

Quality of TVET in Rwanda in relation to age, ownership, location and specialisation factors of access and equal opportunity in Ecole Technique Officiels (ETOs) and Agroveternaires (EAVEs)

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ABSTRACT: Technical Vocational Education and Training (TVET) in Rwanda is undergoing drastic reform, moving towards becoming a well regulated, integrated TVET system. With the prevailing un-harmonised TVET and little consistent scientific data or mapping of access, it has not been possible to determine the quality of the prevailing TVET on offer. A sample of Ecole Technique Officiels (ETOs) and Agroveternaires (EAVs) were surveyed, with respondents being identified using a complex sampling approach. Well-structured, coded and graded interview schedules were used to guide enumerators. Descriptive and inferential statistical analysis was carried out to bring out the inherent patterns in the prevailing *status quo*. Clearly, access to TVET is unequal with respect to spatial distribution/location, age, specialisation and ownership. It is necessary for the Government of Rwanda (GoR) to adopt policies that enable improved equity of access to training opportunities. For sustainability in the future to ensue, models of TVET financing that embrace more private sector participation need to be given emphasis.

Keywords: TVET quality, performance indicators, access, equal opportunity, age, ownership, location, specialisation

INTRODUCTION

The civil war in Rwanda between 1990 and 1994 led to a severe depletion of human resources through death or displacement. By the turn of the Century over 90% of the population in the country was engaged in subsistence agricultural farming. Modern economies are predominantly based on industry, mechanised agriculture and well developed service sectors; all of which are driven by knowledge and which demand the existence of a well-educated and skilled labour force. Whilst the service sector is served well by the proceeds from normal institutions of education, the emergence and sustaining of competitive and efficient modern industry and agriculture is based partly on the proceeds of well-structured and operated technical and vocational training institutions. Skills-training is capital intensive due to the high costs of equipment and consumables. It also demands live linkages with industry in order to keep it abreast with the ever changing processes and techniques in industry. In structure and processes, therefore, Technical Vocational Education and Training (TVET) institutions require careful study in order to ensure they meet the demands of industry.

Over the years, TVET has acquired prominence as a practical alternative route to empowering the population to join the world of work with employable skills that would drive competitive production and the consequent economic development of nations. It has, accordingly, acquired meaning as a means of fostering the acquisition of knowledge and skills for the world of work, and progressively shifted away from the traditional skills-only forums towards training and education [1]. Rwanda's long term development vision, as outlined in the Vision 2020, is to be a middle income export-oriented economy, operating as a knowledge-based service hub by 2020 [2]. The Economic Development and Poverty Reduction Strategy I (EDPRS I) 2008-2012 targeted economy-wide productivity improvements and an economic transformation from subsistence agriculture towards commercial agriculture, manufacturing and services [3]. These strategies are expected to raise demand for better and more appropriately skilled workers.

TVET is an approach to training and skills development that seeks to impart market relevant competencies on trainees and, therefore, graduate work-ready trainees. Marcel Crozet noted that various terms have been used to describe elements of the field that are now conceived as comprising TVET throughout the course of history [4]. He further identified these terms to include: apprenticeship training, vocational education, technical education, technical-vocational education, occupational education, vocational education and training, professional and vocational education, career and technical education, workforce education, and workplace education. Several of these terms are commonly used in specific geographic areas. Atchoaren and Delluc in 2001, as reported by Nyerere, gave the broad definition of TVET as

...Education which is mainly to lead participants to acquire the practical skills, knowhow and understanding, and necessary for employment in a particular occupation, trade or group of occupations [5]. The 2002 UNESCO and ILO reference to TVET as reported by NICHE [6] and separately by Gerd-Hanne Fosen [7] and Vina Del Mar [8] is ...those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences, and acquisition of practical skills, attitudes, understanding and knowledge related to occupation in various sectors of the economic and social life. In all the foregoing definitions is the focus of skills and knowledge learned to the world of work, and a recognition that TVET by nature is expected to be responsive to and, therefore, serve the needs of industry.

