

GLOBAL WATER INSTITUTE IN TANZANIA

Workforce Development through Solar Powered Water Systems

The Ohio State University

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I. Project Background

In Africa, there is an estimate of nearly 500,000 non-functioning water supply systems across the continent. As good-willed organizations work to support new water well builds, it's imperative that financial resources are devoted not only to the construction of wells, but also to establishing a sustainable and capable workforce able to ensure the proper operation of water access points. Estimations that a total of \$360 million dollars has been devoted to the construction of wells that have ceased to operate are a clear illustration of the financial penalties associated with inadequate operation and maintenance of these crucial water access points. These needs necessitate the identification of potential talent pipelines that will provide the able workforce required in years to come. Considerable challenges exist regarding the establishment of an optimized workforce due to technical, social, geographic hurdles.

Water delivery systems in Tanzania have been slow to adapt to business driven, integrated solutions. The Global Water Institute seeks to shift the focus from short-term success metrics (such as number of wells installed) and build the proper foundation for a sustainable solution and long-term outcome measures such as number of operational days per year, reduced incidents of water borne diseases, and new economic activities.

This projects goal, conducted by The Ohio State University Fisher MBA students, is to provide The Global Water Institute with identifying workforce development opportunities for solar powered pumps and systems to ensure there are adequate certified technicians to address annual O&M requirements, near-term tech support and longer-term capital asset replacement for this emerging industry. This project will lead to a recommendation on identifying strategic partnerships that will enable a workforce pipeline as well as identify employee retention methods in order to effectively scale across Sub-Saharan Africa and to meet the needs of rural regions that are more likely to depend on solar and distributed energy systems.

This project is broken down into five key deliverables:

1. Evaluate elements of the Tanzanian workforce and address their approach to workforce development (i.e. Farming, mining, electricity)
2. Identify candidate partnerships for key workforce development activities (two-year diploma schools, vocational high schools, major universities)
3. Evaluate existing training curriculum (certificates, diplomas, courses) and identify direct relationships towards solar power pumping and solar powered systems careers
4. Develop insight on the infrastructure/policy of workforce development activities associate with the government's initiative to increase industrialization and manufacturing in Tanzania
5. Develop proposal for employee incentive/onboarding and retention programs

II. Tanzanian workforce industry review

The Tanzanian workforce has a diverse view of industries spanning from farming, all the way to accounting. This section discusses findings from evaluating elements of the Tanzanian workforce, and addressing several key approaches to workforce development. The findings were narrowed down into four key categories that include: community outreach, employee skill readiness, academic program development and employee motivation.

Community Outreach

The largest industry across Tanzania is farming, making up for just under 70 percent of the population (Farm Africa, n.d). As the nation continues to grow in this industry, one of the most prevalent circumstances for an individual, is to enter this job market at a young age with little education. Around 70-95 percent of the youth enter the job market with just a primary or middle school education. (Minde, et.al, 2015). This has brought up the notion that the teaching of agriculture-related skills needs to happen at those early stages in schooling, where they can learn about the industry. By allowing for a community outreach initiative, they can advance the students success in job readiness, as well as educate them on best practices towards a successful agri-business in their future.

Tanzania has a wealth of natural resources and a fortunate climate. This has allowed for mining to be another leading industry in Tanzania. The minerals discovered contribute over 52% of the country's exports (Open to Export, 2017). The mining industry has historically been an exclusive male employment. Based on an analysis from the University of Dar el Salaam, many students are selecting degrees in the arts and sciences, such as Sociology, over engineering careers such as Mining and Geology. And of those students who do select a mining major, very few are women (Magutu, 2010). One of biggest reasons stated for why this may be the case, is there was a lack of role models to encourage students, specifically young females, to show them what a profession in an engineering career would look like. In the study done by Annah Magutu on women's access to employment in the Tanzanian Mining Industry, she concludes with the suggestion that scholarships for female students, sponsored by the gold mines, should be established at a young age to enable them to attend schooling. Incorporating an outreach program to share this field of study would provide insight and clarity into mining as a career option.

