrete placers, concrete finishers and related workers	45	0	0
Carpenters and joiners	35	0	0
Building frame and related trades workers not elsewhere classified	5	0	0
Roofers	3	5	0
Floor layers and tile setters	13	0	13
Plasterers	5	2	0
Glaziers	3	0	3
Plumbers and pipe fitters	30	0	1
Painters and related workers	4	0	0
Spray painters and varnishers	3	0	0
Welders and frame-cutters	8	0	8
Metal working machine tool setters and operators	5	0	0
Building and related electricians	6	0	0
Electrical mechanics and fitters	7	0	0
Electronics mechanics and servicers	1	0	0
Electrical and electronic equipment assemblers	1	0	0
Locomotive engine drivers	25	0	0
Heavy truck and lorry drivers	32	0	1
Crane, hoist and related plant operators	4	0	4
Lifting truck operators	4	0	4
Civil engineering labors	153	2	0
Building construction laborers	1057	42	300
Sweepers and related laborers	38	28	0
Messengers, package deliverers and luggage porters	3	1	0
Odd job persons	401	0	0
Sub-total Artisans	***2,056***	***114***	***355***
Grand Total	**2,599**	**167**	**469**

b) *Medium Establishments*- The medium establishments' employ 587 labor units, with most labor units working as artisans namely building construction laborers and house builders (Table 13). Women constitute approximately 9.7% of the labor force, whereas expatriates constitute 2.5% of the labor force working mostly as managers.

Table 13: Medium Establishment – Site Preparation Labor Force

Occupation	Existing No	Women	Expatriates
Managing directors and chief executives	27	2	5
Finance managers	15	3	1
Human resource managers	5	1	1
Policy and planning managers	1	0	0
Sales and marketing managers	3	0	1
Construction managers	15	0	0
Civil engineers	43	1	4
Mechanical engineers	4	0	0
Engineering professionals not elsewhere classified	5	0	0
Electrical engineers	9	0	0
Electronics engineers	6	0	0
Building architects	6	1	1
Cartographers and surveyors	1	0	0
Accountants	11	5	0
Training and staff development professionals	20	0	0
Lawyers	3	0	0
Civil engineering technicians	17	0	0
Electrical engineering technicians	9	0	0
Electronics engineering technicians	1	0	0
Mechanical engineering technicians	6	0	0
Draughts persons	1	0	0
Construction supervisors	23	0	1
Office supervisors	2	0	0
Legal secretaries	1	1	0
Administrative and executive secretaries	1	1	0
Interior designers and decorators	1	0	0
Information and communications technology operations technicians	1	0	0
General office clerks	2	2	0
Secretaries (general)	4	1	0
Receptionists (general)	2	2	0
Security guards	6	0	1
House builders	35	0	0
Bricklayers and related workers	22	0	0
Stonemasons, stone cutters, splitters and carvers	10	0	0
Concrete placers, concrete finishers and related workers	5	0	0
Carpenters and joiners	4	0	0
Roofers	4	0	0
Floor layers and tile setters	5	0	0
Plasterers	10	0	0
Plumbers and pipe fitters	3	0	0
Painters and related workers	5	0	0

Building and related electricians	1	0	0
Earthmoving and related plant operators	4	0	0
Crane, hoist and related plant operators	2	0	0
Civil engineering laborers	5	0	0
Building construction laborers	143	14	0
Sweepers and related laborers	36	21	0
Messengers, package deliverers and luggage porters	31	0	0
Odd job persons	6	2	0
Total	**587**	**57**	**15**

c) *Small Establishments*- The small establishments' employ 39 labor units, with most labor units working as artisans namely building construction laborers (Table 14). Women constitute approximately 5% of the labor force, whereas no expatriates are working in the small establishment.

Table 14: Small Establishments – Site Preparation Labor Force

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	6	0	0
Accountants	2	0	0
Civil engineering technicians	1	0	0
Electrical engineering technicians	1	0	0
Secretaries (general)	2	1	0
Security guards	3	1	0
House builders	15	0	0
Roofers	5	0	0
Insulation workers	3	0	0
Plumbers and pipe fitters	1	0	0
Total	**39**	**2**	**0**

d) Micro Establishments: - The micro establishments' employ 35 labor units, with most labor units working as artisans namely building construction laborers and house builders. There are no women and expatriates employed in the micro establishments.

Table 15: Micro Establishments – Site Preparation Labor Force

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	2	0	0
Civil engineers	2	0	0
Accountants	1	0	0
House builders	6	0	0
Building construction laborers	24	0	0
Total	**35**	**0**	**0**

3.3.2 PLUMBING SUB-SECTOR

The Plumbing sub sector employs 227 labor units, with 72% working in large establishments, 10% in medium establishments, 3% in small and 15% in micro establishments. Women constitute 7.9% of the labor force whereas expatriates or foreigners constitute 1.3%.

a) *Large Establishments: - The* large establishments' employ 164 labor units, with most labor units working as technicians namely electrical engineering technicians and electrical engineering technicians to mention but a few (Table 16). Women constitute approximately 11% of the labor force, whereas expatriates constitute 1.83%.

Table 16: Large Establishments – Plumbing sub-Sector Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	5	0	0
Finance managers	2	2	0
Human resource managers	4	2	0
Policy and planning managers	1	0	1
Sales and marketing managers	1	0	0
Construction managers	22	3	2
Health services managers	2	2	0
Civil engineers	2	0	0
Mechanical engineers	4	0	0
Building architects	3	0	0
Accountants	4	2	0
Civil engineering technicians	23	5	0
Electrical engineering technicians	31	1	0
Mechanical engineering technicians	4	0	0
Draughts persons	3	1	0
Construction supervisors	12	0	0
Legal and related associate professionals	1	0	0
Information and communications technology operations technicians	3	0	0
Insulation workers	4	0	0
Plumbers and pipe fitters	25	0	0
Civil engineering laborers	5	0	0
Building construction laborers	3	0	0
Total	**164**	**18**	**3**

b) *Medium*: - The Medium establishments employ 23 labor units in plumbing subsector. Most of the labor units are working as technicians though they are evenly distributed across the different occupation (Table 17). There are no women and expatriates employed by the medium establishments.

Table 17: Medium Establishments – Plumbing sub-Sector Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	3	0	0
Construction managers	1	0	0
Civil engineers	2	0	0
Environmental engineers	4	0	0
Mechanical engineers	1	0	0
Electrical engineers	2	0	0
Electronics engineers	2	0	0
Accountants	1	0	0
Civil engineering technicians	2	0	0
Electrical engineering technicians	4	0	0
Plumbers and pipe fitters	1	0	0
Total	**23**	**0**	**0**

c) *Small Establishments*: - The small establishments' employ 6 labor units, with most labor units working as managers. There are no women and expatriates employed in the small establishments.

Table 18: Small Establishment – Plumbing sub-Sector Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	4	0	0
Accountants	1	0	0
Electrical engineering technicians	1	0	0
Total	**6**	**0**	**0**

d) *Micro Establishments*: - The micro establishments' employ 34 labor units, with most labor units working as artisans (Table 19). There are no women and expatriates employed by the micro establishments in the plumbing sub-sector.

Table 19: Micro Establishments – Plumbing sub-sector Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	1	0	0
Civil engineers	2	0	0
Accountants	1	0	0
House builders	6	0	0
Building construction laborers	24	0	0
Total	**34**	**0**	**0**

3.3.3 Construction Sales Sub-Sector

This sub-sector with 6 labor units employs the least labor force in the construction sector. Only small and micro establishments are fully engaged in it. There are only 2 women employed by the subsector and no expatriates as indicated in Table 19 and 20 below.

Table 20: Small Establishments – Construction labor unit

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	1	0	0
Total	1	0	0

Table 21: Micro Establishments – Construction labor unit

Micro Establishments – Construction Sales labor unit Occupation	Existing	Women	Expatriates
Managing directors and chief executives	5	2	0
Total	5	2	0

3.3.4 Building Construction Sub-Sector

The Construction of Buildings sub sector employs 538 labor units, with 93% working in large establishments, 6% in medium establishments, 0.8% in small and 0.2% in micro establishments. Women constitute 9.5% of the labor force whereas expatriates or foreigners constitute 3.5%.

a) *Large Establishments*: - The large establishments' employ 501 labor units, with most of them working as artisans (Table 22). 329 labor units are working as building construction laborers. Other labor units are evenly distributed between technicians and scientists. Women constitute approximately 9.4% of the labor force with 63.8% of them working as building construction laborers, whereas expatriates constitute 3.4%, with 58.8% working as civil engineers.

Table 22: Large Establishments- Construction of Buildings sub-Sector Labor Unit

Occupation	Existing	Women	Expatriates
Managers			
Managing directors and chief executives	7	2	0
Finance managers	14	4	0
Human resource managers	3	1	0
Sales and marketing managers	1	1	0
Research and development managers	3	0	0
Sub-total Managers	***28***	***8***	***0***
Scientists Professionals			
Civil engineers	31	2	10
Mechanical engineers	5	0	2
Electrical engineers	1	0	1
Building architects	2	0	1
Sub-total Scientists	***39***	***2***	***14***

Technicians			
Civil engineering technicians	15	0	0
Mechanical engineering technicians	15	0	0
Construction supervisors	7	0	2
Sub-total Technicians	***37***	***0***	***2***
Liberal Professionals			
Accountants	4	2	0
Administrative and executive secretaries	1	0	0
Sub-total Liberal professions	***5***	***2***	***0***
Artisans			
Secretaries (general)	4	3	1
Receptionists (general)	2	2	0
Security guards	5	0	0
Carpenters and joiners	8	0	0
Building frame and related trades workers not elsewhere classified	5	0	0
Roofers	3	0	0
Painters and related workers	4	0	0
Locomotive engine drivers	20	0	0
Heavy truck and lorry drivers	12	0	0
Building construction laborers	329	30	0
Sub-total Artisans	***392***	***35***	***1***
Total	**501**	**47**	**17**

b) *Medium Establishments*: - The medium establishments' employ 33 labor units, with most of them working as training and staff development scientists (Table 23). Otherwise the labor units are evenly distributed between managers, technicians and scientists. Women constitute approximately 12.1% of the labor force with of them working as accountants, whereas expatriates constitute 3% of the labor force in this sub-sector.

Table 23: Medium Establishment – Construction of Building Sub-Sector Labor Unit

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	2	1	1
Human resource managers	1	0	0
Engineering professionals not elsewhere classified	3	0	0
Accountants	4	3	0
Training and staff development professionals	20	0	0
Civil engineering technicians	1	0	0
Locomotive engine drivers	2	0	0
Total	**33**	**4**	**1**

Both small and micro establishment employ 4 labor units who are all doing administrative work. There are no women and expatriates employed by the two establishments' categories (Table 24 and 25).

Table 24: Small Establishments – Construction of Building

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	2	0	0
Accountants number	1	0	0
Total	**3**	**0**	**0**

Table 25: Micro Establishments – Construction of Building

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	1	0	0
Total	1	0	0

3.3.5 Utility Projects Construction Sub Sector

The Construction of utility project sub-sector employs 775 labor units, with 92.4% working in large establishments, 6.5% in medium establishments, 10% in small and 0.1% in micro establishments respectively. Women constitute 6.7% of the labor force whereas expatriates or foreigners constitute 58.2%.

a) *Large Establishments*: - The large establishments' employ 716 labor units, with 66.4% of labor units working as artisans (Table 26). 304 labor units are work as building construction laborers. Managers constitute 8.6%, Scientists professionals 5.6%, Technicians 17.9%, and Liberal professionals 1.5% of the labor force. Women constitute approximately 6.8% of the labor force with 40.8% of them working as stone masons; whereas expatriates constitute 62% of the labor force, with 67.6% working as construction laborers.

Table 26: Large Establishments – Construction of Utilities Sub-Sector Labor Units

Occupation	Existing	Women	Expatriate
Managers			
Managing directors and chief executives	10	0	3
Finance managers	5	3	1
Human resource managers	6	2	2
Policy and planning managers number	1	0	1
Business services and administration managers not elsewhere classified	1	0	1
Sales and marketing managers	1	0	0
Advertising and public relations managers	1	0	1
Construction managers	33	3	8
Health services managers	3	2	1
Retail and wholesale trade managers	1	0	0
Sub-total Managers	***62***	***10***	***18***
Scientists Professionals			
Civil engineers	23	0	11
Environmental engineers	1	1	0
Mechanical engineers	8	0	4
Electrical engineers	5	0	3

Building architects	3	0	0
Sub-total Scientists professionals	***40***	***1***	***18***
Liberal Professionals			
Accountants	5	3	1
Lawyers	1	0	1
Administrative and executive secretaries number	1	0	1
Legal and related associate professionals number	1	0	0
Information and communications technology operations technicians number	3	0	0
Sub-total Liberal professionals	***11***	***3***	***0***
Technicians			
Civil engineering technicians	24	6	0
Electrical engineering technicians	36	1	15
Electronics engineering technicians	31	0	21
Mechanical engineering technicians	19	0	15
Chemical engineering technicians	3	0	0
Draughts persons	3	1	0
Construction supervisors	12	0	0
Sub-total Technicians	***128***	***7***	***51***
Artisans			
Secretaries (general)	1	1	0
Receptionists (general)	1	1	0
Building caretakers	1	0	0
Security guards	13	0	0
Bricklayers and related workers	20	0	20
Stonemasons, stone cutters, splitters and carvers	3	20	0
Floor layers and tile setters	13	0	13
Insulation workers	4	0	0
Glaziers	3	0	3
Plumbers and pipe fitters	17	0	1
Welders and flame-cutters	8	0	8
Mechanical machinery assemblers	1	0	0
Electrical and electronic equipment assemblers	2	0	0
Heavy truck and lorry drivers number	1	0	1
Crane, hoist and related plant operators	4	0	4
Lifting truck operators	44	3	4
Civil engineering laborers	33	2	0
Building construction laborers	304	0	300
Messengers, package deliverers and luggage porters number	2	0	0
Sub-total Artisans	***475***	***28***	***357***
Total	**716**	**49**	**444**

b) *Medium Establishments:* - The medium establishments' employ 50 labor units, with most labor units working as artisans namely building construction laborers (Table 27). Otherwise the labor units are evenly distributed between technicians and scientists and a minimal proportion working as liberal professionals. Women constitute approximately 6% of the labor force whereas expatriates constitute 12%, of the labor force.

Table 27: Medium Establishments - Construction of Utilities Sub-Sector Labor Units

Occupation	Existing	Women	Expatriate
Managing directors and chief executives	6	0	2
Finance managers	1	0	0
Human resource managers	1	0	0
Construction managers	2	0	0
Civil engineers	4	0	1
Mechanical engineers	4	0	0
Building architects	1	0	0
Accountants	4	1	3
Civil engineering technicians	4	0	0
Construction supervisors	3	0	0
Legal secretaries	2	2	0
Information and communications technology operations technicians	1	0	0
Civil engineering laborers	2	0	0
Building construction laborers	10	0	0
Sweepers and related laborers	3	0	0
Messengers, package deliverers and luggage porters	2	0	0
Total	**50**	**3**	**6**

c) Both *small and micro establishments* employ 9 labor units, management professionals and scientists dominate the sectors, and there are no women and expatriates employed by establishments, (Tables 28 and 29).

Table 28: Small Establishments - Construction of Utilities Sub-Sector Labor Units

Occupation	Existing	Women	Expatriate
Managing directors and chief executives	3	0	0
Civil engineers	2	0	0
Environmental engineers	1	0	0
Accountants	1	0	0
Civil engineering technicians	1	0	0
Total	**8**	**0**	**0**

Table 29: Micro Establishments - Construction of Utilities Sub-Sector Labor Units

Occupation	Existing	Women	Expatriate
Managing directors and chief executives	1	0	0
Total	**1**	**0**	**0**

3.3.6 Real Estate Subsector

The Real Estate sub sector employs 137 labor units, with 60.6% working in large establishments, 35% in medium establishments, 3.65% in small and 0.73% in micro establishments respectively. Women constitute 8% of the labor force whereas expatriates or foreigners constitute 0.7%.

a) *Large Establishments*: - The large establishments' employ 83 labor units, with most labor units working as technicians namely civil engineering technicians, electrical engineering technicians, construction supervisors and plumbers (Table 30). Women constitute approximately 9.6% of the labor force with 62.5% of them working as civil engineering technicians, whereas only one labor unit is working as an expatriates, the expatriate is working as a policy and planning manager.

Table 30: Large Establishments – Real Estate sub-Sector Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	3	0	0
Human resource managers	1	1	0
Policy and planning managers	1	0	1
Sales and marketing managers	1	0	0
Construction managers	2	0	0
Civil engineers	2	0	0
Building architects	3	0	0
Accountants	3	2	0
Civil engineering technicians	19	5	0
Electrical engineering technicians	17	0	0
Construction supervisors	12	0	0
Information and communications technology operations technicians	3	0	0
Plumbers and pipe fitters number	16	0	0
Total	**83**	**8**	**1**

b) *Medium Establishments:* - The medium establishments' employ 48 labor units, with most labor units working as artisans, namely building construction laborers (Table 28). Women constitute approximately 8.3% whereas there are no expatriates working in the sub-sector.

Table 31: Medium Establishments – Real Estate Sub-Sector Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	3	0	0
Finance managers	1	0	0
Human resource managers	1	0	0
Construction managers	4	0	0
Accountants	1	1	0
Receptionists (general)	1	1	0
Civil engineering laborers	5	0	0
Building construction laborers	22	0	0
Sweepers and related laborers	3	0	0
Messengers, package deliverers and	2	0	0

luggage porters			
Odd job persons	5	2	0
Total	**48**	**4**	**0**

c) As indicated in Tables 32 and 33, the *small and micro establishments* employ only 6 labor units who are all doing management work, although the managers were the technical experts for the respective establishments.