A standard TVET offering is complex and its quality and performance is equally intricate. As a result, there are many indicators that measure this quality. A particular TVET offering must then determine circumstantially, which quality measures best reviews the growth priorities of its specific TVET in its desired contribution to overall national economic development and social transformation. A survey of common practices in the European Union, the United Kingdom, Denmark, England, Germany, Ireland, New Zealand, Scotland, South Africa, Sweden, the Netherlands and the United States of America, brings out the following range of TVET quality indicators clustered according to frequency of occurrence or use [9]:

1. Most common quality indicators: educational attainment, progression, human resources, learning environment, learner support, demographics and inclusiveness.
2. Moderately common quality indicators: assessment processes, financial resources, physical resources, course documentation, quality assurance systems, quality of teaching, quality of courses, stakeholder satisfaction, training cost effectiveness, access and equal opportunity, employment outcomes, management of training provision.
3. Least common quality indicators: effectiveness of training, collaboration and cooperation, occupational health and safety, innovation and development.

Given the relative infancy of TVET reform in Rwanda, equitable and ample access to training for all its citizens is accorded primacy. There is a keen interest to not only improve livelihoods in a way that brings about increased standards of living, but also to foster improved social cohesion in the nation. It is, therefore, very important that resources and opportunities are made available to as wide a range of citizens as possible. Access to TVET is, therefore, very important. This article ventures into this precise area of inquiry to determine the socio-economic profile and inclusiveness of TVET, which articulates the moderately common quality indicator of access and equal opportunity. The article steers clear of sociological theories of inclusion to avoid diverting attention towards otherwise interesting, but peripheral theoretical abstractions and in this way keeps focus on the on-going TVET reform.

The backdrop to this preoccupation with access is a rather mundane profile of TVET in the country. In 2006, only 30% of secondary school trainees were enrolled in TVET, which status in all likelihood symptomised a possible erstwhile low emphasis on TVET in Rwanda. This low prioritisation of TVET was possibly a result of the rather small industrial sector that resulted in an extremely low demand for skilled personnel. The relative ratios of trainees at secondary school undertaking TVET in various countries with higher levels of industrialisation make an interesting comparison. Netherlands TVET stood at 68.0%; with 31.8% in the United Kingdom; 59.4% in Germany; 56.1% in France; 32.3% in Ireland; 63.3% in Egypt; 38.0% in Turkey; 12.0% in Morocco; and 7.9% in Tunisia [10]. In the same year, transition rates to institutions of higher education for all secondary school trainees in Rwanda stood at 23.7% [11]. A pattern that is revealed here of a rather gentle pyramidal education system may hint at a hitherto low emphasis on pathways of education to completion. It may also suggest that the prevailing learning approaches and systems were perhaps weak, poorly contextualised, dated and in the eventuality ineffective.

The Human Resource Development Agency (HIDA) of the Rwanda Government Ministry of Public Service and Labour's (MIFOTRA) Sector Capacity Building Program (MSCBP) draft report of January 2009 showed that the education and agricultural sectors contributed 60% and 15% of the nation's skilled human capital, respectively. Of 75% of the national skilled work force, 76.9%, 7.7%, 14.2% and 2.2% came out in this report as having its skill base as artisan, technician, professional and managerial cadres, respectively. The ratio of artisans to technicians is seen from these figures to be high standing at 9:1 when compared to the internationally accepted ratio of 5:1. The skills shortage in these same cadres was estimated at 35.9%, 57.8%, 46.7% and 11.5%, correspondingly. Whilst the national skills gap averaged at 39.1%, those in the private sector were the highest at 61.5%, followed by the public sector and civil society at 30.8% and 4.8%, in that order [12].

Availability of large numbers of a well skilled labour force acts as a pull force for industry which, then, precipitates change in the employment ratios to diminish as one goes up the education ladder. This is particularly so given the larger amount of skilled labour required by industry relative to the needs for a higher manpower from general education. Increasing unemployment for the best educated as compared with the least educated noted in Jordan over a number of years is a case in point [10]. To this extent, it is a truism then that properly established and well run TVET institutions not only indirectly support increased employment, but also increased production of industrial solutions to the needs of society. Graduates of TVET in effect attract more industry, while also promoting the expansion of existing ones and this way result in all-round increased production.