Employment Readiness

The tourism industry is a rapidly increasing industry in Tanzania. Tanzania is a country that lends well to tourism, and as much as it has supported economic growth, there have been challenges with supporting the hiring and recruitment of the local workforce. In a study done by Michele Carboni on employment traits within the Zanzibar tourism industry, he shares, "migrant workers are more 'employable' because they generally have a higher level of education (English language, mathematics skills and the like)" (Carboni, 2016). Many locals are not prepared for their jobs, even after attending an educational training institution. One key to employee readiness is ensuring that there is a partnership between the educational institution training providers and

the industry stakeholders. In the *Journal of Hospitality & Tourism Education*, an article written by Wineaster Anderson & John J. Sanga, they provide a framework stating, “Linking industry with academia can be done through internships, visiting lectures, giving input into curricula development, and so forth. For instance, work-integrated learning or internship is the traditional strategy that combines classroom-based instruction and one or more periods of relevant experiential learning in work settings”. They also recommend incorporating a constituting advisory board to oversee such programs that involves a practitioner (Anderson, Sanga, 2018). By incorporating a strong partnership to industry professionals and the educational systems, as well as establishing hands-on learning can provide a further enhanced employee readiness skill set for new graduates.

The electricity and energy sector is also a strong industry in Tanzania, with much room for growth and job creation. The energy sector is also has constraints with labor force preparedness as students graduate from public and private vocational schools. Although many agreed apprentice programs were valuable and were offered to students, some lost budget and are now more informal (Mwakupugi, Samji, Smith, 2010). The aspect of having hands-on experience and gained learning from a practitioner is valuable in ensuring the student is prepared for the skills necessary to complete the job.

Academic Program Development

In Tanzania, many academic programs are still being developed and optimized for the necessary economic growth. Even in primary aged students the quality of education is under performing, roughly five percent of standard two students read with a grade-level proficiency (USAID, 2019) This spans through to vocational training programs and institutions.

The beekeeping industry is an excellent opportunity for an entrepreneur to get started in a prosperous career while also being a part of an important conversation role. However, the bee keeping industry is under performing and there is a significant volume of turnover. The Singita Grumeti Reserves in the Mara region of Tanzania established a bee keeping project that was made to empower the community. Additionally, the government developed a National Beekeeping Policy (NBP) in 1998, with the goal to help the beekeeping sub-sector to support sustainable development of the economy, as well as the conservation of natural resources (AllAfrica.com, 2013). The policy has encouraged a conservation institute where 12 students from different districts are trained on the environment, conservation and beekeeping. There have also been other institutions that have been created, such as the Beekeeping Training Institute (BTI), which offers technical training certificate and diploma level program across Tanzania (Beekeeping Training Institute, n.d.). Where there is a lack of education necessary in an industry such as beekeeping, the creation of new training programs have emerged to meet the market demand.

The farming industry has also ventured into further training to incorporate structure and best practices around agriculture and job preparedness. In 2019 a partnership between the Vocational Education and Training Authority (VETA) and the Chinese Henan Vocational

College of Agriculture started to help establish a vocational center of excellence for training in agricultural occupations in Tanzania (The Citizen, 2019).

In addition to bee keeping and farming training programs, the energy industry is also moving forward with expanded programs. The VETA act was established which is a competency-based education and training (CBET) initiative. All vocational training programs must be registered through VETA to ensure the programs don't become too fragmented and lose their credibility (Mwakapugi, Samji, Smith, 2010). These efforts are all in support of providing exceptional academic programs for students and enabling them to be ready for the workforce upon graduation.

Motivation and Job Satisfaction

In the healthcare industry, there is a strong desire for employees to receive appropriate incentives, both intrinsic and extrinsic. Among healthcare workers, there is a strong intrinsic motivation to perform the work they do. In a research study done by Michael A. Munga on using incentives to attract nurses to remote areas, they confirmed that those with a strong intrinsic motivation to provide health care are more motivated to work in a remote location (Munga, Torsvik, Maestad, 2013). It is apparent that internal rewards are valuable to workers who believe they are doing a job that matters to their communities and their own family. Additionally, there are many extrinsic motivators. Michael Munga also shares several incentives such as offering continuing education, increased salaries, offerings of decent housing, educational opportunities for their children, access to benefits, career develop support and possibility for promotions – all were considered valuable in the eye of the health care workforce. By offering employees these intrinsic and extrinsic motivations, there is a high likelihood they will put more care toward their work, as well as minimize turnover rates.

Other industries that displayed a high desire for intrinsic and extrinsic motivation is the professional workers, such as certified accountants (CPAs). Tanzania's current and future need for CPAs is more critical than in previous years as small businesses need financial support. There has been a high turnover rate for CPAs (Mpeka, 2003). In a study done by Rogatus L. Mpeka on CPA's job satisfaction he states that, "Many Tanzanian accountants believe that one of the major reasons for this dissatisfaction is that the pay scale for accounting positions is not high enough when compared with non-accounting positions." He shares that motivators are based on an individual's view of their achievement, recognition, the work itself, responsibility within their job, and growth potential. These motivators are speaking to both intrinsic needs to feel valued, appreciated and have a sense of pride in your work, as well as a tangible extrinsic need for fair compensation and having a good work-life balance.