Table 32: Small Establishments – Real Estate Sub-Sector Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	3	0	0
Accountants	1	0	0
Secretaries (general)	1	0	0
Total	**5**	**0**	**0**

Table 33: Micro Establishments – Real Estate Sub-Sector Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	1	0	0
Total	**1**	**0**	**0**

3.3.7 Demolition Sub- Sector

The Demolition sub sector employs 232 labor units, with 84.9% working in large establishments, 13.4% in medium establishments, 1.29% in small and 0.43% in micro establishments. Women constitute 13.4% of the labor force whereas expatriates or foreigners constitute 4.3%.

a) *Large Establishments:* - The large establishments of the sub-sector employ 197 labor units (Table 34). There is a relatively even distribution between technicians and managers. Women constitute approximately 13.7% of the labor force with 25.9% of them working as civil engineering technicians, whereas expatriates constitute 3% of the labor force.

Table 34: Large Establishments - Demolition Subsector Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	5	0	0
Finance managers	3	2	0
Human resource managers	5	3	0
Policy and planning managers	1	0	1
Sales and marketing managers	1	0	0
Construction managers	22	3	2
Health services managers	2	2	0
Civil engineers	6	1	1
Mechanical engineers	7	0	2

Building architects	3	0	0
Accountants	4	3	0
Civil engineering technicians	29	7	0
Electrical engineering technicians	28	2	0
Mechanical engineering technicians	9	2	0
Draughts persons	6	2	0
Construction supervisors	12	0	0
Legal and related associate professionals	1	0	0
Interior designers and decorators	1	0	0
Information and communications technology operations technicians	3	0	0
Security guards	2	0	0
Insulation workers	4	0	0
Plumbers and pipe fitters	16	0	0
Spray painters and varnishers	3	0	0
Building and related electricians	4	0	0
Heavy truck and lorry drivers	3	0	0
Civil engineering laborers	8	0	0
Building construction laborers	5	0	0
Sweepers and related laborers	3	0	0
Odd job persons number	1	0	0
Total	**197**	**27**	**6**

b) *Medium Establishments:* -The medium establishments in the sub-sector employ 31 labor units, with most labor units working as artisans namely building construction laborers (Table 35). Both Women and expatriates constitute approximately 12.9% of the labor force.

Table 35: Medium Establishments - Demolition Subsector Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	2	0	0
Sales and marketing managers	4	0	4
Construction managers	3	0	0
Accountants	1	1	0
Receptionists (general)	1	1	0
Civil engineering laborers	3	0	0
Building construction laborers	12	0	0
Odd job persons	5	2	0
Total	**31**	**4**	**4**

The employees employed by small and micro establishments are 4 labor units and they are all working as management staff and accountant (Table 36 and 37).

Table 36: Small Establishments - Demolition Sub Sector Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	2	0	0
Accountants	1	0	0
Total	**3**	**0**	**0**

Table 37: Micro Establishments - Demolition Sub Sector Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	1	0	0
Total	**1**	**0**	**0**

3.3.8 Electrical Instillation

The sub sector employs 232 labor units, with 84.9% working in large establishments, 13.4% in medium establishments, 1.29% in small and 0.43% in micro establishments respectively. Women constitute 13.4% of the labor force whereas expatriates or foreigners constitute 4.3%.

a) *Large Establishments*: - As indicated in Table 38, the large establishments in the sub-sector employ 230 labor units, with most labor units working as technicians namely civil engineering technicians, electrical engineering technicians and plumbers to mention but a few. Women constitute approximately 11.7% of the labor force whereas expatriates constitute 2.6%.

Table 38: Large Establishments – Electrical Installation sub-Sector Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	7	0	0
Finance managers	3	2	0
Human resource managers	5	3	0
Policy and planning managers	1	0	1
Sales and marketing managers	1	0	0
Construction managers	22	3	2
Health services managers	2	2	0
Civil engineers	9	1	1
Mechanical engineers	7	0	2
Electrical engineers	2	0	0
Electronics engineers	2	0	0
Building architects	3	0	0
Accountants	6	3	0
Civil engineering technicians	30	7	0
Electrical engineering technicians	39	2	0
Electronics engineering technicians	1	0	0
Mechanical engineering technicians	9	2	0
Draughts persons	6	2	0
Construction supervisors	12	0	0
Legal and related associate professionals	1	0	0
Interior designers and decorators	1	0	0
Information and communications technology operations technicians	3	0	0
Security guards	2	0	0
Insulation workers	4	0	0
Plumbers and pipe fitters	25	0	0
Spray painters and varnishers	3	0	0
Building and related electricians	4	0	0
Heavy truck and lorry drivers	3	0	0

Civil engineering laborers	8	0	0
Building construction laborers	5	0	0
Sweepers and related laborers	3	0	0
Odd job persons	1	0	0
Total	**230**	**27**	**6**

b) *Medium Establishments*: -The medium establishments employ 52 labor units, with most of them working as technicians namely electronics engineering technicians. Otherwise the labor units are evenly distributed between technicians and scientists. There are no women employed by medium establishments, whereas expatriates constitute 19.2%, with 90% working as electronics engineering technicians.

Table 39: Medium Establishments – Electrical Installation Sub-Sector Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	5	0	0
Advertising and public relations managers	3	0	0
Construction managers	2	0	0
Civil engineers	5	0	0
Mechanical engineers	1	0	0
Engineering professionals not elsewhere classified	4	0	0
Electrical engineers	4	0	1
Electronics engineers	3	0	0
Accountants	2	0	0
Lawyers	1	0	0
Civil engineering technicians	3	0	0
Electrical engineering technicians	2	0	0
Electronics engineering technicians	9	0	9
Employment agents and contractors	7	0	0
Plumbers and pipe fitters	1	0	0
Total	**52**	**0**	**10**

c) *Small Establishments:* - The small establishments employ 10 labor units, with most labor units working as management staff. Otherwise the labor units are evenly distributed between technicians and scientists and liberal professionals. There are no women employed in the small establishments, whereas only a single labor unit is employed as an expatriate and this is working as a manager.

Table 40: Small Establishments – Electrical Installation Sub-Sector Labor Units

Size of Firm	Small	Women	Expatriates
Managing directors and chief executives	4	0	1
Civil engineers	1	0	0
Electronics engineers	1	0	0

Accountants	1	0	0
Electrical engineering technicians	1	0	0
Construction supervisors	1	0	0
Legal secretaries	1	0	0
Total	**10**	**0**	**1**

d) *Micro Establishments:* - The micro establishments' employ 35 labor units, with most of them working as artisans namely building construction laborers. There is only one woman employed in the micro establishments and works as a manager and there are no expatriates are employed in the micro establishments.

Table 41: Micro Establishments – Electrical Installation Sub-Sector Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	2	1	0
Civil engineers	2	0	0
Accountants	1	0	0
House builders	6	0	0
Building construction laborers	24	0	0
Total	35	1	0

3.3.9 Construction of Other Civil Engineering Projects

This sub sector employs 361 labor units, with 39.6% in medium establishments, 1.38% in small and 59% in micro establishments respectively. Women constitute 8.3% of the labor force whereas foreigners constitute 7.5%.

a) *Medium Establishments*: - The medium establishments employ 143 labor units, with most of them working as artisans namely building construction laborers and house builders. Women constitute approximately 10.5% of the labor force with 63.8% of them working as building construction laborers, whereas expatriates constitute 6.3% (Table 42).

Table 42: Medium Establishments – Construction of other Civil Engineering Labor Units

Size of Firm	Medium	Women	Expatriates
Managing directors and chief executives	3	1	2
Finance managers	6	2	1
Human resource managers	1	1	1
Policy and planning managers	1	0	0
Sales and marketing managers	1	0	1
Civil engineers	12	0	3
Electrical engineering technicians	2	0	0
Electronics engineering technicians	1	0	0
Mechanical engineering technicians	6	0	0
Construction supervisors	15	0	1
Office supervisors	1	0	0
Legal secretaries	0	0	0
Administrative and executive secretaries	1	1	0

Security guards	4	0	0
House builders	20	0	0
Bricklayers and related workers	2	0	0
Carpenters and joiners	2	0	0
Roofers	2	0	0
Painters and related workers	5	0	0
Welders and flame-cutters	2	0	0
Earthmoving and related plant operators	4	0	0
Crane, hoist and related plant operators number	2	0	0
Building construction laborers number	50	10	0
Total	**143**	**15**	**9**

b) *Small Establishments:* - The small establishments employ 3 labor units, 2 work as management staff and one as an accountant, there are no women and expatriates working in the small establishments (Table 43).

Table 43: Small Establishment – Electrical Installation Sub-Sector Labor Units

Size of Firm	Small	Women	Expatriates
Managing directors and chief executives	2	0	0
Accountants	1	0	0
Total	3	0	0

c) *Micro Establishments:* - The micro establishments employ 213 labor units, with most labor units working as artisans namely building construction laborers, carpenter and brick layers. Women constitute approximately 5.6% of the labor force whereas expatriates constitute 8.4% (Table 44).

Table 44: Micro Establishment – Electrical Installation Sub-Sector Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	4	1	0
Finance managers	9	2	1
Human resource managers	2	1	0
Business services and administration managers not elsewhere classified	2	1	0
Construction managers	1	0	0
Supply, distribution and related managers	2	1	0
Civil engineers	23	2	10
Mechanical engineers	2	0	2
Engineering professionals not elsewhere classified	5	1	0
Electrical engineers	3	0	2
Building architects	3	0	2
Accountants	1	0	0
Civil engineering technicians	6	0	0
Electrical engineering technicians	1	0	0
Construction supervisors	5	0	0

Administrative and executive secretaries	1	0	0
Secretaries (general)	2	2	1
Receptionists (general)	1	1	0
Security guards	2	0	0
Bricklayers and related	25	0	0
Carpenters and joiners	30	0	0
Roofers	3	0	0
Painters and related workers	4	0	0
Electrical mechanics and fitters	5	0	0
Locomotive engine drivers	1	0	0
Building construction laborers	70	0	0
Total	**213**	**12**	**18**

3.3.10 Other Construction Instillation Sub-Sector

The sub sector employs 503 labor units, with 85.7% working in large establishments, 5.6% in medium establishments, 1.98% in small and 6.75% in micro establishments. Women constitute 5.6% of the labor force whereas foreigners constitute 3.2%.

a) *Large Establishments:* - The large establishments employ 413 labor units, with most of them working as artisans namely building construction laborers, concrete placers and technicians namely construction supervisors (Table 44). Women constitute approximately 6.5% of the labor force, whereas expatriates working in the large establishments constitute approximately 0.7% of the total labor force.

Table 45: Large Establishments – Other Construction Installation Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	7	1	0
Finance managers	3	2	0
Human resource managers	5	3	0
Policy and planning managers	1	0	1
Sales and marketing managers	1	0	0
Construction managers	23	3	2
Health services managers	2	2	0
Civil engineers	7	0	0
Mechanical engineers	4	0	0
Electrical engineers	2	0	0
Electronics engineers	2	0	0
Building architects	2	0	0
Accountants	4	1	0
Civil engineering technicians	20	3	0
Electrical engineering technicians	26	1	0
Electronics engineering technicians	1	0	0
Mechanical engineering technicians	4	0	0
Draughts persons	3	1	0
Construction supervisors	38	0	0
Legal and related associate professionals	1	0	0
Information and communications	2	0	0

technology operations technicians			
Security guards number	2	0	0
Concrete placers, concrete finishers and related workers	40	0	0
Insulation workers	4	0	0
Plumbers and pipe fitters	19	0	0
Civil engineering laborers	5	0	0
Building construction laborers	203	10	0
Total	**431**	**27**	**3**

b) *Medium Establishments:* - The medium establishments employ 28 labor units, with most of them working as technicians namely civil engineering technicians to mention but a few (Table 46). Women constitute approximately 3.4% of the labor force whereas expatriates constitute 42.8% of the labor force working in the medium establishments.

Table 46: Medium Establishments – Other Construction Installation Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	4	0	1
Construction managers	1	0	0
Civil engineers	3	0	0
Electrical engineers	1	0	0
Electronics engineers	1	0	0
Accountants	4	0	3
Lawyers	1	0	0
Civil engineering technicians	10	0	8
Electrical engineering technicians	1	0	0
Legal secretaries	1	1	0
Plumbers and pipe fitters	1	0	0
Total	**28**	**1**	**12**

c) *Small Establishments*: - The small establishments employ 10 labor units, with most of them working as management stuff, otherwise the labor units are evenly distributed amongst the scientists and technicians (Table 47). There are now women employed by the small establishments and only one labor unit is employed as an expatriate.

Table 47: Small Establishments – Other Construction Installation Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	4	0	1
Civil engineers	1	0	0
Electronics engineers	1	0	0
Accountants	1	0	0
Electrical engineering technicians	1	0	0
Construction supervisors	1	0	0
Legal secretaries	1	0	0
Total	**10**	**0**	**1**

d) *Micro Establishment:* - The micro establishments employ 34 labor units, with most of them working as artisans namely building construction laborers, and house builders to mention but a few (Table 48). There are no women and expatriates working the micro establishments.

Table 48: Micro Establishments – Other Construction Installation Labor Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	1	0	0
Civil engineers	2	0	0
Accountants	1	0	0
House builders	6	0	0
Building construction laborers	24	0	0
Total	**34**	**0**	**0**

3.3.11 Other Specialised Construction Activities Sub- Sector

The sub sector employs 503 labor units, with 85.7% working in large establishments, 5.6% in medium establishments, 2% in small and 6.76 % in micro establishments. Women constitute 5.6% of the labor force whereas expatriates or foreigners constitute 3.2%.

a) *Large Establishments*: - The large establishments employ 196 labor units, with most of them working as artisans namely odd persons and technicians namely as civil engineering technicians and electrical engineering technicians to mention but a few. Women constitute 12.8% of the labor force whereas expatriates constitute 2.5% of the labor force (Table 49).

Table 49: Large Establishments – Other Specialized Construction Activities

Occupation	Existing	Women	Expatriate
Managing directors and chief executives	5	0	1
Finance managers	3	2	0
Human resource managers	4	2	0
Policy and planning managers	1	0	1
Business services and administration managers not elsewhere classified	2	2	0
Sales and marketing managers	1	0	0
Research and development managers	2	0	0
Construction managers	26	3	2
Health services managers	2	2	0
Civil engineers	5	1	0
Environmental engineers	1	1	1
Mechanical engineers	6	0	0
Building architects	5	0	0
Landscape architects	1	0	0
Accountants	4	2	0
Financial analysts	2	1	0
Civil engineering technicians	24	5	0
Electrical engineering technicians	22	1	0
Mechanical engineering technicians	5	0	0
Draughts persons	4	1	0

Occupation	Existing	Women	Expatriate
Construction supervisors	13	0	0
Legal and related associate professionals	1	0	0
Social work associate professionals	1	0	0
Information and communications technology operations technicians	3	0	0
Security guards	1	0	0
Insulation workers	4	0	0
Plumbers and pipe fitters	16	0	0
Civil engineering laborers	5	0	0
Building construction laborers	3	0	0
Odd job persons	24	2	0
Total	**196**	**25**	**5**

b) *Medium Establishments*: - The medium establishments employ 33 labor units, with an even distribution across occupations within managers, technicians and scientists. The artisans constitute the least proportion of the labor force. Women constitute 18% of the labor force whereas expatriates constitute 6% of the labor force (Table 49).

Table 50: Medium Establishments – Other Specialized Construction Activities

Occupations	Existing	Women	Expatriate
Managing directors and chief executives	3	0	1
Finance managers	1	1	0
Construction managers	1	0	0
Civil engineers	1	0	1
Electrical engineers	5	0	0
Accountants	2	0	0
Electronics engineering technicians	2	0	0
Mechanical engineering technicians	5	1	0
Construction supervisors	4	1	0
Office supervisors	2	2	0
Legal secretaries	1	1	0
Secretaries (general)	1	0	0
Security guards	3	0	0
Sweepers and related laborers	2	0	0
Total	**33**	**6**	**2**

c) *Small Establishments:* - There were only 2 labor units employed by the small establishments surveyed. They were working as managing and administrative staff.

3.3.12 Building Completion & Finishing Sub Sector

The sub sector employs 956 labor units, with 96% working in large establishments, 3.6% in medium establishments, 0.3% in small and 0.1% in micro establishments. Women constitute 2.4% of the labor force whereas expatriates or foreigners constitute 46.2%.

a. *Large Establishments:* - The large establishments in this sub-sector employ 918 labor units, where 77.6% of labor units working as artisans mainly as building construction laborers (Table 51). Managers constitute 4.6%, Scientists professionals 5.0%, Technicians 11.3%, and liberal professionals 1.5% of the labor force. Women constitute 2.3%of the labor force. The large establishments in this sub sector is heavily dominated by expatriates who account for 48.2% of the labor force, with 40.2% working as building construction laborers.