Vision 2020's goal of converting Rwanda into a middle income economy partly through the development of human capital cannot be realised without well trained skilled personnel to support the various arms of the economy [2]. Attainment of this target and the attendant demand for adequate numbers of a well-trained skilled labour force is predicated on the existence of well formulated, established, staffed and equipped TVET institutions, with well-structured training standards (curricula and assessment mechanisms). In order to drive the nation towards these goals, the Economic Development Poverty Reduction Strategy (EDPRS) projected an increased enrolment in TVET institutions and a reduction in the student to teacher ratio that would be consistent with world practice [3]. The strategy also envisaged medium term increase in the absorption rate of TVET graduates to about 47%.

ACCESS TO AND EQUITY OF RWANDAN TVET

Descriptive analysis of selected internal and external factors of the social economic profiles of Ecole Technique Officiels (ETOs) and Ecole Agroveternaires (EAVEs) in Rwanda is undertaken here. This analysis covers a requisite four of 10 choice aspects of society that include: age, ownership, specialisation, location aspects of access and equity. Other essential factors of access and equal opportunity for TVET that include the female student population, male student population, female academic staff population, male academic staff population, overall student population and overall academic staff population location have been addressed, and can be referenced as published by Paul Mwangi Maringa and Maina Maringa [13].

Age

The 14 years since 1994 contributed 32.7% of the present stock of TVET schools, compared with 56.4% (89.1% - 32.7%) realised in the preceding 32 years from 1962, and 10.9% that were present before 1962. This trend portrays a drastically increased possible recognition of the value of TVET by Government (Table 1, Figure 1).

Table 1: Age distribution of TVET schools.

Age in years of schools		Frequency of Occurrence	Proportion by Percentage	Valid Percent Proportion	Cumulative Percent
Valid	4	2	3.5	3.6	3.6
	5	3	5.3	5.5	9.1
	7	3	5.3	5.5	14.5
	11	3	5.3	5.5	20.0
	13	2	3.5	3.6	23.6
	14	5	8.8	9.1	32.7
	15	6	10.5	10.9	43.6
	19	6	10.5	10.9	54.5
	20	3	5.3	5.5	60.0
	23	3	5.3	5.5	65.5
	35	4	7.0	7.3	72.7
	36	3	5.3	5.5	78.2
	43	3	5.3	5.5	83.6
	46	3	5.3	5.5	89.1
	51	2	3.5	3.6	92.7
	54	3	5.3	5.5	98.2
71	1	1.8	1.8	100.0	
	Total	55	96.5	100.0	
Missing	System	2	3.5		
Total		57	100.0		

Clearly, there is a concerted effort to increase access to TVET. The Government has ended up in being the single largest owner (40.4%) or sponsor (35.1%) of these schools accounting for a total of 75.5% of all TVET institutions in the country. While this is a commendable trend in as far as it serves to expand the availability of TVET, inherent challenges of sustainability of financing and management will need to be addressed sometime in the future.

The scenario is that there are many old schools, with 40.0% of them having been in existence since 1988. Only 9.1% of the schools have come into existence since 2003. The period between 1988 and 1994 saw the introduction of 30.9% of the present stock of schools. Particular periods of active school building worth highlighting are 1994 (8.8 % of the present stock of schools), 1993 (10.9% of the present stock of schools), 1989 (10.5% of the present stock of schools), and 1973 (5.3 % of the present stock of schools). The years 2003, 2001, 1997, 1988, 1985, 1972, 1965, 1962, 1954 each contributed 5.5% to the present stock of schools. Before 1962, a mere 10.9% of the present stock of schools was in

place. The period from 1994 has contributed 32.7% of the stock of schools till 2008, compared with 56.4% realised since 1962 and the 10.9% present before 1962.