In the food processing industry, there are several challenges that have disabled growth for the Tanzanian manufacturing sector. In the food processing industry for areas such as sunflower oil, findings show that the main constraint is lack of capital. Other areas that bring challenges are raw material, equipment and electricity processing, regulations, market accessibility and competition (Carboni, 2016). These findings are not siloed in nature and are encompassed in the

challenge of workforce development. Personnel management was another area of great concern due to a gap in human resources management due to labor laws being violated or ignored (Wangwe, S., et.al, 2016). A study done by The Brookings Institution shares that there are challenges with work morale and compensation, and if not addressed, a lower work morale usually results in lower productivity.

The Tanzanian workforce is multifaceted and valuable to understand as we evaluate ways to incorporate best practices and strategies around recruitment to ensure we are building a pipeline of a future workforce, employee incentives to ensure we are providing a sustainable approach to keeping employees happy and engaged, and retaining employees long-term to create continuity for both the employer and the employee.

III. Partnerships for Key Workforce Development Activities

A central mission of GWI is to equip Tanzanians to be in a position to be able to manage and maintain solar powered wells independently. An adage that holds true is that of Maimonedes, “give a man a fish and you feed him for a day; teach a man to fish and you feed him for a lifetime”. The overarching goal is to equip local citizens with the training and tools to be self-sufficient. To do so successfully entails identifying and forming partnerships with organizations and schools for key workforce development activities. Given the vast range of educational institutions available in the country and in order to provide a greater catchment of students, schools we focused on included two-year diploma schools, vocational high schools and major universities. The schools we included in this analysis along with the criteria used to evaluate them are detailed in the next section.

Regarding organizations for candidate partnerships, efforts, interviews and interactions were focused on 5 institutions. These were the Tanzania Education Authority (TEA), Oikos East Africa, Arusha Technical College (ATC), WorldServe International and WorldServe Tanzania.

The Tanzania Education Authority (TEA) is an education fund that was established by the Education Fund Act in 2001. TEA’s primary mission is to secure financial and material resources for the Education Fund and to deploy these resources to support educational projects and programs. The goal is to improve access, equity and quality of education. According to Christina Meela, Legal Service Manager of TEA, the organization in joint efforts with the Ministry of Education Science and Technology is currently coordinating a Skills Development Fund (SDF) with funding from the World Bank. Through this fund, TEA provides grants to eligible training institutions and providers under the skills development window. The focus is on conducting short courses geared to promote the expansion and quality of skill development opportunities in the labor market. Some of these eligible institutions include the Vocational Education and Training Authority (VETA), Small Industries Development Organization (SIDO), along with other universities and technical colleges. TEA also performs monitoring and evaluation of grant utilization by these institutions. The effectiveness of this program should be evaluated over time as it is ripe with opportunity. Specifically, what percentage of participants

that have been funded by these grants have completed the program, what training is geared towards renewable energy systems and certified well technicians, and more importantly have trainees been able to secure gainful employment within the solar power energy workforce following completion of the program.

Based in Arusha, Tanzania, Oikos East Africa is a non-governmental organization that “promotes the protection of biodiversity and sustainable use of natural resources as tools to fight against poverty”. Oikos is interested in promoting renewable energy as a major initiative. They identified that a significant limiting factor in attracting students and technicians to work in rural areas was the lack of electricity in many of these regions. They also noted, however, that the Tanzanian government is focused on securing employment for youth and is focused on rural electrification. Oikos further directed our attention to a program called Neighborhood that is run by Arusha Technical College (ATC). Neighborhood offers discount rates for its training programs to ensure greater accessibility to students. However, many students, following completion of their training are currently focused on securing solar power in homes.