Table 51: Large Establishments – Building Completion & Finishing Sub-Sector Units

Occupation	Existing	Women	Expatriates
Managers			
Managing directors and chief executives	11	2	3
Finance managers	9	3	1
Human resource managers	5	1	2
Policy and planning managers	1	0	1
Business services and administration managers not elsewhere classified	1	0	1
Sales and marketing managers	2	1	0
Advertising and public relations managers	1	0	1
Research and development managers	3	0	0
Construction managers	8	0	6
Health services managers	1	0	1
Sub-Total Managers	***42***	***7***	***16***
Scientists Professionals			
Civil engineers	21	0	11
Mechanical engineers	7	0	4
Engineering professionals not elsewhere classified	1	0	0
Electrical engineers	3	0	3
Building architects	10	0	0
Town and traffic planners	4	0	0
Sub-total Scientists	***46***	***0***	***18***
Liberal Professionals			
Accountants	9	5	1
Lawyers	1	0	1
Administrative and executive secretaries	1	0	1
Information and communications technology operations technicians	3	0	0
Sub-total Liberal professionals	**14**	**5**	**3**
Technicians			
Civil engineering technicians	31	5	0
Electronics engineering technicians	31	0	21
Mechanical engineering technicians	30	0	15
Construction supervisors	12	0	0
Sub-total Technicians	***104***	***5***	***36***

Occupation	Existing	Women	Expatriates
Artisans			
Secretaries (general)	4	2	0
Receptionists (general)	3	3	0
Security guards	13	0	0
Bricklayers and related workers	20	0	20
Stonemasons, stone cutters, splitters and carvers	20	0	0
Concrete placers, concrete finishers and related workers	40	0	0
Carpenters and joiners	3	0	0
Building frame and related trades workers not elsewhere classified	5	0	0
Floor layers and tile setters	13	0	13
Glaziers	3	0	3
Plumbers and pipe fitters	17	0	15
Welders and flame-cutters	8	0	8
Locomotive engine drivers	20	0	0
Heavy truck and lorry drivers	13	0	2
Crane, hoist and related plant operators	4	0	4
Lifting truck operators	4	0	4
Building construction laborers	490	0	300
Sub-total Artisans	***712***	***5***	***369***
Total	**918**	**22**	**442**

b. *Medium Establishments:* - The medium establishments employ 34 labor units, with most of them working as artisans namely building construction laborers. There is only one woman employed by the medium establishment s and no expatriates.

Table 52: Medium Establishments – Building Completion and Finishing Sub-Sector Units

Occupation	Existing	Women	Expatriates
Managing directors and chief executives	3	0	0
Finance managers	1	0	0
Human resource managers	1	0	0
Sales and marketing managers	1	0	0
Construction managers	2	0	0
Building architects	1	0	0
Accountants	2	1	0
Civil engineering technicians	2	0	0
Draughts persons	1	0	0
Construction supervisors	2	0	0
Information and communications technology operations technicians	1	0	0
Civil engineering laborers	2	0	0
Building construction laborers	10	0	0
Sweepers and related laborers	3	0	0
Messengers, package deliverers and luggage porters	2	0	0
Total	**34**	**1**	**0**

c. *Small establishments* in this sub-sector had 4 labor units of which 3 were employed as managers and one as an accountant.

3.4 Profiles of Labor Units in the Large Establishments

The analysis of the labor profile/occupation data indicates that there are large proportions of foreigners in key occupations in Large Establishments in the four key subsectors in the Construction industry, namely "***Site Preparation', "Construction of Utility Projects", "Building Completion & Finishing***" and ***Construction of Buildings.*** Foreigners tend to dominate in key occupations including scientist professionals, technicians and even artisans. Women are also underrepresented in all the occupations. In these large establishments, the industry lacks qualified Rwandans in the following professionals, and thus relies on foreign labor.

- **Civil Engineers**
- **Mechanical Engineers**
- **Electronic Engineers**
- **Electrical Engineers**
- **Building Construction Artisans (Laborers).**

Table 53: Site Preparation Sub-Sector: Large Establishments' Occupation by Gender & Origin

Occupation	% Women	% Foreign	Areas of Dominance
Managers	20.4	15.9	
Scientific professionals	6.0	26.7	Foreigners constitute 25.2% of Civil Engineers and 47.1% of Mechanical Engineers.
Technicians	5.1	21.3	Foreigners constitute 53.8% of Electronic Engineers, and 33.3% of Electrical Engineers Technicians.
Artisans	5.5	17.3%	28.4% of Artisans who work as Building Construction laborers are foreigners.

Total (Women and Foreigners)	**6.4**	**18.7%**	Apart from managers women constitute less that 7% in other occupations.

Table 54: Construction of Utility Projects*: Large Establishments' Occupation by Gender & Origin

Occupation	% Women	% Foreign	Areas of dominance
Managers	16.1	29	
Scientific professionals	2.5	45	47.8% of Civil Engineers, 50% of Mechanical Engineers, and 60% of Electrical Engineers are Foreigners.
Technicians	5.5	39.8	67.7% of Electronic Engineers, 78.9% of Mechanical engineers, and 41.7% are Electrical Engineers are foreigners
Artisans	5.9	75.2	98.6% of Building Construction laborers are foreigners.
Total (Women and Foreigners)	**3.9**	**62.0**	Foreigners' dominance in this the sector is significant, at the ratio of 6:1 against Rwandans. Women are very few in this sub-Sector.

**Construction of Utility projects* includes installation of urban pipeline, communication and power lines; water lines, reservoirs and sewer system.*

Table 55: Building Completion & Finishing: Large Establishments' Occupation by Gender & Origin

Occupation	% Women	% Foreign	Areas of dominance
Managers	16.7	38.1	
Scientific professionals	0	39.1	52.3% of Civil Engineers, 57.1 Mechanical Engineers, and 100% Electrical engineers are foreigners.
Technicians	4.8	34.6	67.7% of Electronic Engineers, and 50% of Mechanical Engineers are foreigners.
Artisans	0.7	51.2	61.2% Building Construction Laborers are foreigners.
Total (Women and Foreigners)	**2.3**	**48.2**	Foreigners dominate this subsector by 5 to 1 Rwandan. Women are insignificant in this sector even among artisans.

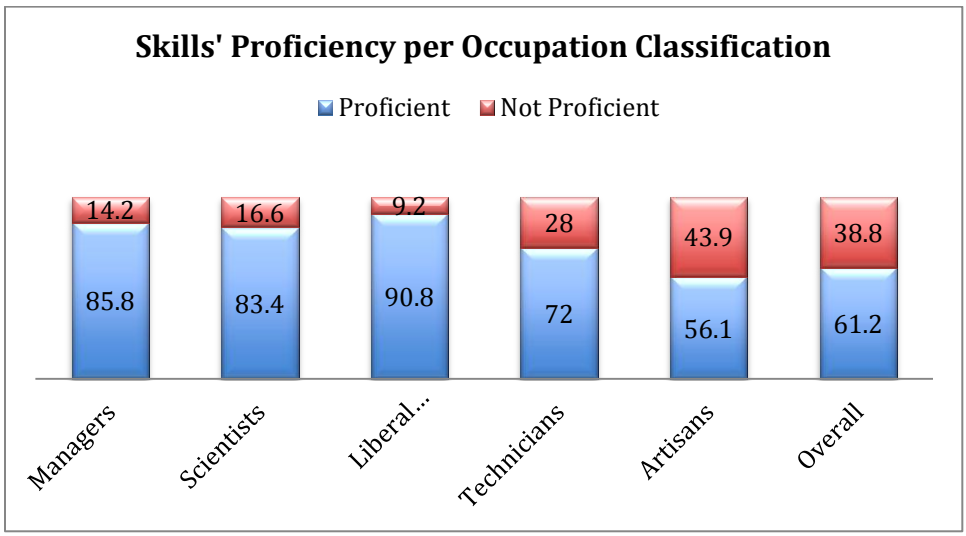
Table 56: Construction of Buildings Subsector: Occupation by Gender & Origin

Occupation	% Women	% Foreign	Areas of dominance
Managers	28.6	0	
Scientific professionals	5.1	35.9	32.3% of Civil Engineers, 40.1% of Mechanical Engineers are foreigners
Technicians	0	5.4	28.5% of Construction Supervisors are foreigners
Artisans	8.9	0	
Total (Women and Foreigners)	**9.4**	**3.4**	Foreign technicians dominate Rwandan ones by almost 6:1. Apart from management, women are under-represented in the other occupations.

3.5 Proficiency of Employee by Occupation

The CEO / Owners of establishments were asked to assess and indicate the proficiency of their employees. The survey indicates that the overall proficiency of the labor units employed in the Construction Sector in Rwanda is 61.2%. As indicated in Figure 5 the Managers have a proficiency level of 85.8%, Scientists professionals 83.4%, Liberal professionals 90.8%, Construction Technicians 72%, and Artisans have a proficiency level of 56.1%.

Figure 5: Skills Proficiency by Occupation in Construction Establishments



Low levels of proficiency are more pronounced among artisans, who are also the majority in employees in the construction establishments.

Managers Proficiency:- Table 57 indicates the level of proficiency among different categories of managers in the construction sector. The least levels of proficiency were reported in research and development managers (40%), policy and planning managers (60%), and finance managers (74.5%).

Table 57: Proficiency among Categories of Managers

Occupation	Number	Number Proficient	Percent
Managing directors and chief executives	97	97	100
Finance managers	47	35	74.5
Human resource managers	21	17	81
Policy and planning managers	5	3	60
Business services and administration managers not elsewhere classified	5	5	100
Sales and marketing managers	11	9	81.8

Advertising and public relations managers	4	4	100
Research and development managers	5	2	40
Construction managers	72	55	76.4
Supply, distribution and related managers	8	8	100
Health services managers	3	3	100
retail and wholesale trade Managers	1	1	100
Real estate agents and property managers	2	2	100
Total	**281**	**241**	**85.8**

Scientists Proficiency: - Table 58 indicates the proficiency levels among scientists professionals in the construction sector. Of the total 286 scientists employed in the sector, 83.6% were reported proficient. Low levels of proficiency were mainly reported in landscape architects (25%) and building architects (66.7%).

Table 58: Proficiency levels among Scientists Professionals

Occupation	Number	Number Proficient	Percent
Civil engineers	149	125	83.9
Mechanical engineers	31	28	90.3
Building architects	30	20	66.7
Electrical engineers	26	25	96.2
Engineering professionals not elsewhere classified	17	17	100
Electronics engineers	11	8	72.7
Environmental engineers	8	8	100
Landscape architects	8	2	25
Town and traffic planners	4	4	100
Cartographers and surveyors	2	2	100
Total	**286**	**239**	**83.6**

Liberal Professionals' Proficiency: - As already reported, the sector employs 98 labor units as liberal professionals. Of these 90.8% were reported proficient. The least level of proficiency is reported in financial (Table 59).

Table 59: Proficiency levels among Liberal Professionals

Occupation	Number	Number Proficient	Percent
Accountants	46	41	89.1
Training and Staff Development	20	20	100
Lawyers	8	5	71.4
Information and communications technology sales professionals	5	5	100
Financial and investment advisers	3	2	66.7
Financial analysts	3	3	100

management and organization	1	1	100
Advertising and marketing professionals	1	1	100
Environmental protection professionals	1	1	100
Employment agents and contractors	9	9	100
Social work associate professionals	1	1	100
Total	98	89	90.8

Construction Technicians' Proficiency: - Table 60 indicates the proficiency level among the construction technicians. Amongst the 397 labor units employed as technicians in the construction sector, 72% were reported as proficient. The least levels of proficiency per occupation were reported construction supervisors (42.2%), electronics engineering technicians (70.6%) and civil engineering technicians (73.6%).

Table 60: Proficiency levels among Construction Technicians

Occupation	Number	Number Proficient	Percent
Civil engineering technicians	106	78	73.6
Construction supervisors	83	35	42.2
Electrical engineering technicians	74	57	77.0
Mechanical engineering technicians	55	53	96.4
Electronics engineering technicians	51	36	70.6
Draughts persons	25	24	96.0
Chemical engineering	3	3	100
Total	**397**	**286**	**72.0**

Artisans' Proficiency: - Table 61 indicates the proficiency levels among the varies categories of artisans in the construction establishments. Artisans have the lowest levels of proficiency compared to other occupation in the sector. From the 3,981 employed labor units, only 56.1% were reported as proficient. The least proficiency was reported among lifting truck operators (13.6% proficient), sweepers (15.2% proficient), carpenters (30.8% proficient), insulation workers (28.6% proficient) and house builders (43.8 proficient).

Table 61: Proficiency levels among Artisans in Construction Sector

Occupation	Number	Number Proficient	Percent
Building construction laborers	1228	837	68.2
Stonemasons, stone cutters, splitters and carvers	1013	445	43.9
Odd job persons	431	215	49.9
Sweepers and related laborers	356	54	15.2
Civil engineering laborers	195	134	68.7
House builders existing	128	56	43.8
Concrete placers, concrete finishers and related workers	96	79	82.3

Bricklayers and related workers	72	60	83.3
Plumbers and pipe fitters	46	35	76.1
Lifting truck operators	44	6	13.6
Security guards	41	36	87.8
Heavy truck and lorry drivers	40	38	95
Carpenters and joiners	39	12	30.8
Messengers, package deliverers and luggage porters	37	35	94.6
Locomotive engine drivers	27	19	70.4
Roofers	22	21	95.5
Floor layers and tile setters	18	18	100
Secretaries (general)	17	17	100
Plasterers existing	15	15	100
Welders and flame-cutters	13	13	100
Painters and related workers	9	7	77.8
Receptionists (general)	8	7	87.5
Insulation workers	7	2	28.6
Building structure cleaners	7	7	100
Building and related electricians	7	5	71.4
Electrical mechanics and fitters	7	5	71.4
Crane, hoist and related plant operators	6	6	100
Building frame and related trades workers	5	5	100
Metal working machine tool setters and operators	5	5	100
Earthmoving and related plant operators	5	4	80
Interior designers and decorators	5	5	100
Information and communications technology operations technicians	5	4	80
General office clerks	4	4	100
Office supervisors	4	4	100
Administrative and executive secretaries	4	4	100
Glaziers	3	3	100
Spray painters and varnishers existing	3	3	100
Electrical and electronic equipment assemblers	3	3	100
Legal secretaries	3	1	33.3
building caretakers	1	1	100
electronics mechanics and servicers	1	1	100
Mechanical machinery assemblers	1	1	100
Total	**3981**	**2232**	**56.1**

3.6 Existing vacancies and skills mismatch

3.6.1 Overall Existing Vacancies

The survey also asked CEOs/Owners of the establishments to indicate the existing vacancies in their firms at the time of the study. The findings indicate that 22.9% of the establishments reported to have had vacancies and 77.1% had no vacancies in the 12 months prior to the survey. A total of 721 vacancies were reported to have existed in that period.

Table 62 indicates the existing vacancies by occupation. The vacancies were mainly in artisans and technicians. The artisans were mainly construction laborers with an absolute value of 600 labor units. Technicians were composed mainly of building technicians. The professionals included environmental engineers and liberal professionals.

Table 62: Vacancies by Occupation in Construction

Occupations	Number
Construction laborers	600
Building Technicians	50
Civil Engineers	15
Drivers	9
Civil Technicians	7
Electrical Technicians	6
Electrical Engineer	5
Plumbing engineer	5
Mechanical Technicians	4
Draftsmen	3
Building architects	2
Environmental engineers	2
Project Manager	2
Store Keepers	2
Accountant	1
Assistant Director Manager	1
Finance Manager	1
Lawyer	1
Logistic Manager	1
Marketing Officer	1
Mechanical Engineer	1
Office Administrator	1
Technical Manager	1
Total	**721**

3.6.2 Hard to fill skills and Mismatch by Occupation and Duration

Employers also indicated the specific occupations that were hard to fill in their establishments. These included a plumbing engineer who had taken 22 months to be found, civil engineers 17months, and mechanical engineers 12 months. By the time the survey was conducted the hard to fill occupations were reported to have taken between 3 and 22 months to establish competent labor units (Table 63).

Table 63: Occupation that Were Hard-to-Fill

Occupation Name	Number of Hard to fill vacancies	Duration of search Months
Building architects	1	6
Civil engineers	7	17
Civil Technicians	1	12
Electrical Engineer	1	6
Electrical Engineer	4	7
Electrical Technicians	1	12
Finance Manager	1	12
Logistic Manager	1	4
Mechanical Engineer	1	12
Mechanical Technicians	2	8
Office Administrator	1	0
Plumbing engineer	4	22
Project Manager	1	6
Construction Technical Manager	1	12

Skills Mismatch: - During the survey, employees were asked to indicate whether they were assigned the job they were hired for when they joined an establishment. The level of mismatched labor units at the point of entry into the labor market was reported to be 32.2%. These were employees who at the time of entry into the establishments, were given work not necessary related to what they studied, trained in or hired for. The labor units with mismatch work were approximately 1,868 as indicated in Figure below.

Figure 6: Skills' Mismatch Magnitude

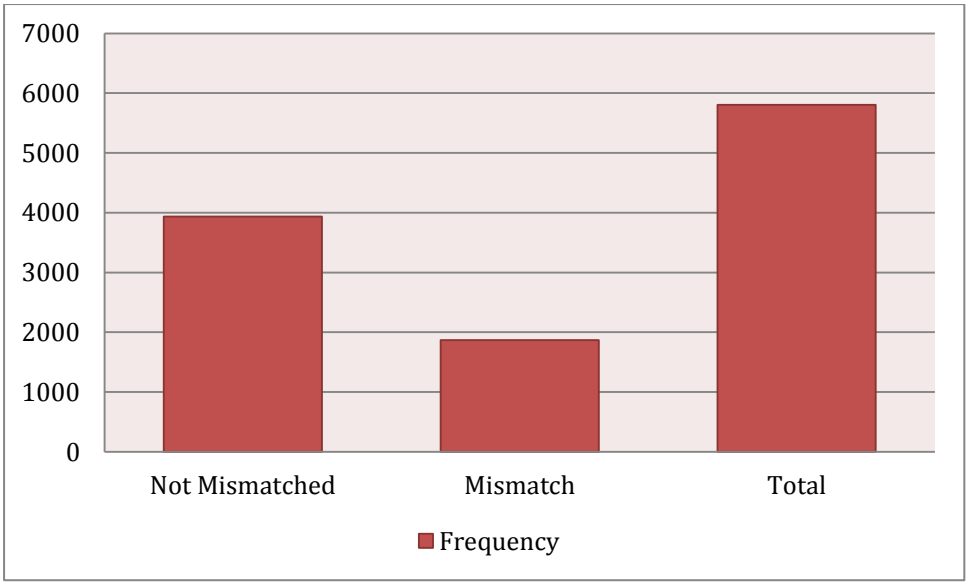


Table 64: Indicates Mismatch of Labor Units by Occupation in the Establishments Visited

Occupation	Absolute Number
Construction Technician	374
Plumber	125
Construction Supervisor	125
Human Resource Manager	100
Electrical Technician	100
Concrete Mixer	75
Construction Manager	75
Civil Engineer	75
Sweeper	50
Assistant Manager	50
Brick layer	50
Civil Engineer Technician	50
Civil Engineering Technician	50
Mechanical Engineer	50
Concrete Design Supervisor	25
Locomotive Engine Driver	25
Purchasing Officer	25
Carpenters	125
customer attendant	25
Designer	25
Draftsmen	25
Electronic Technician	25
Glazier	25
Graphic designer	25
Lab Attendant	25
Labor	25
Maintainer	25
Managing Director	25
Procurement Officer	25
Project Administrator	25
Project Manager	25
Real Estate	25
Rural Engineer	25
Total	**1868**

Technical Training needed: - Employees were also asked to indicate technical areas where they need further training. Table 65 indicates the employees' responses. Construction skills, leadership skills, architectural skills and technical skills, ICT skills, plumbing skills and construction management skills were some of the critical areas that additional training is needed.