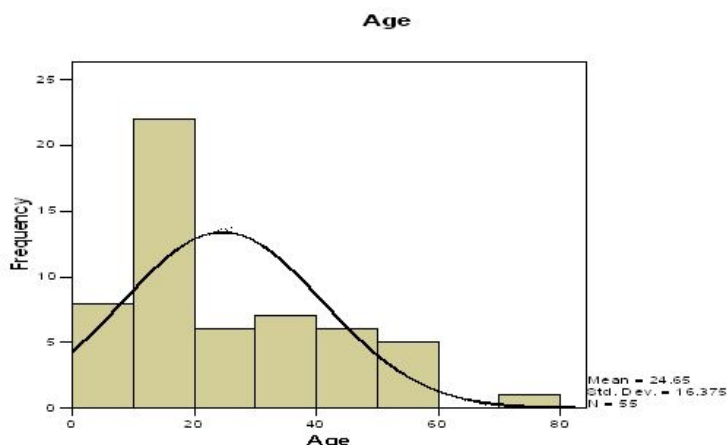


Figure 1: Age distribution of TVET schools.

Ownership

Resolution of all challenges within the TVET system is easier achieved when the stakeholders, owners and sponsors of the schools are well known. It is instructive that the Government is the single largest owner of these schools, with 40.4% of the schools falling under its ambits (Table 2, Figure 2). The 35.1% recorded here as public schools are sponsored by Government and very likely, therefore, also belong to Government. Private schools contribute only 5.3% of the stock of schools. Then, there are the ADPER schools, which amount to 10.5% of the stock of schools on hand, and the missionary-government assisted schools that contribute 5.3% to the stock. There also is this peculiar grouping of SoS KHI private schools that provide 3.5% of the stock of schools.

Table 2: Ownership patterns of TVET schools.

Ownership of schools		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ADPER	6	10.5	10.5	10.5
	Government	23	40.4	40.4	50.9
	Missionary assisted by Government	3	5.3	5.3	56.1
	Private	3	5.3	5.3	61.4
	Public	20	35.1	35.1	96.5
	SoS KHI Private	2	3.5	3.5	100.0
	Total	57	100.0	100.0	

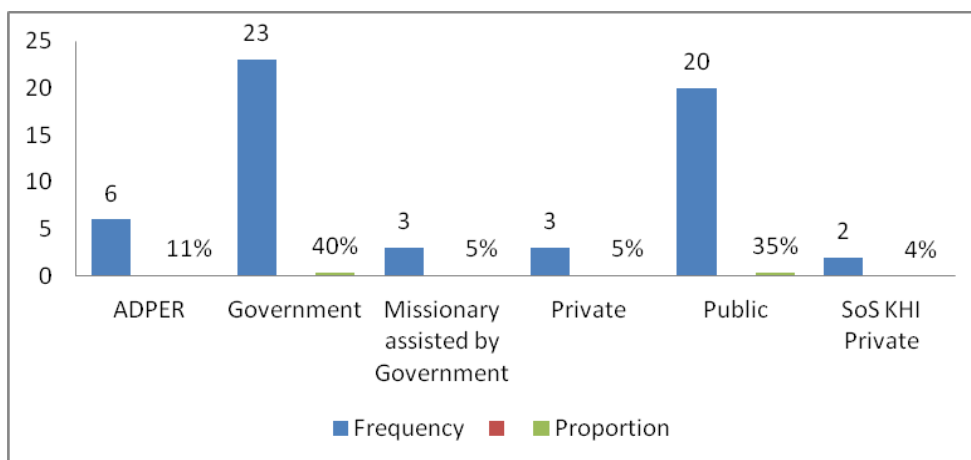


Figure 2: Ownership patterns of TVET schools.

Issues of policy affecting equity could in some measure be easier to iron out as the controlling agency is in most cases the Government itself. It is clear, though, once more that there is an overdependence on central authority for financial

support. This profile does not auger well for future sustainability of this educational initiative, even though education is a strategic investment. It is a well-accepted axiom that the private sector is more sensitive to market needs, runs leaner bureaucracies that are more efficient and accountable. It is these benefits that are normally targeted by a drive to encourage more private investment in TVET.

Specialisation

Unarguably, technical education takes up a good proportion: 47.4% of the specialisations available in these schools (Table 3, Figure 3). This is a credible emphasis on a useful discipline with good practical skills that are available even before graduation, translate in tangible service and developmental transformation of society, and the economy at large.