In meeting with representatives from Arusha Technical Institute (ATC), we learned that their Department of Engineering has approximately 4,000 students, 2,000 of whom are in the technician program. Additionally, the department has a solar center for excellence which is geared towards training students for solar maintenance and repair. The center has formal degree programs which typically last three years, however, they also conduct short courses that can be geared towards a student’s specific interest. The majority of the funding for the program is currently from the government. Many job opportunities within the country are also within the government sector. Following the completion of two semesters of coursework, students are required to complete a 10 week internship program and many job opportunities are borne out of these internships. Currently, there is no tracking system available to monitor how many of the graduated students enter the solar panel workforce, and how many stay in that workforce. ATC is in the process of setting up an application that would create more practical and hands-on experience and training for its students. Proficiency in operating, maintaining and repairing the solar powered wells is a venture ATC would like to explore further. They also directed our attention to the Kilimanjaro Institute of Technology and Management (KITM) and the Kilimanjaro International Institute for Telecommunications, Electronics, and Computers (KIITEC) which use a plant for training students.

WorldServe International is a non-profit organization based in Missouri. Originally founded in 1996, WorldServe International refined its mission to become a leading provider of clean water wells in Sub-Saharan Africa in 2001. Through sustainability and education, the goal is to enhance economic prosperity in Africa by providing clean water, improved sanitation and education. They select their large scale water system projects by focusing on areas of critical need, data support, safe access and community engagement. Each project takes approximately 10-16 months to complete. WorldServe International currently focuses efforts in Ethiopia, Kenya, and Tanzania with the goal of expanding to the West African countries of Burkina Faso, Chad, Niger, Nigeria and Senegal in the near future. In order to fulfill their mission of sustainability and community investment, WorldServe International recognizes the central role

of technicians in maintaining the solar powered wells. A representative from the organization noted that they prefer technicians with diplomas from electrical engineering programs with at least two years in the field. The importance of interpersonal skills was also stressed.

WorldServe Tanzania was registered in 2003 as a for profit business under WorldServe International. It was one of the first private drilling operations in Tanzania. The business of water in Tanzania changed significantly in 2010 when the World Bank and the African Development Bank offered a zero interest loan to the Tanzanian government. Several different companies entered the water business at the time which added complexity to a system that was already experiencing challenges in managing oversight and accountability of its water delivery projects. WorldServe Tanzania registered and started funding their own projects in 2013. As noted, by David Bongiorno, Operating Manager, one of the greatest barriers to further development of the Tanzanian workforce is the lack of training programs. Currently, there are no programs that WorldServe Tanzania recruits directly from. Rather, they depend heavily on relationships especially those built by their in country directors. Through these relationships, they have been able to identify, train and recruit many young individuals who usually have a background in electrical engineering. There is a heavy focus on hands on job training which they provide themselves, after which, technicians are assigned trial periods to work with project crews that are already up and operating. Working closely with Lorentz, a leader in providing solar powered water pumping solutions, WorldServe has also hosted training workshops and conferences for its employees. Mr. Bongiorno recognizes that work in the field, especially in rural areas, can often be isolating away from families for several weeks at a time with limited resources. In order to retain and promote a sustainable workforce, WorldServe Tanzania offers a good salary with year-end bonuses and stipends for workers while in the fields. A limiting factor of field work in the rural areas is that it tends to not attract women due to conditions and time away from family for long periods of time. WorldServe Tanzania recognizes the importance of collaboration and has worked closely with the Drilling and Dam Construction Agency (DDCA) which is under the Ministry of Water and Irrigation and is tasked with water well drilling along with the servicing and rehabilitation of the wells. The organization also works closely with the Tanzania Bureau of Standards (TBS) under the Ministry of Industry. TBS is responsible for monitoring quality control of products and ensuring industry and commerce standardization. WorldServe Tanzania highlights the importance of obtaining quality equipment for the wells as this in turn ensures their longevity and decreases the need for repeated visits by technicians to perform maintenance and repairs.

A vital component that cannot be glossed over as we explore key partnerships for workforce development activities is the funding resource. The World Bank has been an instrumental source of funding in supporting efforts in Tanzania that promote clean water resource. One of the recent projects developed by the World Bank is the Sustainable Rural Water Supply and Sanitation Program Project for Tanzania. (World Bank, 2018). The overarching goal of this project is to not only increase access to rural water supply and sanitation but also to ensure sustainability of service delivery. This total project cost is US \$740 million and is being heralded by the Tanzanian Ministry of Works and Irrigation. Prior to this, the World Bank supported several other initiatives including the Rural Water Supply and Sanitation Project

(2002–2008) and the Dar es Salaam Water Supply and Sanitation Project (2003–2010). The two projects laid the groundwork for the development of the Government of Tanzania’s Water Sector Development Program (WSDP) in 2006. The World provided financing for the WSDP under Water Sector Support Project (2007–2015). (World Bank, 2018)

Another significant funding source has been the Department for International Development (DFID). DFID is a component of the United Kingdom government and is the largest provider of foreign direct investment in Tanzania. DFID recognizes the importance of sustainable job creating growth as a means to enhance economic development and move citizens out of poverty. In 2018/2019, DFID planned to spend £17millions to support rural water supply, sanitation and hygiene in Tanzania. (Department for International Development, n.d.). Other sources of funding for water projects have included several organizations such as the United States Agency for International Development (USAID) and the Tanzania Development Trust.