Table 65: Employees Responses on Technical Training they Need

Area of Training	Frequency	Percent
Construction skills	722	15.9
Leadership skills	448	9.9
Architecture skills	398	8.8
Technical skills	274	6.0

Area of Training	Frequency	Percent
Information Technology skills	225	5.0
Plumbing skills	199	4.4
Construction management skills	150	3.3
Project management skills	150	3.3
Accounting skills	125	2.8
Communication skills	125	2.7
General IT skills	125	2.7
Carpentry skills	100	2.2
Software skills	75	1.7
Crow paint skills	75	1.6
Electricity skills	75	1.6
Mechanical skills	75	1.6
Networking skills	75	1.6
Languages skills	50	1.1
Auto CAD software skills	50	1.1
Business plan skills	50	1.1
Concrete designing skills	50	1.1
Designing skills	50	1.1
Auditing skills	25	0.5
Blue print software skills	25	0.5
Chemistry of Plastics skills	25	0.5
Civil Engineering degree	25	0.5
Civil Engineering skills	25	0.5
Conceptual skills	25	0.5
Concrete enforcement studies	25	0.5
Concrete mixing skills	25	0.5
Conflict Resolution skills	25	0.5
construction of irrigation system	25	0.5
Design software skills	25	0.5
Electrical Engineering skills	25	0.5
Electronic skills	25	0.5
Engineering skills	25	0.5
Entrepreneurship	25	0.5
Environmental impact assessment skills	25	0.5
Evaluating skills	25	0.5
Fiber technical skills	25	0.5
Finance skills	25	0.5
Insurance skills	25	0.5
Interpersonal skills	25	0.5
Land measurement skills	25	0.5
Local Consultancy	25	0.5
Marketing skills	25	0.5
Mine and stone preparation skills	25	0.5
Procurement Management skills	25	0.5
Property evaluation skills	25	0.5
Quality delivery of my service	25	0.5
Micro Installation skills	25	0.5
Rural Electrification skills	25	0.5
Severs skills	25	0.5
Soft work skills	25	0.5
Store Management skills	25	0.5
Structural Engineering skills	25	0.5
Water supply skills	25	0.5

Area of Training	Frequency	Percent
Total	4,536	100

3.6.3 Overall Skills Gap in the Construction Sector

The sector has a total skills gap of 3,259 labor units accounting for 65% of the existing labor force at the time the study was done. The skills gap in the sector is dominated by Artisans accounting for 86%, Technicians 8%, Scientists professional 4%, managers 3%, and Liberal professionals accounting for 1%.

Managers: - The managers have a total skill gap of 82 labor units. As indicated in Table 66 this includes proficiency gap, expatriates and short term vacancy. The gap is dominated by finance managers (26%), construction managers (21%), and senior managers (20%).

Table 66: Overall Skills Gaps among Managers

Occupation	Vacancy/ short term	Proficiency gap	Expatriate	Total Gap
Managing directors and chief executives	3	0	13	16
Finance managers	1	12	8	21
Human resource managers	1	4	3	8
Policy and planning managers		2	3	5
Business services and administration managers not elsewhere classified	1	0	5	6
Sales and marketing managers	-	2	0	2
Advertising and public relations managers	-	0	1	1
Research and development managers	-	3	1	4
Construction managers	-	17	0	17
Supply, distribution and related managers	-	0	1	1
Health services managers	-	0	1	1
retail and wholesale trade Managers	-	0	0	0
Real estate agents and property managers	-	0	0	0
Total	6	40	**36**	82

Scientists: - The sector has a total skills gap of 119 scientists professionals (Table 67). The occupations with the most gaps are civil engineers (55%), building architects (13%), electrical engineers (10%) and mechanical engineers (10%).

Table 67: Overall Skills Gaps among Construction Scientists Professionals

Occupation	Vacancy/Short term gap	Proficiency Gap	Expatriate	Total Gap
Civil engineers	15	24	27	66
Mechanical engineers	1	3	8	12
Building architects	2	10	3	15
Electrical engineers	5	1	6	12
Electronics engineers	0	3	0	3

Environmental engineers	2	0	1	3
Landscape architects	0	6	2	8
Total	**25**	**47**	**47**	**119**

Liberal Professionals: - A total gap of 17 labor units was reported amongst the liberal professionals (Table 68). The occupations with the biggest proportions are accountants and lawyers.

Table 68: Overall Vacancies among Liberal Professionals

Occupation	Vacancy/Short term	Proficiency gap	Expatriate	Total Gap
Accountants	1	5	4	10
Lawyers	1	3	0	4
Information and communications technology sales professionals		0	1	1
Financial and investment advisers		1	0	1
Advertising and marketing professionals	1	0	0	1
Total	**3**	**9**	**5**	**17**

Technicians: - A total skills gap of 252 technicians was reported in the construction sector (Table 69). The skills gaps are dominated by construction supervisors (40%), electronics engineering, technicians (18%), and civil engineering technicians (17%).

Table 69: Overall Vacancies among Construction Technicians

Occupation	Vacancy/Short Term	Proficiency gap	Expatriate	Total Gap
Civil engineering technicians	7	28	8	43
Construction supervisors	50	48	3	101
Electrical engineering technicians	6	17	15	38
Mechanical engineering technicians	4	2	15	21
Electronics engineering technicians		15	30	45
Draughts persons	3	1	0	4
Total	**70**	**111**	**71**	**252**

Artisans Gap: - The artisans dominate the overall gap in the construction sector in Rwanda, with a magnitude of 2,789 labor units. The occupations with the main gaps are building construction laborers (47.2%), stonemasons (20.1%), odd job persons 7% and sweepers (10%).

Table 70: Artisans Skills Gaps

Occupation	Vacancy	Proficiency	Expatriate	Overall

	No	Gap		Total Gap
Building construction laborers	625	391	300	1316
Stonemasons, stone cutters, splitters and carvers	0	568	0	568
Odd job persons	0	216	0	216
Sweepers and related laborers	0	302	0	302
Civil engineering laborers	0	61	0	61
House builders existing	0	72	0	72
Concrete placers, concrete finishers and related workers	0	17	0	17
Bricklayers and related workers	0	12	20	32
Plumbers and pipe fitters	5	11	1	17
Lifting truck operators	0	38	4	42
Security guards	0	5	1	6
Heavy truck and lorry drivers	0	2	1	3
Carpenters and joiners	0	27	0	27
Messengers, package deliverers and luggage porters	2	2	0	4
Locomotive engine drivers	0	8	0	8
Roofers	-	1	0	1
Floor layers and tile setters	-	0	13	13
Secretaries (general)	-	0	1	1
Welders and flame-cutters	-	0	8	8
Painters and related workers	-	2	0	2
Receptionists (general)	-	1	0	1
Insulation workers	-	5	0	5
Building and related electricians	-	2	0	2
Electrical mechanics and fitters	-	2	0	2
Crane, hoist and related plant operators	-	0	4	4
Earthmoving and related plant operators	-	1	0	1
Information and communications technology operations technicians	-	1	0	1
Office supervisors	26	0	1	27
Spray painters and varnishers existing	25	0	3	28
Legal secretaries	-	2	0	2
Total	**25**			**2789**

3.7 Employees Competency in Qualitative (Soft) Skills

Currently the labor market experience is a constantly changing work environment due to technology, customer-driven markets, information- based economy and globalization that are impacting on the structure of the workplace and leading to an increased reliance on and demand for soft skills. Both hard

and soft skills when used effectively increase employees performance, competitiveness and quality delivery.

In this study, employees were asked to assess their competency by indicating if they were either 'fully competent', 'not fully competent' or 'needed further training' in seven soft skills areas, including: leadership, communication, problem solving, team work, customer service, managing change, and risk assessment and management.

As presented in Figure 7, the overall assessment of employees showed that half of the employees (52.8%) felt that they needed further training in the 'soft skills', followed by 27.2% who indicated that they were fully competent, and 20% felt they were not fully competent in these skills.

Figure 7: Overall Soft Skill Assessment by Employees

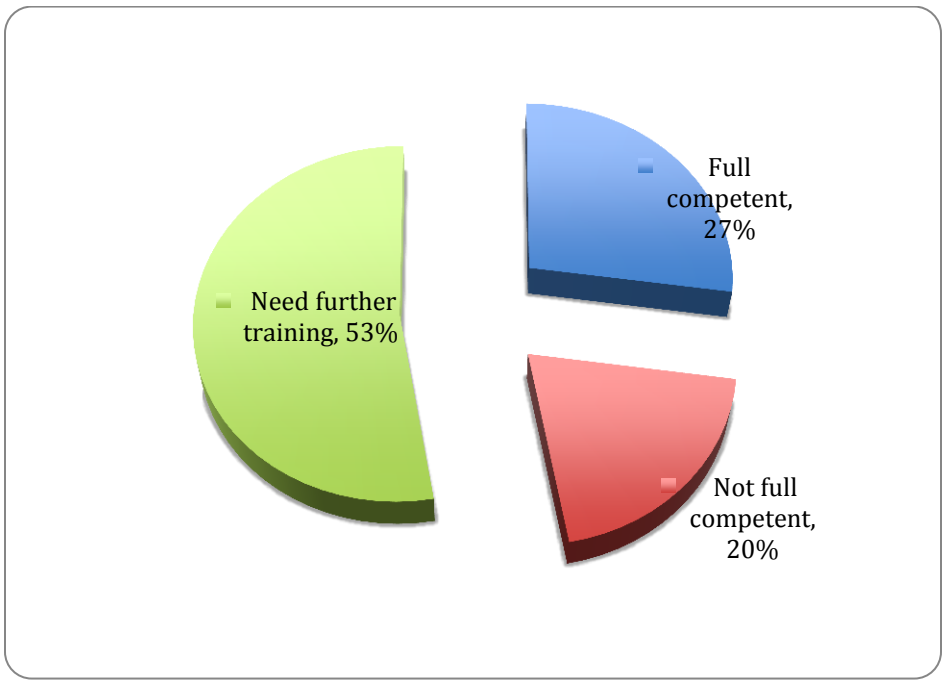


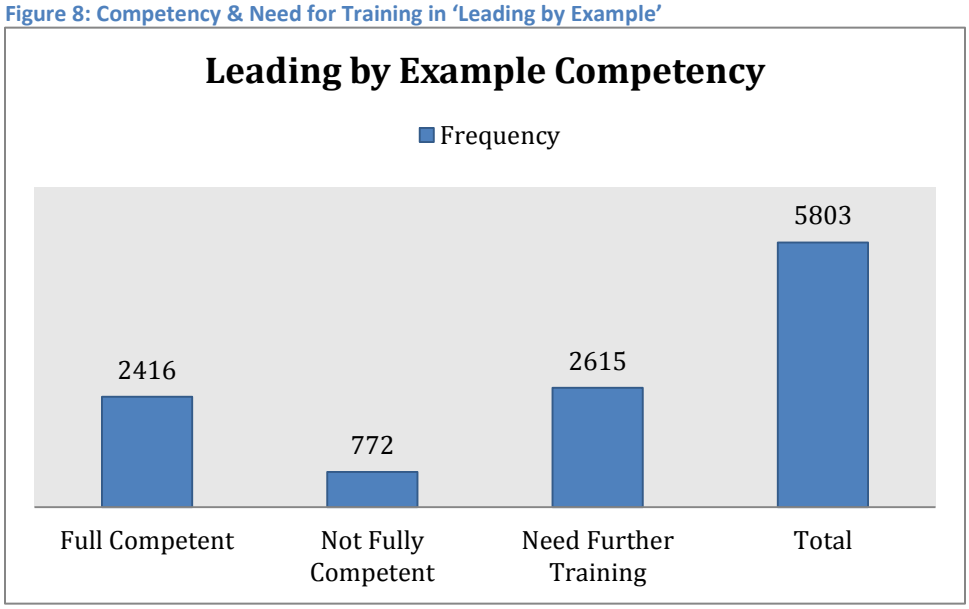
Table 71 shows that a relatively higher proportion of employees were of the opinion that they needed skills in managing change (57.5%), leadership 54.2% and risk management 53.8 compared to to need for skills in team work 46.2%, problem solving 51.9% and communication 52.5%. Team work, leadership, and communication are skill areas where a relatively smaller proportion of employees felt they were not fully competent. There were higher proportions who felt fully competent in Team work 42.2%, commuication 30.4% and leadership 29.0% compared to full competence in risk assessment and management, managing cange and problem solving where the perecentage were 18.8, 21.6 and 25.2 respectively.

Table 71: % Employees Overall Assessment of Their Soft Skill Status

Indicators	Full competent	Not fully competent	Need further training	Total
Leadership	29.0	16.8	54.2	100.0
Communication	30.4	17.1	52.5	100.0
Problem solving	25.2	22.8	51.9	100.0
Team work	42.2	11.6	46.2	100.0
Customer service	23.5	23.3	53.2	100.0
Managing change	21.6	20.9	57.5	100.0
Risk assessment and management	18.8	27.4	53.8	100.0
Overall Assessment	27.2	20.0	52.8	100.0

As indicated in Figure 8, although 42% of employees indicated that they are fully competent in "leading by example', 45% would like to get further training on the same in order to be more effective in their work.

Figure 8: Competency & Need for Training in 'Leading by Example'



As far as leadership skills is concerned, 18.1% employees indicated that they are 'not fully competent' in this skill and 57.1% would like further training on the same in order to make them more effective in their work (Figure 9). Leadership skills are regarded as critical in the construction sector because of the fact that many unskilled laborers are employed in the sector. They need close supervision and instruction all the time.

Figure 9: Competency & Need for Training in 'Positioning Self as a Leader'

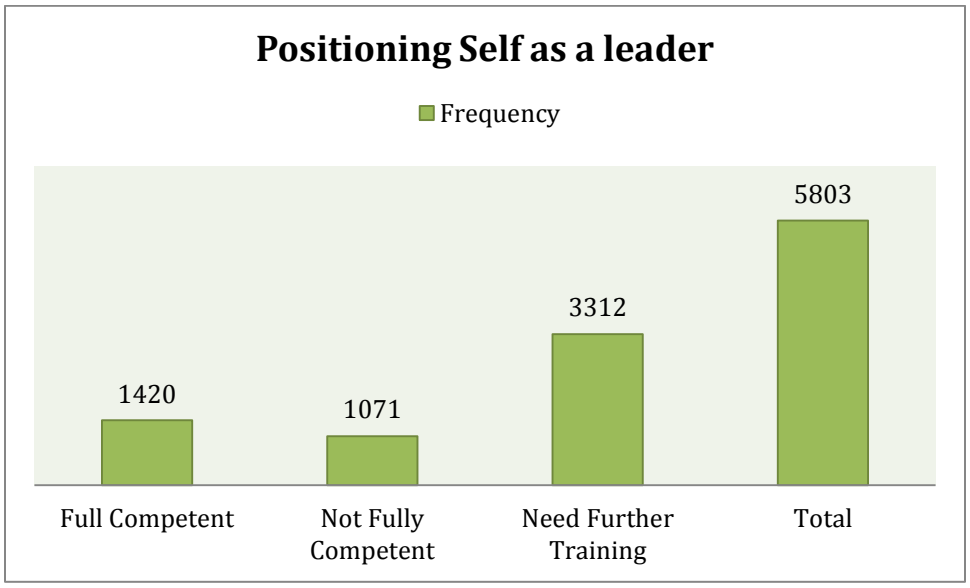
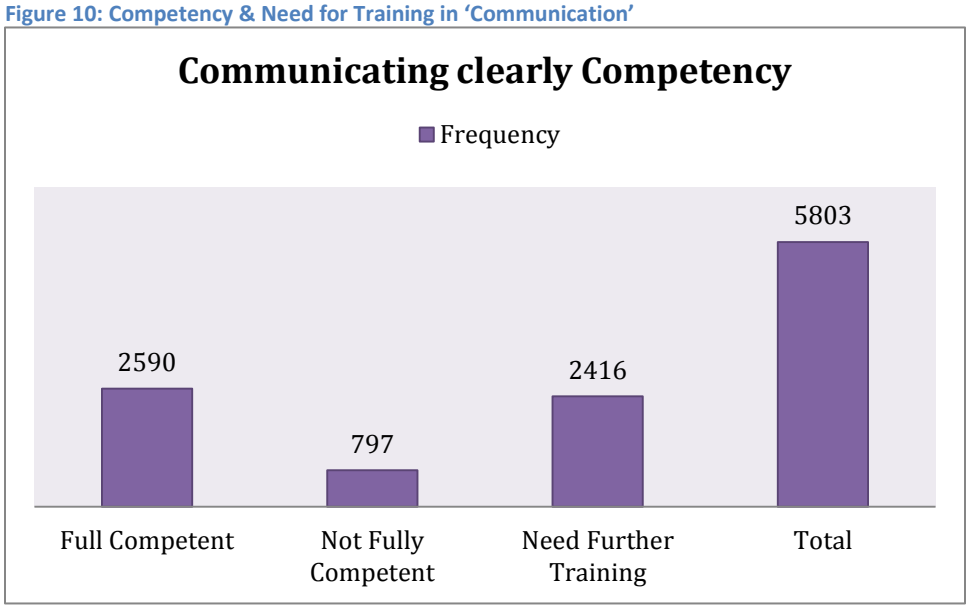


Figure 10 indicates that although 44.6% of employees indicated that they are 'fully competent' in communication skills, 41.6% indicated that they would like further training on the same.