The demand for these technical skills in the industrialisation of a developing country is much higher than is shown by this distribution of emphasis. The demand for self-reliance of school graduates in terms of generating self-employment is also not favourably addressed when only 47.5% of the schools take up a technical education orientation. It is not convincing for just 47.5% of the labour force in a country desirous of industrialisation to be the only ones with a technical bent.

Table 3: Distribution of training specialisations/occupations areas in TVET.

Specialisations offered in schools	Frequency of Occurrence	Proportion by Percentage	Valid Percent Proportion	Cumulative Percent
Valid	2	3.5	3.5	3.5
A	Agriculture, Veterinary, Biochemistry	3	5.3	8.8
B	Agriculture, Electricity	3	5.3	14.0
C	Agriculture, Veterinary, Biochemistry, Maths	3	5.3	19.3
D	Agronomy A2, Veterinary A2	3	5.3	24.6
E	Accountancy, Human science, Maths, Physics	3	5.3	29.8
F	Accountancy, Biochemistry, Secretarial	3	5.3	35.1
G	Maths, Physics, Biochemistry Commerce, Accountancy	3	5.3	40.4
H	Science & technical	1	1.8	42.1
I	Sciences (Maths, Physics, Biochemistry, Accountancy)	3	5.3	47.4
J	Secretarial, Accountancy	1	1.8	49.1
K	Technical education	27	47.4	96.5
L	Technical Education	2	3.5	100.0
Total	57	100.0	100.0	

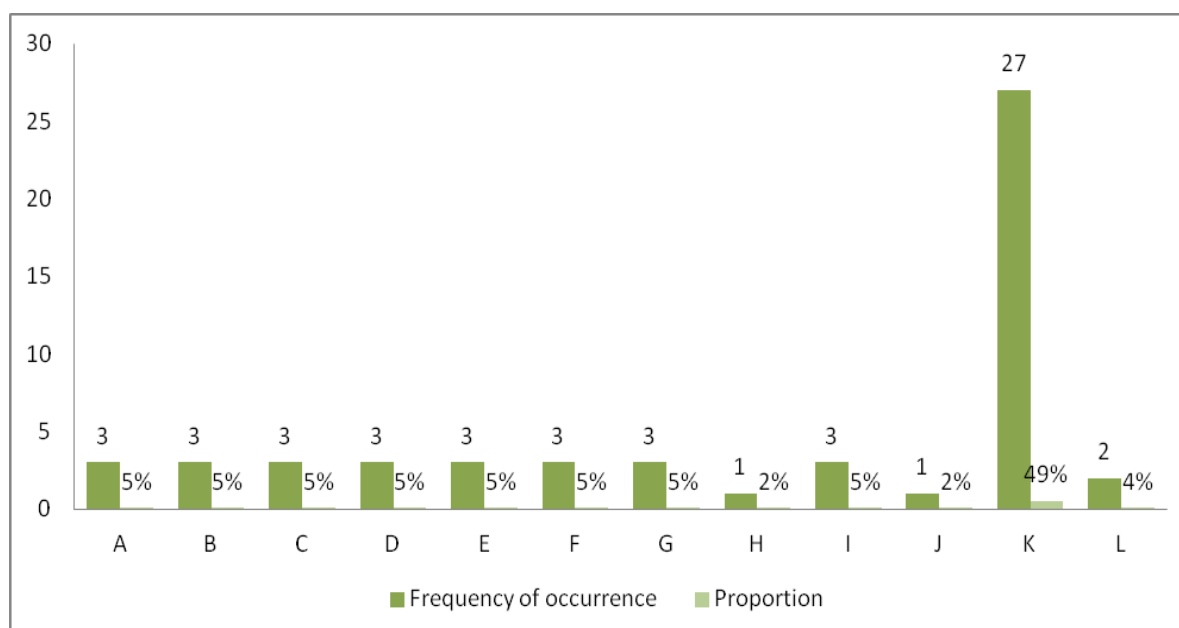


Figure 3: Distribution of training specialisation/occupation areas in TVET schools.

Location

Schools are generally evenly distributed through the country, with most districts contributing 5.3% of the stock of schools (Table 4). However, the Gasabo - MVK and Nyarugenge districts, appear disadvantaged as they only each represent a 3.5% stock of the schools. The district of Gatsibo on its part is relatively well-endowed with 8.8% of the stock of schools.