As we conducted interviews with various stakeholders and sought candidate partnerships for workforce development, a series of questions were developed and posed to each organization.

- Tell us more about your organization.
- Is water a lucrative business?
- What do you perceive as some barriers to workforce development in Tanzania?
- Are there specific training programs that your organization recruits from to manage solar powered wells?
- Can you provide a list of institutions that are currently providing this training and which you have found successful.
- What does a list of essential skills look like for a technician? Where are the most significant skill gaps when hiring new ones?
- How would you ideally measure the skill/success of someone in that position?
- What are traits/characteristics exhibited by the most successful employees.
- What do you see as the current barriers to training, recruitment and retention?
- What current employment benefits are provided to technicians; why should they stay?
- What government policy directions or programs have been most beneficial to your work?
- How has the government encouraged sustainable power sources in regards to village water system?
- What incentives would draw citizens towards wanting to be a part of a solar power servicing industry, specifically water, in this case?
- How can we engage more woman in this process?

IV. Partnerships Potential Preferred Educational Partners

Background:

There are challenges both for those hiring solar maintenance technicians, and for those who have recently graduated, and there are skill gaps that make this a difficult situation. This is especially challenging for the one doing the hiring, who now has to put in more time, effort, and

expense to ensure that the individual is able to properly perform the job which he or she should have been trained to perform through their school-based training. There is currently no established method of monitoring which graduates are most proficient and prepared, or which schools are best able to prepare students for this specialized position.

Currently, there are not any schools that offer specific solar maintenance training programs. While this is the case, most other schools also have extremely limited course offerings available, with many not being able to support any engineering programs at all. This helps to explain why there was such a noticeable skill gap for new hires, as there are not as many schools that are able to provide the specific technical training that is required in these positions.

KPIs:

According to Dr. Erick Mgya of Arusha Technical College, the most common pathway to working in the solar maintenance industry is through studying electrical engineering, closely followed by civil engineering. These are the most significant metrics that need to be taken into consideration when evaluating schools, their ability to offer these training pathways for students.

Based on information provided by Worldserve Tanzania, these metrics are what should be used to evaluate whether a school is able to adequately prepare their students to begin work in this field without significant retraining.

Metrics:

- Availability of an electric engineering degree/diploma
- Availability of a civil engineering degree/diploma
- Availability of other degrees/diplomas related to renewable energy
- Availability of solar training facilities
- Location relative to an area of focus of the MacArthur grant

There are other aspects of the job that require skills outside of those specifically taught by a school but are still necessary. According to Hezron Manga, with Worldserve Tanzania, it is not just the technical training and hard skills that are needed, but also community and relationship building skills along with the ability to confidently work with essential computer software on the job.

When an employee at Worldserve Tanzania is hired without meeting the job requirements, he or she is placed into a three-month probation period while they undergo on the job training in an attempt they be brought up to the standards as determined by their supervisor. This three-month period could potentially be wasted if the new employee is unable to adequately be trained, and this is also a larger cost to the employer as their most competent employees must now divide their time between performing the job and also training someone with inadequate training or experience.

Evaluation of Existing University Curriculum:

There are 12 top schools in Tanzania that many would consider when wanting to further their education. This is a collection of larger schools that are also not geographically congested in order to expand the range of internship and hiring options to be based on location and nearness to future worksites.

Schools:

1. Arusha Technical College
2. Dar es Salaam Institute of Technology
3. Mbeya University of Science and Technology
4. Ministry of Water – Water Institute
5. Mzumbe University
6. Nelson Mandela African Institute of Science and Technology
7. Sokoine University of Agriculture
8. St. Augustine University
9. St. Joseph University
10. Tumaini University Makumira
11. University of Dar es Salaam
12. University of Dodoma

Demographic information is available for a significant portion of the schools that should be considered. While there is generally a shortage of women in the workforce across all industries in Tanzania, six of the nine which had information available had over 30% of the student body made up of females, while four had over 40% made up of female students (Kihampa, 2018). This is a promising statistic, as including women in the workforce has been a challenge across industries and a goal of GWI in increasing the involvement of women in the workforce.