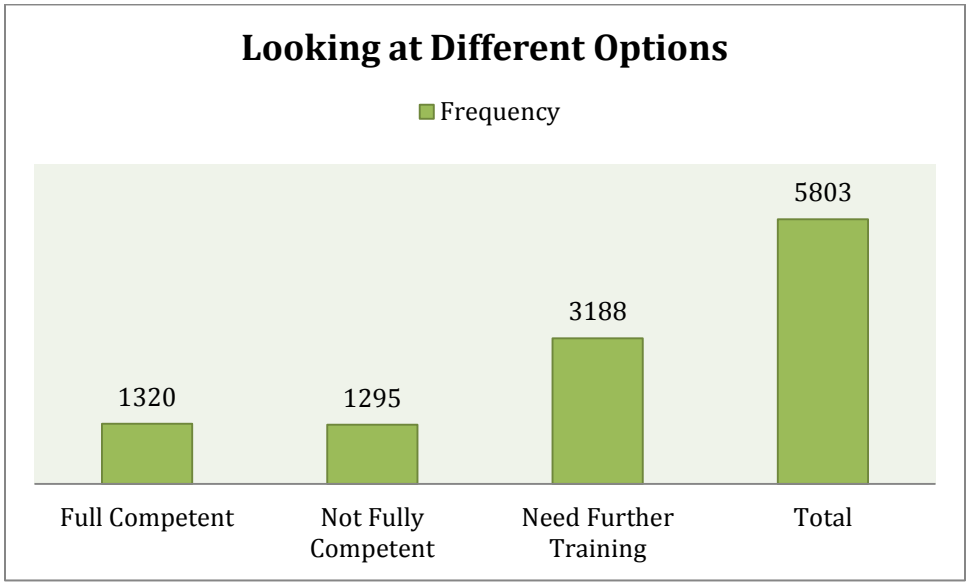
Figure 10: Competency & Need for Training in 'Communication'



The construction sector involves innovations and taking quick and relevant decisions because employees work and handle dangerous equipment and inputs. Figure 11 indicated that only 22.7% of the

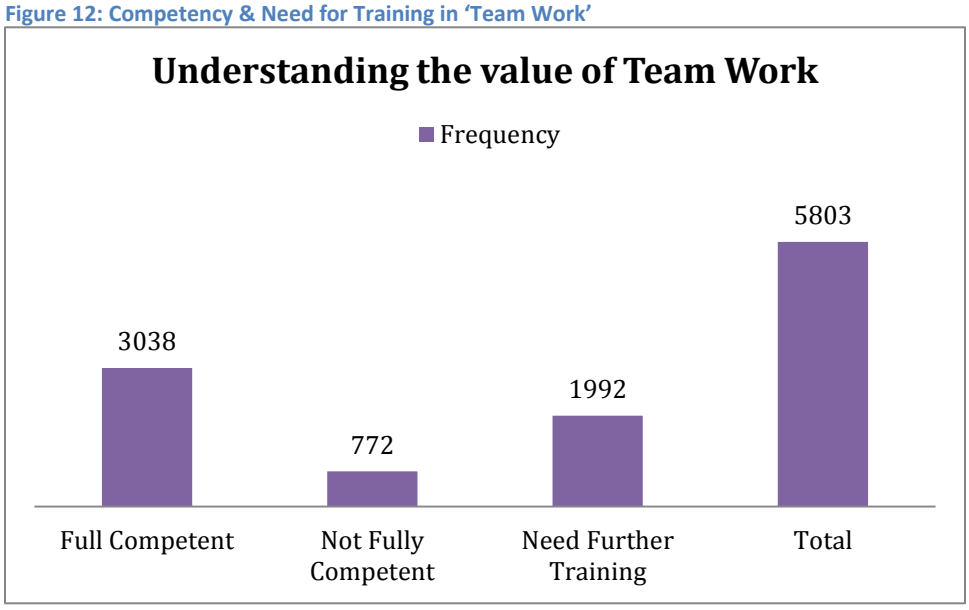
employees are fully competent in the ability of 'looking at different options' to solve a problem or implement an idea. And 54.9% indicated that they would like further training on the skill for effectiveness in their work.

Figure 11: Competency & Need for Training in 'Looking at Different Options'



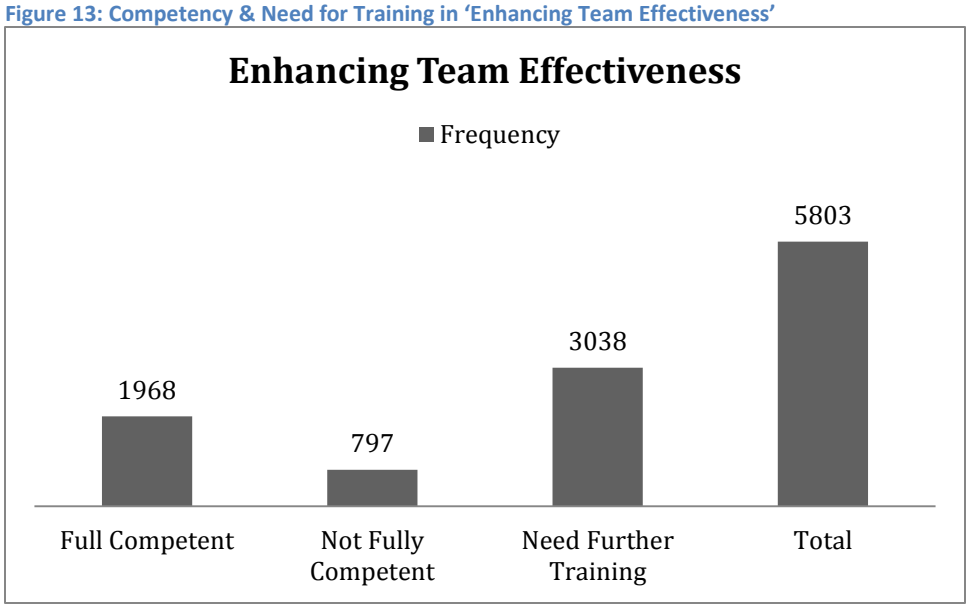
Teamwork is another 'soft skill' that is critical in the construction sector. As indicated in Figure 12, only 13.3% of employees indicated that they are 'not fully' competent' in this skill. However, 34.3% would like further training on the skill.

Figure 12: Competency & Need for Training in 'Team Work'



To make them more effective, 52.4% of employees indicated that they would like further training in the ability to 'enhance team effectiveness' in the construction establishments surveyed (Figure 13).

Figure 13: Competency & Need for Training in 'Enhancing Team Effectiveness'



As far as 'creating partnership' is concerned, only 18% of employees indicated that they are "fully competent" in this skill (Figure 14). The majority of employees – 61.8% - indicated that they would like to have further training on the skill as building partnerships among various entities and professionalism is critical in the construction sector.

Figure 14: Competency & Need for Training in 'Creating Partnerships'

Table 72 indicated that only 24.5% of the employees surveyed are fully competent in recognizing risks. And 53.2% would like to have further training to make them effective and safe in their work.

Table 72: Employees' Competency in Recognizing Risk

Recognizing Risk	Frequency	Percent
Full Competent	1420	24.5
Not Fully Competent	1295	22.3
Need Further Training	3088	53.2
Total	**5803**	**100.0**

Very few employees, 15.9% are fully competent in assessing and monitoring risk, a competency that is critical in the construction sector because of the safety issues in the construction sector. 54.9% of the employees indicated that they would like further training on this critical competency (Table 73).

Table 73: Employees' Competency in Assessing & Monitoring Risk

Assessing and monitoring Risk	Frequency	Percent
Full Competent	922	15.9
Not Fully Competent	1694	29.2
Need Further Training	3188	54.9
Total	**5803**	**100.0**

As far as mitigating risks is concerned, only 15.5% of the employees indicated that they are 'fully competent' in this skill, 29.6% indicated that they are 'not fully competent', and 54.9% of the employees would like further training on the skill to make them more effective and efficient in their work in the industry (Table 74)

Table 74: Employees' Competency in Mitigating Risk

Mitigating Risk	Frequency	Percent
Full Competent	897	15.5
Not Fully Competent	1718	29.6
Need Further Training	3188	54.9

Total	**5803**	**100.0**

3.8 Training and Internship Programs

Construction establishments visited where asked to indicate the level of financial resources they allocate for training of their employees and whether they accommodate trainees as interns. 87.9% of the establishments never had any of resources allocated to training with the 12.1% of those that allocated having an allocation interval of 2% to 15% of their budgets (Table 75)

Table 75: Level of Financial Resources Allocated to Training

Percentage of total budget	Frequency	Percent
0	77	92.7
2	1	1.2
5	3	3.6
15	2	2.5
Total	**83**	**100.0**

The main reasons for not offering training were of lack of affordability (36.1%), absence of relevant training (18.1%) availability of adequate skills by existing staff (8.4%), high turnover (8.4%) to mention but a few (Table 76)

Table 76: Reasons for not offering Training

Reasons	Frequency	Percent
They have adequate skills	7	8.4
Cannot afford	30	36.1
We don't find it effective (i.e. don't see results)	6	7.2
High turnover—we will not benefit	7	8.4
Can't find relevant training	15	18.1
None	17	20.5
they refused unless they are paid	1	1.2
Total	83	100

Less than 50% of the establishments acknowledged having had interns in their work places in the last 12 months prior to the survey. The interns come from universities and IPRCs.

Knowledge Transfer Partnerships: - Knowledge transfer partnerships were reported on a significantly small scale by approximately 4.8% of the establishments in the sector (Table 77). This was reported to have existed with the National university of Rwanda, which was involved in water treatment; and Kigali Institute of Science and technology, which was working on high-way engineering and accounting which was reported to be done with a foreign academic institution.

Table 77: Knowledge Transfer Partnerships

KTP	Frequency	Percent
Yes	4	4.8
No	79	95.2
Total	83	98.8

3.9 Wages / Earnings in the Construction Sector

Information on earnings was not easy to get because of sensitivity it raises, thus only 30% of the establishments responded to the specific question during the survey, while the others considered it confidential. The challenge with the earnings data is that response per occupation wasn't consistent through the data collection process with some occupations having more respondents than others.

Managers Earnings: - Managers averagely earned 335,665 Rwandan francs with the lowest salary being approximately 112,857 and the highest 300,000 Rwandan francs (Table 78). The highest salary is reported amongst managing directors with an average of 504,341 franc. There is however a significant deviation between the lowest earning and the highest earnings of the managing director which amounts to 260,000. Other managers namely Financial, Human Resource, Policy and Planning and construction managers earn as low as 50,000 and as high as 722,000 Rwandan francs. Averagely though, they earn between 300,000 francs and 425,133 Rwandan Francs.

Table 78: Earnings of Managers by Category in Construction Establishments

Occupation	Lowest	Highest	Average
Managing directors and chief executives	40,000	3,000,000	504,341
Finance managers	100,000	600,000	423,750
Human resource managers	100,000	600,000	371,429
Policy and planning managers	300,000	400,000	325,000
Sales and marketing managers	200,000	400,000	300,000
Construction managers	50,000	722,000	425,133
Average	**112,857**	**817,429**	**335,665**

Scientists Professionals' Earnings: - Building Scientists (professionals) averagely earn 301,509 Rwandan francs with the lowest salary being approximately 150,000 and the highest 900,000 Rwandan francs (Table 79). The highest average salary is reported amongst Electronic Engineers with an average of 490,000 Rwandan francs. Other Professionals including Civil Engineers and Mechanical Engineers averagely earn 301,509 and 490,000 francs.

Table 79: Scientists Professionals' Earnings in Construction Establishments

Occupation	Lowest	Highest	Average

Civil engineers	150,000	722,000	459,052
Environmental engineers	300,000	800,000	390,000
Mechanical engineers	320,000	600,000	385,000
Electrical engineers	350,000	720,000	470,000
Electronics engineers	350,000	720,000	490,000
Building architects	300,000	900,000	428125
Average	**186,667**	**623,333**	**301,509**

Liberal Professionals Earnings: - Liberal professionals averagely earn 212,784 Rwandan francs with the lowest salary being approximately 50,000 and the highest 700,000 Rwandan francs (Table 80). The highest average salary is reported amongst accountants with an average of 700,000 Rwandan francs. Other Professional occupations namely environmental protectionists, lawyers to mention but a few averagely earn between 125,000 and 331, 250 Rwandan francs.

Table 80: Liberal Professionals' Earnings in Construction Establishments

Occupation	Lowest	Highest	Average
Environmental protection professionals	400,000	400,000	400,000
Accountants	40,000	700,000	276,826
Financial and investment advisers	150,000	400,000	275,000
Lawyers	50,000	300,000	191,667
Office supervisors	150,000	250,000	200,000
Information and communications technology operations technicians	100,000	150,000	130,000
General office clerks	60,000	200,000	105,000
Secretaries (general)	50,000	250,000	123,777
Average	**125,000**	**331,250**	**212,784**

Technicians Earnings: - Technicians averagely earn 261,374 Rwandan francs with the lowest salary being approximately 90,000 and the highest 700,000 Rwandan francs (Table 81). The highest average salary is reported amongst construction supervisors with an average of 600,000 Rwandan francs. Other technician occupations namely electrical engineering technicians, chemical engineering technicians to mention but a few averagely earn between 174,286 and 432,857 Rwandan francs.

Table 81: Technicians' Earning of in Construction Establishments

Occupation	Lowest	Highest	Average
Civil engineering technicians	90,000	540,000	220,833
Electrical engineering technicians	100,000	450,000	230,909
Electronics engineering technicians	250,000	450,000	330,000
Mechanical engineering technicians	250,000	450,000	355,000
Chemical engineering technicians	250,000	270,000	260,000
Draughts persons	150,000	270,000	208,333

Construction supervisors	130,000	600,000	224,545
Average	**174,286**	**432,857**	**261,374**

Artisans' Earnings: - Artisans averagely earn 107,981 Rwandan francs with the lowest salary being approximately 12,000 and the highest 330,000 Rwandan francs (Table 82). The highest average salary is reported amongst civil engineering laborers with an average of 250,000 Rwandan francs. Other artisan occupations namely glaziers, plumbers, plasterers and roofers to mention but a few averagely earn between 71,728 and 150, 955 Rwandan francs.

Table 82: Artisans' Earning in Construction Establishments

Occupation	Lowest	Highest	Average
Security guards	30,000	180,000	63,333
House builders	45,000	330,000	116,214
Bricklayers and related workers	25,000	200,000	73,333
Stonemasons, stone cutters, splitters and carvers	104,000	130,000	117,000
Carpenters and joiners	12,000	100,000	53,000
Roofers	78,000	104,000	91,000
Plasterers	30,000	80,000	55,000
Glaziers	104,000	130,000	117,000
Plumbers and pipe fitters	100,000	200,000	129,166
Air conditioning and refrigeration mechanics	104,000	130,000	120,000
Spray painters and varnishers	78,000	91,000	84,500
Building structure cleaners	30,000	65,000	45,000
Sheet-metal workers	78,000	91,000	84,500
Building and related electricians	150,000	300,000	250,000
Electrical mechanics and fitters	250,000	250,000	250,000
Locomotive engine drivers	70,000	150,000	117,500
Heavy truck and lorry drivers	100,000	150,000	125,000
Civil engineering laborers	50,000	250,000	250,000
Building construction laborers	30,000	150,000	56,944
Sweepers and related laborers	30,000	100,000	73,333
Messengers, package deliverers and luggage porters	30,000	90,000	53,750
Odd job persons	50,000	50,000	50,000
Average	**71,727**	**150,955**	**107,981**

4.0 PART II: SUPPLY OF SKILLS FOR THE CONSTRUCTION SECTOR

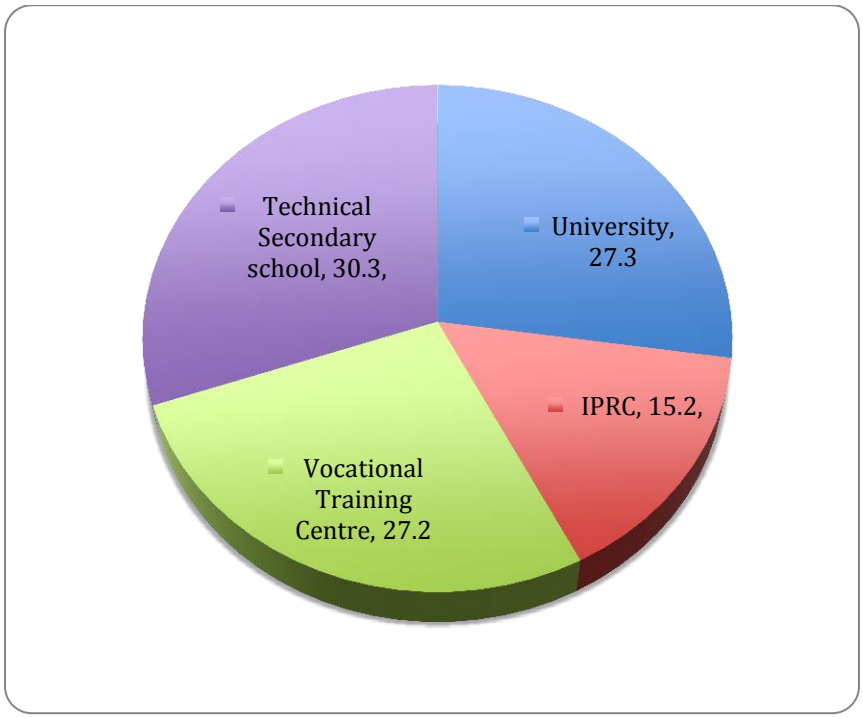
To complete the picture and situation of skills profiles in the Construction Sector, the survey was also designed to look at the supply of skills by the training institutions in the country.