Table 4: Spatial distribution of TVET schools.

Location of Schools		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Burera/Northern	3	5.3	5.3	5.3
	Gakenke/Northern	3	5.3	5.3	10.5
	Gasabo-MVK	2	3.5	3.5	14.0
	Gatsibo	5	8.8	8.8	22.8
	Gisagara	3	5.3	5.3	28.1
	Huye	3	5.3	5.3	33.3
	Karongi	3	5.3	5.3	38.6
	Kicukiro	3	5.3	5.3	43.9
	Ngoma/Eastern	3	5.3	5.3	49.1
	Ngororero	3	5.3	5.3	54.4
	Nyamasheke/West	3	5.3	5.3	59.6
	Nyamata	3	5.3	5.3	64.9
	Nyanza	3	5.3	5.3	70.2
	Nyarugenge	2	3.5	3.5	73.7
	Rubavu/Kunyundo	3	5.3	5.3	78.9
	Rubavu/West	3	5.3	5.3	84.2
	Ruhango	3	5.3	5.3	89.5
	Rusizi/West	3	5.3	5.3	94.7
	Rwamagana	3	5.3	5.3	100.0
	Total	57	100.0	100.0	

FINDINGS

The rate of increase in the stock of schools was a considerable 1.6% per year during the 32 year span of the post-independence/pre-war years of 1962 to 1994. Growth in this era represents 51.4% of the present stock of schools. Growth of schools stock in the 14 year pre-war period of 1994 to 2008 was remarkably higher at a rate of 2.3% per annum. The overall increase in the stock of schools in this period of 32.7% is less than half that for the post-independence/pre-war period. The pre-independence period, before 1962, rates dismally, managing to supply only 10.9% of the current stock of schools. A majority 75.6% of the schools stock is owned or sponsored by Government, with 40.4% being owned and the remaining 35.1% being sponsored by Government. This is likely to be a result of the capital intensive nature of technical education and also its strategic nature.

Intervention measures, then, must principally emanate from Government and target government initiatives and abilities. ADPER schools are the third next most popular in the ownership categorisation, accounting for 10.5% of the schools, while missionary schools that are assisted by government and private schools each take up 5.3%. The SoS KHI private schools on their part take up 3.5% of the total number of schools. The relative share of the market for this last group of players in the market can be used to possibly represent their weight in responsibility and decision making in the market, including representation in regulatory and coordinative bodies, such as a TVET board of directors or the Council for Higher Education.

TVET is a venture with strategic value to national development. The current monopoly of this sector by Government may, therefore, be understandable, especially as the nation ventures to recreate itself from the ashes of the debilitating 1994 civil war. Government must continue to catalyse and, at times, lead investment in this important area of training, without losing site of the value that the private training providers can bring on board. Private investors are more adaptable to changing circumstantial dynamics and with more financial and managerial accountability. They tend to roll out learner more efficient systems. Private investment in TVET is able to respond to short-term demands for mono-skills that surface from time-to-time with fast changing technologies that typify modern production processes and business. In the long run, private investors are a more sustainable route through which to grow TVET in a nation and need to be encouraged.

Technical education represents 47.4% of the learning and training offered in the schools that were surveyed. At face value, this ratio may appear to compare favourably with trends in developed nations. In reality though, the overall stock of schools does not match demand for training in a scenario where more than 70% of the population is under 30 years of age. This sector of education will need drastically increased investment. In this way, there is hope that TVET can match the national expectations of a drastically expanded enrolment. A good supply of needed skilled workforce to drive industrialisation, with a subsequent socio-economic transformation of Rwanda into a middle income nation by 2020 would then result.

The spatial mapping of schools reveals few incidents of neglect or inequality in the supply of schools. Accordingly, 27 out of 30 (90%) of the districts in the country have 5.3% of the existing stock of TVET schools. Two of the 30 districts (6.7%) emerge as exceptions to this trend with a lower stock of 3.5% of the national total. Another exception is the district of Gatsibo, which exceeds the national mode of 5.3%, reflecting 8.8% of the current overall stock of schools.