Information sought for in this survey were on the institutions profiles, training programs, outputs of students, linkages to industry, institutions capacities to supply skills, and labor market information system (LMIS).

4.1 Higher Institutions in the Survey:

The study covered universities, Integrated Polytechnic Regional Centers (IPRC), Vocational Training Centers (VTC) and Technical Secondary Schools (TSS). A total of 33 institutions responded to the survey questionnaires (Figure 1) consisting of university 27.3%, technical secondary schools 30.3%, vocational training centers 27.3%, and IPRC 15.2%.

Figure 15: % Distribution of Training Institution by Type of Institution



A majority of the training institutions visited were located in Kigali. Out of the 33 institutions 23 (69.7%) were based in Kigali and 10 in the provinces. In Kigali 39.1% of the institutions were universities, IPRS and VTC each comprised of 17.4% and TSS 26.1%. In the other provinces, TSS comprised of 30.3% of the institutions, followed by University and VTC each 27.3% and IPRC 15.2% respectively.

4.2 Education, Training Programs & Students

Table 83 indicates the types of courses offered by various training institutions and level of training of such programs.

Table 83: Type of Training Courses by Training Institutions & Level

Type of institution	Name of department	Level of Training
TSS	Construction/Public works	Certificate
VTC	Welding, plumbing, hairdressing, carpentry	Certificate
	Construction/public work	Certificate
IPRC	Construction/Public work	Diploma/Certificate
	Automobile tech., Air conditioning and refrigeration, electrical courses	Diploma/Certificate
University	Estate management & valuation	Degree
	Construction management	Degree, Diploma
	Architecture	Degree
	Civil engineering & environmental studies, construction /public works	Degree
	Electronic and Electrical engineering	Degree

1. University degree graduates: - Table 84 shows data obtained on university graduates in Bachelor of Science (BSC) in Engineering (Construction Engineering & Management) 2010-2011 period.

Table 84: Number of Student Graduating from Universities Courses by Gender 2010-

Sector	2010			2011			2012		
	M	F	Total	M	F	Total	M	F	Total
Construction	63	1	64	84	13	97	107	16	123
Total	**63**	**1**	**64**	**84**	**13**	**97**	**107**	**16**	**123**

Despite the increased demand of professionals in the construction industry in Rwanda, the number of students taking construction courses and graduating from universities is dismal. In the last two years less than 130 professionals have graduated in this field. At KIST- the Centre for Excellence in Science and Technology, according to the Graduation Handbook, in 2010 only 12 students graduated with **Bachelor of Science (B Sc.) in Engineering (Construction Engineering & Management**, and 52 with **B Sc. in Engineering (Civil Engineering & Environmental Technology.** In 2011, only 2 graduated a with B Sc. Construction Engineering (*And the booklet indicates that those two had a mere 'Pass'. No student had "Upper Second Honors" or*

"Lower Second Honors") (KIST 9th Graduation List). Currently there are 300 students enrolled at KIST in the construction related department, who will graduate by 2014.

Compared to universities in the region (Box 1), construction courses offered in Rwanda universities are few and limited in scope. KIST, for example, has only one B Sc. course in construction related field. The institution does not have masters and doctoral programs to train high-level skills for the construction industry.

Box 1: UNIVERSITY OF NAIROBI COLLECGE OF ARCHITECTURE & ENGINEERING

Academic Programmes:

*** Faculty of Architecture, Design and Development**

- Bachelor of Architecture (B.Arch)

- Bachelor of Arts in Building Economics

- Bachelor of Arts in Design

- Bachelor of Arts in Land Economics

*** Masters of Architecture (M.Arch):**

Areas of specialization in Architecture include the following areas:

- **Architectural Design**
- **Environmental Building Science**
- **Building Technology**
- **Landscape Design**
- **Urban Design.**

*** Masters Arts in Building Management**

*** Masters of Arts in Housing Management.**

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2. Diploma and certificate graduates: Averages of 1,400 trainees are produced in varies diploma and certificate colleges in the country – as technicians and artisans for the construction industry. IPRC, VTCs and TSS produce the majority of these trainees – 99 %. Table 85 indicates that the number of diploma students graduating in Construction courses in 2009 and 2010.

Table 85: Number of Diploma Students Graduating by Sector & Gender 2009-2011

Sector	2009			2010			2011		
Diploma Graduates	**M**	**F**	**Total**	**M**	**F**	**Total**	**M**	**F**	**Total**
Construction	41	4	45	34	1	35	30	10	40
Certificate Graduates									
Construction	1,029	297	1326	1281	157	1438	-	-	-
Total	**1,070**	**301**	**1,371**	**1,315**	**158**	**1,473**	**-**	**-**	**-**

The number of students graduating with certificate level courses by gender in construction courses were high with 1326 (22.4% Female) in 2009 and 1438 (10.9 Females) in 2011, an increase of 8.4 per cent as shown Table 86 below. Females are also underrepresented at this level.

Table 86: Number of Certificate Students Enrolled by Type of Institution & Gender, 2009-2010

	2009			2010		
Construction	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
IPRC	597	64	661	764	72	836
VTC	113	211	324	154	54	208
TSS	319	22	341	363	31	394
Total	1029	297	1326	1281	157	1438

Based on the increasing demand and skills gaps in the construction sector, the demand outstrips the supply by 2:1. The current training institutions need to double their intakes to meet the current and short-term demand. The assumption here is that the quality of these graduates is high and they will graduate with needed skills in the labor market.

CASE STUDY OF KIGALI INSTITUTE OF SCIENCE AND TECHNOLOGY (KIST) CAPACITY TO TRAIN FOR THE CONSTRUCTION SECTOR/INDUSTRY

KIST runs two faculties offer two training programs in field of construction;

i. The Faculty of Architecture and Environmental Design (FAED) and ii. The Faculty of Engineering.

A. **Faculty of Architecture and Environmental Design (FAED): Has** There 3 core courses that serves the need of construction industry: i.e.

- Bachelor of Architecture
- Bachelor of Science in Building Economics (Quantity Surveying)
- Estate Management and Valuation

The FAED is a relatively new, with Department of Architecture running its first classes for bachelor program in Construction Management in and Estate management as from January 2009. Table 87 below indicates the courses and number of students in the faculty.

Table 87: Construction Related Course & Enrolment at KIST FAED.

Department	Courses	Occupation	Duration	Male	Female	Total
Architecture	Bachelor of Architecture (0A)	Architect	5 years	87	20	107
Construction Management	BSc in Construction Management	Quantity Survey	4 years	73	32	105
Estate Management and Evaluation	BSc in Estate Management and Valuation (A0)	Land Valuer and Estate Manager	4 years	66	32	98
Total No. of Students				**226**	**84**	**310**

There are no postgraduate (Masters and PhD) courses in the institution at the moment. One of the reasons given to justify this gap is that the institution has limited financial and qualified human resources to manage such programs. Besides, the available equipment/workshops and laboratories cannot accommodate post-graduate students for effective teaching and training.

Number of Academic staff in the FAED: - The KIST's FAED has drawn most of its academic staff from abroad, mostly from within the East African region (Kenya, Uganda and Tanzania) and Europe (France, Ireland, Britain, Spain and Italy) and United States of America. Table 85 shows the number of staff by department, qualification, and gender.

Table 88: KIST FAED Academic Staff by Qualification, Origin & Gender

Department and staff qualifications		Local		Foreign		
		Male	Female	Male	Female	Total
Architecture	Prof.	0	0	0	0	15
	PhD	0	0	0	1	
	Masters	1	0	5	2	
	Bachelors	4	0	2	0	
Construction Management	Prof.	0	0	0	0	11
	PhD	0	0	0	0	
	Masters	3	0	3	1	
	Bachelors	2	0	2	0	
Estate Management & valuation	Prof.	0	0	0	1	12
	PhD	0	0	0	1	
	Masters	2	0	2	2	
	Bachelors	4	0	0	0	
Total		**16**	**0**	**14**	**8**	**38**

The department of architecture has the highest percentage of foreign academic staff (expatriates) standing at 67% at and Construction Management at 54% and Estate Management and Valuation at 50% foreigners. The FAED at KIST is referred to as ***"The expatriate"*** faculty due to this high number of foreign academic staff. Local staffs are mostly recruited as Tutorial Assistants in their respective fields following an affirmative action in the year 2011. This is in part due to the fact that architecture and quantity surveying were not offered in Rwanda prior to January 2009 and January 2010 respectively. And there are limited qualified professionals in the Rwanda market to meet the high demand from both the private and public sectors.

In terms of qualifications, out of 38 lecturers, there is only 1 professor in the Department of Estate Management & Valuation, and 2 PhD holders (1 in Architecture & 1 in Estate Management). And all are foreigners. All the 16 Rwandan lecturers are men and 10 of them have bachelors degrees while only 6 of them have masters.

SWOT Analysis of FAED at KIST

STRENGTH	WEAKNESS
a) KIST has been given the mandate by the Government and is recognized by other stakeholders as the 'Centre of Excellence' and a hub for science and technology. b) FAED is the pioneering school of architecture, construction management and Estate management and valuation in Rwanda c) FAED receives a lot of support from the government due to its strategic role in realizing its mission. Recently received funding from African Development Bank (ADB) for its programs. d) Faculty members are drawn from within the region and different parts of the world bringing a rich pool of knowledge and skills mix which is passed on to students.	a) The training program is not recognized within other Commonwealth countries and is only valid in Rwanda. This because the program has yet to be accredited by the Commonwealth Association of Architects. b) The departments are under-staffed as most of the lecturers are foreigners and lengthy recruitment process compounds timely appointment of lacking academic staff. c) The building housing the Faculty was adopted from military camp and it is neither sufficient nor well suited to accommodate all the students within the design studios as in the case in other schools of architecture and design. d) Lack of adequate equipment and material to train the design studio due to limited financial resources. e) Lack of enough technicians prepare and run internship takes lot time of the few existing lecturers from research, class preparation and other academic duties. The few academic staffs have also been appointed to perform management/administrative duties. f) There is limited position for placement of students for internship especially in the field of architecture and estate management and valuations due to few registered firm related to the field in Rwanda.
OPPORTUNITY	**THREATS**
a) Local graduates are assured of jobs as the field in quantity survey and architecture cannot meet the current demands of construction industry. b) Graduates have a large region to practice within the integrated East African region. c) Currently the process of accreditation of some of the programs such as architecture by the Commonwealth Association of Architects is underway. d) Framework to control the construction industry by the Architectural Association of Rwanda (AAR) is underway to sensitize the population on the need of engaging professionals. most of them slotted to graduate in 2014.	a) There is a general negative perception by the construction industry against engineering graduates from KIST citing incompetence or lack of skills or substandard training due to lack of equipment. b) Most of the local academic staff undertaking postgraduate studies rarely returns to take up their faculty jobs due perceived better opportunities elsewhere. c) Most of the established foreign firms provide their own foreign staff to manage construction in the country denying the local graduates an opportunity to gain experience. d) Part time staff tends to exhibit high rate of turnover, which imparts negatively on the growth of the training program. They are to reluctance by the institution to hire full time foreign staff due to budget constraints and high cost of salaries.

B. KIST Faculty of Engineering (FoE)

The department of civil Engineering and Environmental Technology under the Faculty of Engineering offer construction. There are 5 programs including the following (Table 88):

- Diploma in construction;
- Bachelor of Civil Engineering and Environmental Technology (CEET);
- Bachelor of Science in Mechanical Engineers (MEE), with specialization in mechanical building services;
- Bachelor of Science in Electrical and Electronics (EEE, with specialization in electrical building services;
- Masters in Highway Engineering and Management.

Table 89: Summary of Student Enrollment for Courses at the Dept. of CEET, MEE

Department	Training Program	Occupation	Duration	M	F	Total
Civil Eng and Environmental Technology	Diploma in construction (A1)		3 years	30	2	32
	Bachelor of Science in **Civil Engineering**	Civil Engineer / Contactor	5 years	279	59	338
	Bachelor of science in **Water and Environmental Engineering**	Environmental Engineer	5 years			
	Bachelor of Science in Mechanical Engineering	Mechanical and Building service Engineers	3 years	11	0	11
	Bachelor of Science in **Electrical and Electronics Engineers**	Electrical and Electronics Engineers	5 years	163	36	199
	MSc. in **Highway Engineering & Management**	Highway / Road Engineer	2 year	No data		

The program in civil engineering provides a broad base in civil engineering with modules focusing on the various aspects of civil and structural as well as environmental engineering. Modules covered during undergraduates are as follows;

- Workshop Technology
- Engineering Economics
- Construction Managements
- Engineering Geology

- Engineering Hydrology
- Concrete Technology and
- Structural Engineering (Design of foundations, Concrete, mason and Timber structures)
- Surveying
- Irrigation and drainage engineering
- Estimating and costing
- Transport Engineering

Specialization into the various fields of construction can be acquired during post graduate studies or via experience in the field upon completion of Undergraduate program. Currently KIST offers Masters of Science in Transport Engineering and Management.

Number of Academic staff in the FoE - CEET, ME EAND EEE: - CEET was established in 2005 and has a large number of local staff (89%), some of whom where alma alters of KIST. Below is the staff distribution of Academic staff in the CEET

Table 90: Number of Academic staff in the FoE – CEET, ME EAND EEE

Department and staff qualifications		Local		Foreign		
		Male	Female	Male	Female	Total
Civil Engineering and Environmental Technology	Prof.	-	-	-	-	19
	PhD	2			1	
	Masters	10		1		
	Bachelors	5				
Total Academic Staff		**17**		**1**	**1**	**19**

SWOT Analysis FoE Department of Civil Engineering and Environmental Technologies.

STRENGTH	WEAKNESS
a) KIST program of CEET, running under the FoE, is one of the two program in higher learning institution in Rwanda (the other is NUR) offering civil engineering in Rwanda. The demand is available. b) Students have easy access within Kigali for field work and potential job networking compared to Butare as is the case of NUR c) Proximity with IPRC Kigali, which has additional state-of the art equipment makes up for inadequate training equipment, MoU can be explored to check sharing possibilities.	a) The training program is not recognized within other Common Wealth countries and is only valid in Rwanda. This because the program has yet to be accredited by the Commonwealth Association of Architects. b) There is lack of sufficient and up to date equipment to train the students c) Shortages of qualified academic staff.
OPPORTUNITY	**THREATS**
a) Local graduates are assured of jobs as the field in quantity survey and architecture cannot meet the current demands of construction industry. b) Graduates have a large region to practice within the integrated East African region. c) Currently the process of accreditation of some of the programs such as architecture by the Commonwealth Association of Architects is underway. d) Framework to control the construction industry by the Architectural Association of Rwanda (AAR) is underway to sensitize the population on the need of engaging professionals. most of them slotted to graduate in 2014	a)There is a general negative perception by the construction industry against engineering graduates from KIST citing incompetence or lack of skills or substandard training due to lack of equipment. c) Most of the local academic staff undertaking postgraduate studies rarely returns to take up their faculty jobs due perceived better opportunities elsewhere. c)Most of the established foreign firms provide their own foreign staff to manage construction in the country denying the local graduates an opportunity to gain experience. d) Part time staff tends to exhibit high rate of turnover, which imparts negatively on the growth of the training program. They are to reluctance by the institution to hire full time foreign staff due to budget constraints and high cost of salaries.

- **Number of Academic staff in the CEET**

CEET was established in 2005 and has large number of local staff (89%), some of whom where alma alters of KIST. Below is the staff matrix distribution of Academic staff in the CEET

Table 91: Number of Academic staff in the CEET

Department and staff qualifications		Local		Foreign		
		Male	Female	Male	Female	Total
Civil Engineering and Environmental Technology	Prof.	0	0	0	0	19
	PhD	2	0	0	1	
	Masters	10	0	1	0	
	Bachelors	5	0	0	0	
Total Academic Staff		17	0	I	1	19

Box 2: CASE STUDY OF ST JOSEPH INTEGRATED TECHNICAL COLLEGE (ITC)

St. Joseph Integrated Technical College (ITC) is a private initiative of the Catholic Church (Fathers) in Rwanda to offer training programs for the development of competency skills. It targets young school leavers in Rwanda. The facility was started in the 1970s and has some of the best training facilities (workshops, laboratories and equipment) in the country. Training Programs are for both Diploma and Certificate courses, full-time and part-time students: A2 and A1 Students

Courses include: Construction, Public Works: Civil Engineering: Road & Bridge Construction,
Survey, Water Supply and Sanitation, including Hdrolic works; Plumbing, and Carpentry.

At TSS level have about 466 students doing construction, public works and survey. But for short courses operate under-capacity despite the great demand. A class /facility with a capacity of 40-60 trainees have only 5-10 finishing/graduating. The dropout rate is very high due to lack of school fees. For example, in a 9 months course, at the beginning about 60 students are enrolled; every month students dropout. By the end of the course, only 10 graduate. The cost of a nine-month course is about 300,000 RWF ($500).

The problem of dropout is also a challenge among A1 level Engineering students in Building Construction. This is a three-year course and the cost is 600, 000 RWF ($1,000) per year. The demand is also high. At the beginning about 60-70 students are enrolled; but they dropout annually. By the end of three years only 25-30 manage to finish and graduate.

Lecturers: Have adequate and qualified lecturers: Professor earns about 500,000 to 600,000 per month net ($8000 – 1,000); Assistant Lecturer earns about 300,000 ($500) per month net.

The institution puts more emphasis on practicals: 1-hour theory, 2 hours practicals for all the students. The college have well equipped and state-of the art facilities. Two laboratories: 1. For soil/sand testing, and, 2. For Structural Engineering (costing RwF233 million - $390,000). There is also an internship program, where students are sent to various establishments for attachments including EWASA. But the challenge is that there are many companies registered as Construction Establishments in Rwanda. But well-established ones that could offer students useful practical hands-on experience are very few.

The institution management and lecturers appeal to Rwanda Government and RDB in particular for support. One way of making the students gain from the institutions is for RDB/the government to subsidize students' fees and in some cases giving full scholarship. There is also need for public education and sensitization of parents and communities in all the districts.

4.3 Academic Staff in the Construction Courses in HLI

Table 91 shows the number of lecturers by qualification and nationality in the 33 higher institutions that responded to the survey. Rwanda lecturers constitute 86 per cent of the teaching force, while foreigners constitute 14 per cent. Lecturers who are professor are less than 1% and are all foreigners. Those with PhD constitute 5% (of whom Rwandese 73%, Foreigners 27). Lectures with Masters Qualifications constitute 28.7% (of whom Rwandese is 76.5 and Foreigners 23.5%). Those with BA/BSC constitute the bulk of the lecturers at 39.8% (Rwandese 93%), and the lecturers with Diploma constitute 17 per cent (of whom Rwandese are 97.3%).

Table 92: Construction Lecturers by Qualification, Gender & Nationality

Qualification	Rwandese			Foreigners		
	Male	Female	Total	Male	Female	Total
Professors	0	0	0	0	1	1
PhD Lecturers	6	2	8	0	3	3

Lecturers with Masters	**55**	**7**	**62**	**14**	**5**	**19**
Lecturers with BA/BSc	**73**	**7**	**80**	**6**	**0**	**6**
Lecturer with Diploma	**31**	**5**	**36**	**1**	**0**	**I**
Total	**165**	**21**	**186**	**21**	**9**	**30**

Women lecturers in the sector constitute 13.9% (of whom 70% are Rwandese). 57% of women lectures that are Rwandan have bachelors and diploma qualifications. The only woman lecturer at professor level is a foreigner.

Based on international standards, training institutions of higher learning are required to have a composition of about 10% professors, 70% PhDs, 19% Masters and 1% BA/BSc and diploma holders for effective teaching, supervision and research**.** Rwanda institutions instead have less than 1% professors, 5% PhDs holders, 28.7% Masters, and 39.8% Bachelors and 17% Diploma.

4.4 Training Facilities and Equipment: Workshops/Laboratories

Heads of academic programs were asked to assess the conditions of their institutions/departments training facilities including laboratories/workshops. Table 93 shows that 78.8% of the institutions had enough laboratories/workshops for their teaching. In TVC and SST, respondents were unanimous about the availability of these facilities. However, at the university, only one third of universities had enough laboratories/workshops.

Table 93: Distribution of Institutions by adequacy of Laboratory/workshop

Institution	Enough Lab/Workshop	Not enough	Total	Enough Lab/Workshop	Not enough	Total
University	3	6	9	33.3	66.7	100.0
IPRC	4	1	5	80.0	20.0	100.0
TVC	9	0	9	100.0	0.0	100.0
SST	10	O	10	100.0	0.0	100.0
Total	26	7	33	78.8	21.2	100.0

However, in terms of the conditions and availability of equipment only 11.1% of universities, 22.2% TVCs (22.2%) indicated that they have some good equipment for practical instructions, compared to 80% of IPRCs. One IPRC in Kigali support by KOICA of Korea have state of the art facilities.

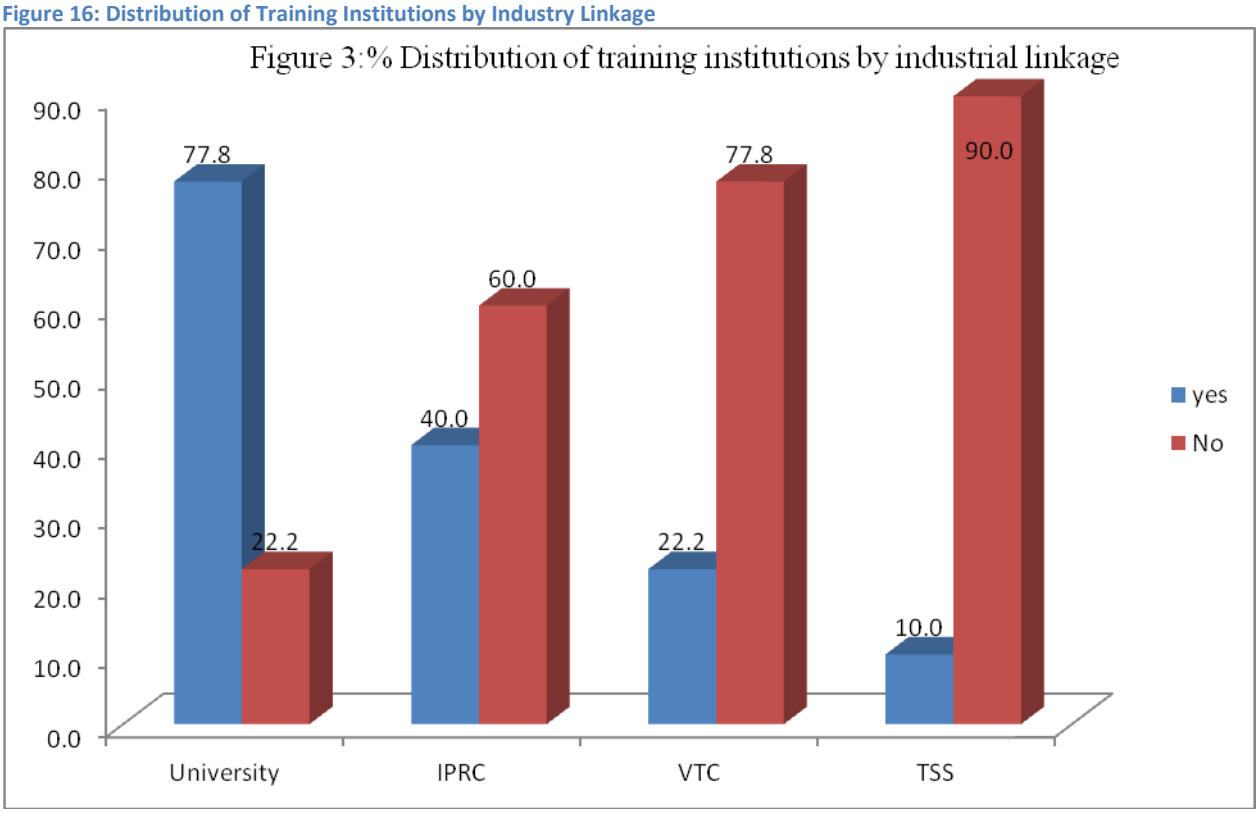
The facilities and equipment in the training institutions visited were old and dilapidated, and few for meaningful practical instruction. All the training institutions responded that they do not have the state of the art laboratories/workshops with modern equipment because of

lack of financial resources to buy them. Of the universities visited only 22.2% indicated that they have adequate number of good equipment, compared to 60% of IPRC and 22.2% of TVC. Even with the few students that the training institutions enroll in construction, the equipment -student ratio is still high at 1-25 up to 35-40 in IPRC and TVCs, compared to international standards of 1:1 up to 1:4.

4.5 Training Institution - Industry linkage & Internships

The survey sought to know the existing training institution-industry linkage. Figure 15 indicates the distribution of training institutions that reported having linkages with industry in Rwanda. The number of linkages is high at the university level followed by IPRC.

Figure 16: Distribution of Training Institutions by Industry Linkage



The linkages with industry is mainly for intership and consultancy where lecturers are commissioned/hired by private establishments to work for them in some sector related professional assignments. Industrial attachment for students is a mandatory requirement.

Table 94: Kind of Work Done by Lectures /Tutors with Industry

Institution	Kind of work done with industry
University	Architectural consultancy services run at the departmental level, Organize workshops and exhibition of students work and practicing architects, Networking with practicing architects for industrial

	attachment positions
	Consultancy services in collaboration with private sector
	Industrial Attachment, Exposure programs, Function catering when there are events, meeting.
	Research and trying to allocate placement for internees.
	Research for industrial attachment and assessment/feedback curriculum review.
IPRC	Research for internship placement, also try and locate work for graduates (employment).
	Curriculum review.
	Test material and surveying for public/private institutions.
VTC	Study tours and preparation of teaching aid.
TSS	Study tours and preparing teaching aid.

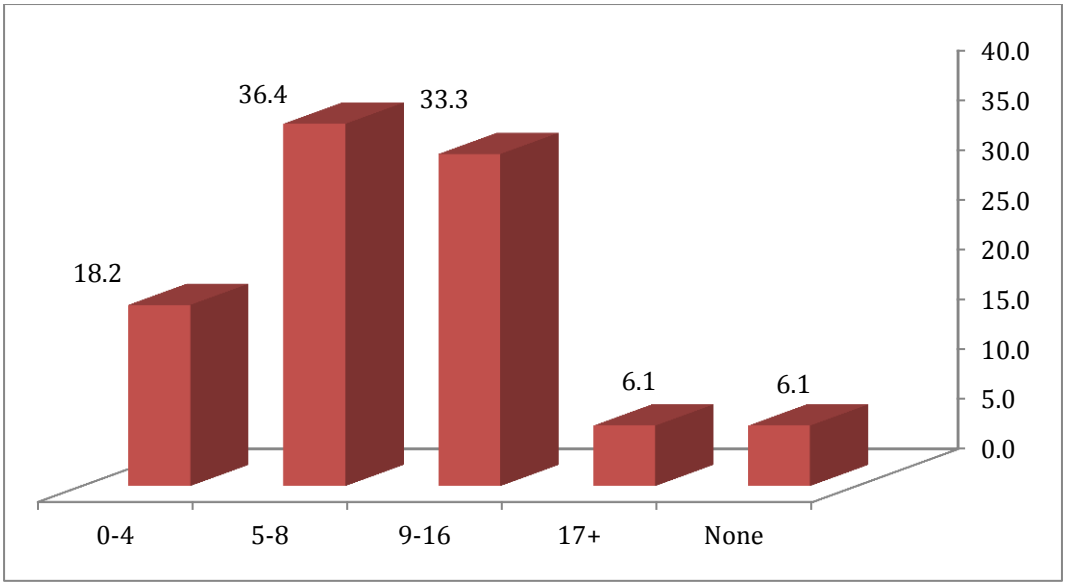
Internship and industrial attachment: - Table 95 shows that 93.9% of the 33 training institutions visited had internship program.

Table 95: Number of Training Institution with Internship Program

Institution	Have intern program	No program	Total
University	8	1	9
IPRC	5	0	5
TVC	9	0	9
SST	9	1	10
Total	**31**	**2**	**33**

A majority of institutions with internship programs are of duration of 5-8 weeks (36.4%), followed by 9-16 weeks (33.3%). For a shorter period up to 4 weeks (18.4%) and 6.12% the institutions have a program for longer duration of 17 weeks or more.

Figure 17: Duration of Trainees Industrial Attachment (Weeks)



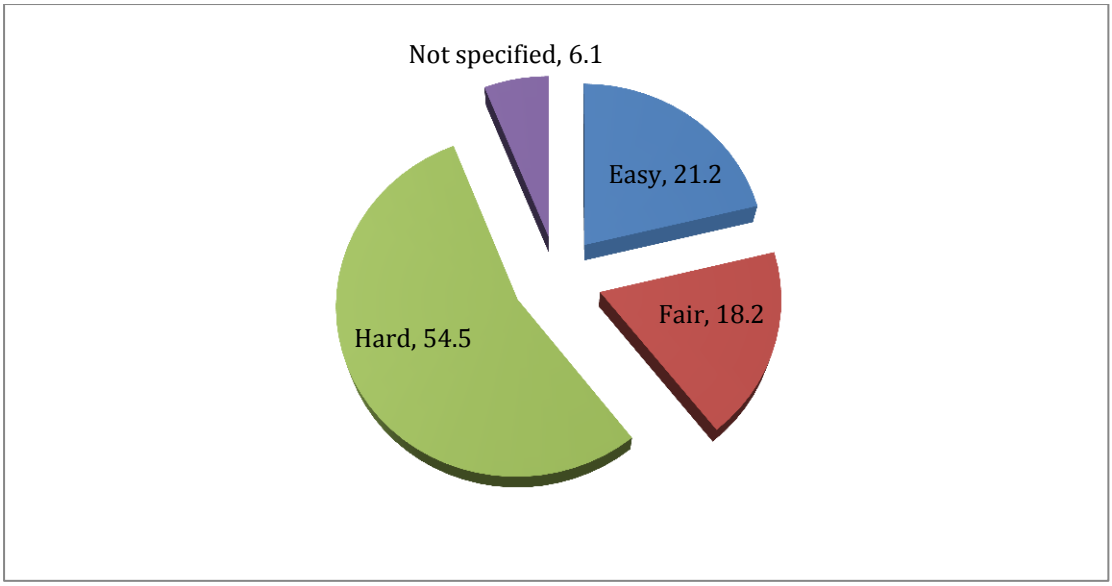
The private sector organizations is the leader in accepting students on internship with a share of 63.7% of all the students followed by the public sector with 36.9% (Table 96) International organizations take only 0.4% of these students. However in the case of Universities, the share of students going to public institutions is relatively higher 55.2% compared to the private sector 44.2%.

Table 96: Organizations Where Training Institutions Take Their Trainees for Industrial Attachment

Organizations	University		IPRC		TVT		TSS		Total	
	No	%	No	%	No	%	No	%	No	%
International Organization	3	0.6	2	1.8	0	0.0	0	0.0	5	0.4
Private sector	225	44.2	95	86.4	390	78.0	180	60.0	890	62.7
Public Institution	281	55.2	13	11.8	110	22.0	120	40.0	524	36.9
Total	**509**	**100.0**	**110**	**100.0**	**500**	**100.0**	**300**	**100.0**	**1419**	**100.0**

Level of challenges: - Respondents from training institutions were asked to rate how difficult it was to place the interns in the private sector. More than half -54.5% of the institutions felt that it was hard compared to 21.2% who indicated it was 'easy' and 18.2% of the institutions indicating it was 'fair' (Figure 17(.

Figure 18: Level of Challenges in Placing Interns in the Private Sector



SST and VTC find it harder than universities and IPRCs to place their students places for internships (Table 94).

Table 97: Response by Institutions on Placement for Internship

	Easy	%	Fair	%	Hard	%
University	1	14.3	4	66.7	3	16.7
IPRC	3	42.9	1	16.7	1	5.6
TVC	2	28.6	1	16.7	6	33.3
SST	1	14.3	0	0.0	8	44.4
Total	**7**	**100.0**	**6**	**100.0**	**18**	**100.0**

Knowledge of RBD-HCID internship: - RDB, the client of this survey, runs an internship program for young Rwandans. Training institutions representatives were asked if they are aware of this program. The level of awareness of RDB/HCID internship program is relatively low. Figure 8 shows that 27.3% of the institutions were aware of this program. And 72.7% of the institutions were not aware of the program and were hearing of its existence for the first time. Of the 9 universities who responded to the survey, 66.7% were not aware of the program, compared to 60% of IPRC and 88.9% of TVC.

4.6 Labor Market Information System (LMIS)

Labor Market Information (LMIS) is a valuable resource that can be used by training institutions, students and employers. Job seekers, service providers, employers, educators, researchers and policy makers all use LMI to plan and make informed decisions.

During the survey training institutions were asked about establishment of Labor Information System. Three quarters of the institutions did not have a LMIS. Analysis by institution as presented in Figure 5 shows where even at the university level 88.9% of the institutions visited reported that they do not have some kind of LMIS, compared to 80% of IPRC and 77.5% of VTC reporting the same.

Table 98 indicated the institutions knowledge about the existing RDB LMIS at HCID. Of the 33 training institutions that responded to the survey, 81.8% had no knowledge of RDB LMIS.

Table 98: Knowledge of LMIS at RBD- HCID

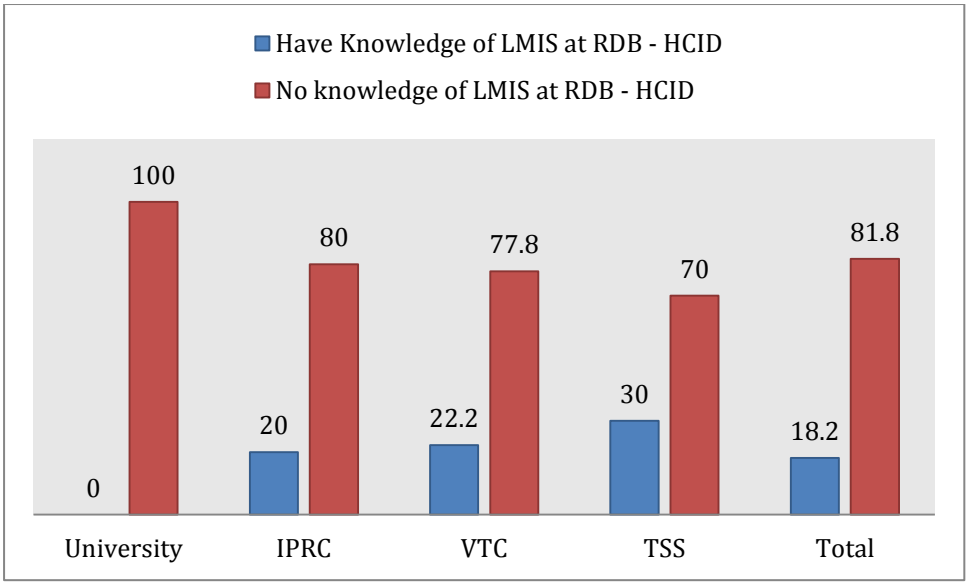
	Have Knowledge of LMIS at RDB – HCID	No knowledge of LMIS at RDB - HCID	Total
University	0.0	100.0	100.0
IPRC	20.0	80.0	100.0
VTC	22.2	77.8	100.0
TSS	30.0	70.0	100.0
Total	**18.2**	**81.8**	**100.0**

In relation to RDB, one in every 5 institutions was not aware of LMIS at RDB. None of the universities surveyed knew of existence of LMIS at RDB (Table 96).