CONCLUSIONS

A trend of increasing investment in TVET in the country is evident and this must be encouraged. However, Government on its part inordinately dominates TVET ownership and, therefore, financing. While this can be justified by the need to jump start a neglected though important sector of the human resource development, there are obvious risks of sustainability and untapped potential in the private sector (private training providers and industry-based training) that needs to be accorded more attention in the years ahead.

Technical subjects in TVET schools are more or less matched by non-technical offerings. This is an inefficient use of the school infrastructure and human resources. It is also a loss of opportunity to expand the TVET enrolment. Inevitable conflicts that arise out of a lack of or slow growth of industry, and the attendant low employment and production figures will need some well guided reflection. Sluggish growth in industry can be tied to an inherent low supply of the necessary skilled labour force. The spatial distribution of TVET shows no obvious bias and citizens have equal opportunity of reaching TVET schools within their localities; however, scarce these schools may be in numbers.

RECOMMENDATIONS

For parity of access to ensue in Rwandan TVET, it will be necessary to:

- Encourage more private sector investment in TVET to scale down the overwhelming government monopoly and, therefore, reduce public spending on education. This emphasis is expected to increase sensitivity of the sector to market needs, efficiency and accountability and should usher in leaner bureaucracies in the sector.
- Increase the proportion of schools offering TVET above the present 47.4%, in order to provide the country's workforce with an adequate amount of skilled manpower that is able to translate in tangible self-employment, service and developmental transformation of society and the economy at large, and to foster faster national growth and eventual industrialisation, even before graduation.
- Audit carefully the 21.9% of schools of an age above the statutory 40 year life span of buildings especially given the then low levels of technologies and also possibly building standards for upgrading and, where necessary, replacement of their physical infrastructure.

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BIOGRAPHIES



Paul Mwangi Maringa (PhD) is an Associate Professor of Architecture and Planning. He has taught variously in diploma, degree, and graduate theory and portfolio courses in the department architecture at the Jomo Kenyatta University of Agriculture and Technology (JKUAT) in Juja, Kenya, for 14 years; and also in the Department of Civil and Environmental Engineering at the Kigali Institute of Science and Technology (KIST), Kigali, Rwanda, for 2 years. His academic and professional career has seen him take up positions as Head of Department, Ag., Vice Rector and Ag., Rector, Editor-in-Chief, Associate Editor and referee for two, one and three peer reviewed academic journals respectively. He has also served variously as an Architect/Planner with the Nairobi Provincial office of the Ministry of Works, Githunguri and Collins International, and Ramani Consultants. He has considerable diverse consulting experience in TVET working as a technical expert and master trainer in

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Maina Maringa (PhD, CEng and MIMechE) is an Associate Professor of Mechanical Engineering with research specialisation in thermoelastic stress analysis, composite engineering materials and materials characterisation. He has lectured and undertaken research at tertiary level institutes and at universities for 17 years, while an academic member of staff in the Department of Mechanical Engineering at the Jomo Kenyatta University of Agriculture and Technology (JKUAT) in Juja, Kenya; in the Department of Mechanical Engineering of the Kigali Institute of Science and Technology (KIST), Kigali, Rwanda; and in the Department of Mechanical and Mechatronic Engineering of the Technical University of Kenya in Nairobi, Kenya. Maina served as the founding Vice-Principal initially in charge of Administration, Finance and Academics at the Integrated Polytechnic Regional Centre (IPRC) Kigali, in Kigali, Rwanda and was the founding Acting

Deputy Director General of the Rwanda Workforce Development Authority. He has also served as the Head of the School of Engineering Science and Technology and is presently Acting Executive Dean of the Faculty of Engineering and the Built Environment, both within the Technical University of Kenya in Nairobi, Kenya. He has also worked as an operations and maintenance engineer cum manager in the hydro power generation sector in Kenya, following a one-year intensive training programme in thermal, geothermal, hydro and diesel power generation plants, electric power transmission distribution systems, system control and switchgear testing service, maintenance and repair. Maina serves as a Chief Editor, member of editorial board and referee for 16 journals internationally, and is a member and assessor of the Institute of Mechanical Engineers (UK).