Table 99: Knowledge of LMIS at RBD

	Have Knowledge of LMIS at RDB	No knowledge of LMIS at RDB	Total
University	0	9	9
IPRC	1	4	5
VTC	2	7	9
TSS	3	7	10
Total	**6**	**27**	**33**
Total	**18.2**	**81.8**	**100.0**

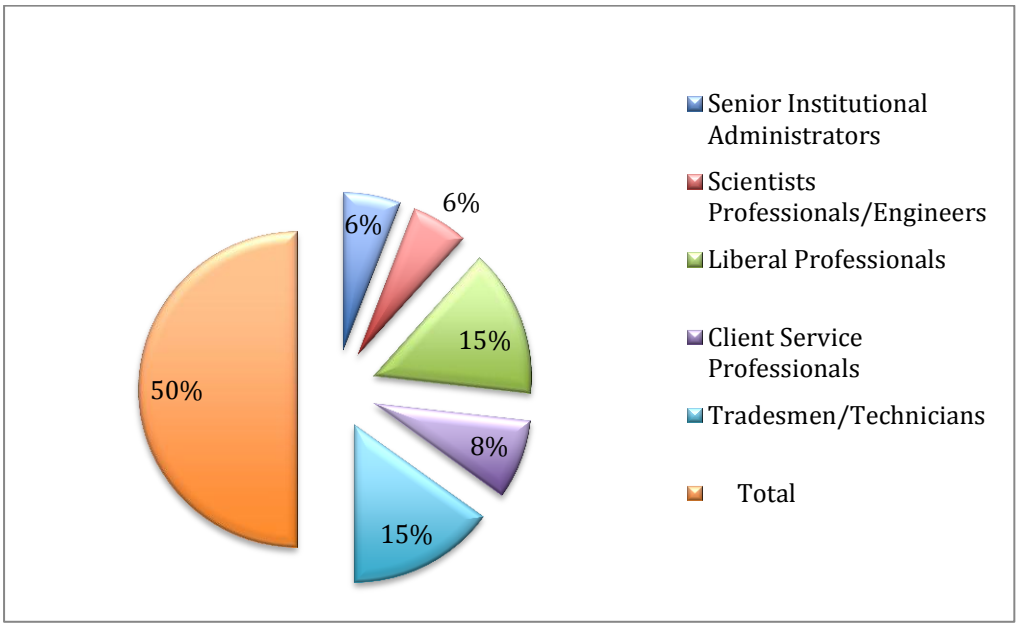
Figure 19: Knowledge of HCID



4.7 Staff Turn-over & Vacancies

The training institutions that participated in the survey were also asked to indicate the existing vacancies in their institutions. As indicated in Figure 19, 50% of the training institutions indicated that had vacancies at the time of conducting the survey. More vacancies were at the level of technicians and liberal professionals.

Figure 20: Vacancy by Category of Occupation in Training Institutions



The main reasons given by institutions for the existing vacancies included; "Our pay offer not attractive to qualified people", "Applicants do not meet qualifications and experience required (education & training)", and "we are unable to offer competitive incentives, thus high turnover"

Staff-turnover: - The capacity of training institutions is reduced by the frequent and high turnover of qualified staff. About 33 per cent of the institutions reported high staff turnover. Table 100 indicates the proportion of training institutions that reported high staff turnover during the survey. The staff turnover is high in TSS and IPRC. About 33.3 of universities visited reported staff turnover.

Table 100: Staff Turnover by Type of Institution 2011/2012

Institution	High staff turn over		No high staff turn over		Total	
	No	%	No	%	No	%
University	3	33.3	6	66.7	9	100
IPRC	3	60.0	2	40.0	5	100
TVT	4	44.4	5	55.6	9	100
TSS	7	70.0	3	30.0	10	100
Total	**17**	**51.5**	**16**	**48.5**	**33**	**100**

Table 101 below shows that high turnover is experienced among academic (61.7%) at universities and IPRCs, turnover of teachers and technicians at TVC and TSS is reported at 17% and 17% respectively.

Table 101: Number of Staff Turn-Over in the Last Three Years

Occupation	Male	%	Female	%	Total No.	Total %
Academic staff	42	75	16	25	58	61.7
Accountant	1	100	0	0	1	1.0
Civil engineer	4	100	0	0	4	4.3
Teachers	10	62.5	6	37.5	16	17.0
Trainers/Instructors/Technicians	12	80	3	20	15	16.0
Total	**69**		**25**		**94**	**100.0**

Respondents who reported reasons for high staff turnover indicated that this arose from competitive salaries from other employers, dissatisfaction with salary rewards and working environment.

Academic staff and earnings: - The average earnings for Rwandese and foreign individuals are presented in Table 102. For Rwandese these earnings range from an average of 155,551RWF for a laboratory technician to 1,208,700 RWF for Professors. Furthermore, there is a significant gap in the salaries paid; foreigners earn between 3.6% higher than local lecturers, to 14.5% for professor.

Table 102: Salary Structure for Academic Staff in Universities

Level	Rwandese	Foreigners	Average
Professor	1,208,700	1,383,360	1,296,030
Assistant professor	1,031,700	1,140,300	10,860,00
Senior lecturer	507,648	584,350	545,999
Lecturer	256,250	384,314	245,782
Assistant lecturer/Tut. Fellow	223,588	231,538	227,563
Lab technician	155,511	148,636	152,073

The salaries are not competitive enough in the region, especially in private training institutions in Kenya, Tanzania and SADEC countries, South Africa and Botswana in particular, where the salaries for academic and technical staff are up to three to four times higher than Rwanda salaries. In addition, there are other incentives/ benefits like house allowance/mortgage facilities, health insurance and transport allowance.

5.0 FUTURE IMPLCATIONS & RECOMMENDATIONS ON SKILL SUPPLY

5.1 Emerging Issues

The survey findings indicate that the construction industry in Rwanda is experiencing five critical issues. First, it is one of the fastest growing sector in Rwanda's economy and it is booming with establishments in all the five provinces. Second, the construction industry has a heavy reliance on foreigners as technical and artisan workers, which makes it expensive for investors and consumers. Thirdly, the training institutions in the country (universities, polytechnics and VCs) have limited capacities to train adequate numbers for competitive skills required for the industry. Fourth, it is an industry that is 99% dominated by men even among artisans. And fifth, with an existing ratio of scientists to technicians to artisans of 1:1.4:12.2 (as opposed to international standards of 1:5:30) the construction industry is experiencing skills shortages in the three categories,

i. Scientists Professionals: the industry requires an estimated 119 scientists professionals in a short term (1-2 years)

ii. Construction Technicians: the industry requires an estimated 252 technicians in the next 1-2 years.

iii. Artisans to support construction investments: The industry requires 2,789 trained artisans now and the next 2 years.

Rwanda lacks professionals, technicians and even skilled artisans in the construction industry. The overall, skills gaps (current) are estimated to be 3,259 (Managers 82, Scientists professionals 119, Technicians 252, and Artisans 2,786), which is about 65% of the existing labor force in the industry. The problem is more acute at technician and artisan levels. Besides, the proficiency of the existing labor force is estimated to stand at 61.2%.

The existing labor force in the industry is also weak in 'soft skills' like communication, assessing & managing risks and team building. The skills gap is likely to double in the next 2-3 years if the current boom in Rwanda's construction industry continues. The challenge is that the existing training institutions currently produce about 100 graduates and 1,400 diploma and certificate holders every year. However, there are a few qualified and skilled plumbers, electrical installers, painters, steel specialists, and construction supervisors in general. Such technicians, in many occasions are imported from Kenya and Uganda, if one needs a good finishing job to be done.

More critical is that, foreigners constitute a larger portion of the labor force in the industry-at 18% of the total labor force. Large Establishments in the four subsectors, namely "Site Preparation", "Construction of Building", "Construction of Utility Projects", and "Building Completion and Finishing" are dominated foreigners in key occupations including technicians and artisans as already discussed.

The development and supply of needed skills for the construction industry today and in future in Rwanda is experiencing many skills development challenges. These include the following:

1. An inadequate number of young Rwandans entering training institutions (polytechnics and universities) and taking construction related programmes/courses. This is because of limited programmes and training opportunities in the current training institutions in the country.

2. The existing construction related programmes in the training institutions are not only narrow and less responsive to market needs in their approach, but are also lacking facilities, equipment and qualified academic staff to take and support a big number of students interested in the industry.

3. Limited supply of much needed construction technicians. This is because of limited opportunities, facilities and staff in IPRC and VTC. Currently such institutions can only accommodate 20 – 30 students; which after graduating is just a small drop in the competitive market in the country. Besides, such institutions have limited capacities to mount competitive tailor-made courses for construction technicians and artisans.

   Thus, there is a lack of enough vocationally trained 'work ready' graduates to fill the existing vacancies and satisfy the increasing demand in the industry.

4. A failure by training institutions (and regulating body/structure in Rwanda) to ensure that the quality and relevance of training programmes are keeping with the increasing demand of skills in the industry in Rwanda. The existing institutions currently have:
   - limited qualified academic staff and technicians
   - limited and outdated equipment
   - Dilapidated workshops and laboratories.

5. A very limited training institutions-industry linkage and R&D programmes. The existing linkages are reduced to students internship programmes, which are also not comprehensive enough leave alone being available to the majority of trainees.

6. About 90 per cent of establishment in the construction industry in the country do not allocate resources for training and re-training of their employees. They report that they do not have money for such training and even if they have, they are not aware of institutions that could offer relevant and quality training.

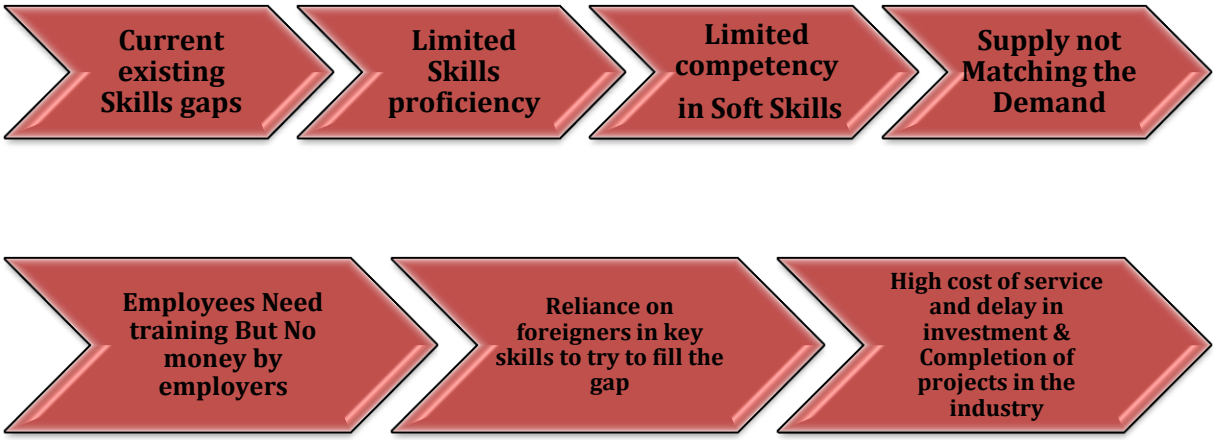
7. Earnings and other incentives including working environment is low and unattractive for construction professionals and technicians in Rwanda and the region. Thus hiring such skills, motivating and retaining them in the training institutions in Rwanda is a critical challenge.

8. With the ratification and implementation of EAC Common Market Protocol, and the free movement of labor in particular, could exacerbate skills shortages in Rwanda due to limitation of attracting and retaining skilled labor. There could be increased

competition from other EAC member countries making it difficult to attract skilled labor in the construction industry into Rwanda with the currently low salaries and limited incentives.

In summary, despite the increasing demand for skilled labor force, the construction industry in Rwanda is currently going through a full circle of challenges (Figure 20).

Figure 21: Vicious Cycle of Skills Gaps in Rwanda



And the vicious circle of limited skills continues. This results into poor quality of products and service and less competitive industry. For efficiency and effectiveness in this vicious cycle has to be broken in a systematic and comprehensive manner. It is from the above analysis that the following recommendations are made.

5.2 Recommendations

The findings of the skills survey indicate that there is need for concerted, coordinated and comprehensive efforts, strategy and investment to enhance skills development for the fast growing construction industry in Rwanda. This will cushion the industry from being 'invaded' by foreigners – technicians and artisans- in particular, and make the cost of doing business in the industry cheaper.

The following specific recommendations need to be implemented:

1. **Establishment of Sectors Skills Councils (SSC's)**
   The Sector Skill Councils are national partnership organizations that will bring together all the stakeholders – industry, labour and the training providers, for the common purpose of workforce development within the industry sectors. The sectors will be key

in developing qualifications standards to ensure that the quality of trainees in technical schools, higher learning institutions and professional development stages is relevant and globally competitive. The SSC's will also be the center mechanism for coordinating school to industry linkages that provide work based experiential learning for skills development.

2. **Up skill the of existing labor force:**
   There are over 2,500 unskilled labor units, in particular, technicians and artisans, currently in employment in the industry. In the short-term (6-12 months) there is need for specific in-service training courses to improve skills and competencies of the existing labor force in the industry. In addition, there is need to mobilize and sensitize owners to take training/upgrading of their employees skills as a strategy for quality improvement, higher productivity and hence profitability.
   To address this, technical training institutions to launch tailor made programmes for already employed or self-employed technicians and artisans. Private and well established technical institution with capacity to train (like The Catholic Brothers Technical College) should be funded and commissioned to expand and mount training programmes for existing/already employed labor in the construction industry. The fees charged by such a good institution should be subsidized and students supported through a voucher system.
3. **Enhancing Qualitative Skills among Employees in the Private Establishment:**
   Employees who responded to the survey indicated a need to enhance their capacities in 'soft' skills targeting: Communication skills, Leadership skills, Risk identification & mitigation. Beyond the technical skills, these are important for investor relations and personal development.

4. **Strengthening capacities of IPRCs and VTCs**
   In the medium term (13-36 months) building on the Government initiative to establish 5 IPRC (1 per province) stakeholders in Rwanda and abroad, to mobilize resources to enhance the capacities of these institutions and those of Vocational Training Centers(VTC's) . Various options should be considered:
   - Inviting regional and foreign investors to invest and manage selected IPRC and VTCs and mount competitive courses for five years. This courses should target market demanded technicians and artisans.
   - Twin all the IPRCs with international institutions, which will invest resources and time in these Rwandan institutions to make them competitive and offer more opportunities to Rwandan youth and employees;
   - Mobilize Rwanda in Diaspora and friends of Rwanda abroad (corporate and individuals) to provide resources for skills development in IPRCs and VTC.
   - Establishing and Incubation facility-Business incubation facilities are used to develop entrepreneurial skills among the youth who graduate from TVET institutions. Such a facility should serve the following purposes:
     - opportunity for research and knowledge building;

- skills development in technical areas;
- entrepreneurship skills to start and run a business;
- provision of seed grant to start a business . This is given to a group of trainees who have viable and bankable business projects

5. **Promoting PPP for internships and attachment programmes**

   Public-Private Partnership should be enhanced in Rwanda to promote attachment, apprenticeship and internship opportunities for trainees and graduates. The strategies for this include following options:

   - Development of a national Internship Policy, starting with an assessment of the existing programmes to establish priority skills areas to be developed.
   - The Government should consider motivating private companies to participate in internship through industrial levies managed by WDA and/or tax rebates as it happens in Kenya.
   - Establish and mobilize partners to establish Internship Fund and establishments should apply for such funds on the basis of trainees they have offered internship.
   - Identify top innovative and hardworking graduates in agriculture courses and take them abroad for 4-6 months attachment in well-established construction industries in the region.

6. **Develop a Demand Driven Strategic Plan to expand and strengthen the capacity of KIST.**

   For a long-term skills development, stakeholders in the construction industry in Rwanda should develop a comprehensive 5-10 year demand driven strategic plan for skills development. In particular, target strengthening and expanding the institutional and training capacities of KIST's Faculty of Engineering, departments of construction and civil engineering with a view to:

   - Expand its training programme and make them demand driven and competitive in the region;
   - Equip and expand its training workshops/laboratories and equipment/facilities;
   - Offer competitive salaries and incentives to attract, motivate and retain qualified academic staff at the institution.
   - Enhance KIST-Industry linkages for comprehensive internship and R&D programmes.

7. **Promote stakeholders coordination for specific TVET programmes**

   Industrial attachment, research and development, rewarding talent and quality service should be enhanced. In addition advocacy , public education and sensitization on TVET and acquisition of practical skills in construction sector should be stepped up among the public, targeting the youth. There is also need for exchange and education tours within the region – targeting TVET students

8. **Establishment of Skills Development Fund:**

Skills development needs specific and adequate resource. In order to encourage investment in skill development especially where there are severe skill gaps, the government can initiate a skill development levy where employers have to contribute. The levy collected is channeled into the Skills Development Fund (SDF), which provide grants to companies that send their workers for training. In addition, resources from PSCBS should be open to private sector training. Five percent of the Secretariat's financial resources should be allocated to capacity building of employees within the construction sector in Rwanda.