Figure 1: Locations of Schools Being Evaluated

Possible districts and village clusters for 250 village project

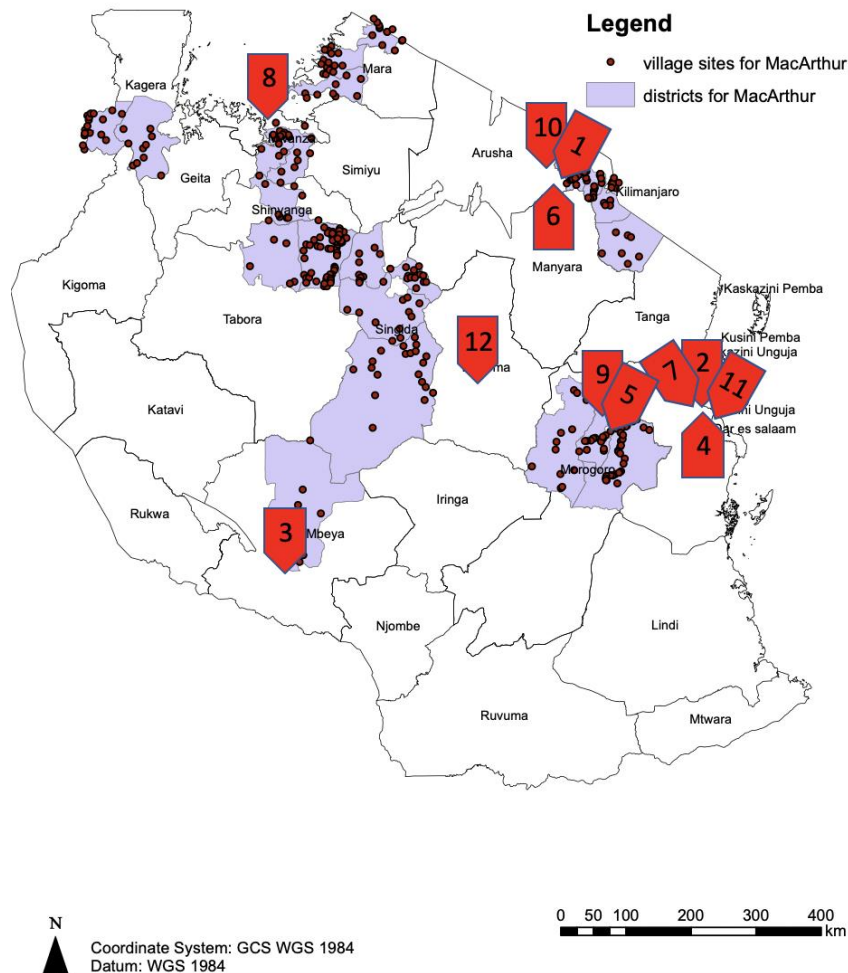


Figure 2: Schools Demographic Data

Schools	Enrolled 2017-18			F:M ratio	Graduates per year 2017	Student:Faculty ratio
	Male	Female	Total			
1 Arusha Technical College	168	48	216	22.22%	30	Unavailable
2 Dar es Salaam Institute of Technology	528	113	641	17.63%	615	Unavailable
3 Mbeya University of Science and Technology	652	144	796	18.09%	459	Unavailable
4 Ministry of Water - Water Institute	Unavailable	Unavailable	Unavailable	Unavailable	54	Unavailable
5 Mzumbe University	1,644	1,277	2,921	43.72%	2,118	Unavailable
6 Nelson Mandela African Institute of Science and Technology	Unavailable	Unavailable	Unavailable	Unavailable	83	Unavailable
7 Sokoine University of Agriculture	2,475	1,229	3,704	33.18%	2,731	10.02
8 St. Augustine University	2,149	1,523	3,672	41.48%	2,048	17.54
9 St. Joseph University	Unavailable	Unavailable	Unavailable	Unavailable	591	Unavailable
10 Tumaini University Makumira	408	347	755	45.96%	637	Unavailable
11 University of Dar es Salaam	5,394	3,674	9,068	40.52%	Unavailable	19.1
12 University of Dodoma	5,894	3,257	9,151	35.59%	5,370	Unavailable
Average	2,145.78	1,290.22	3,436.00	33.15%	1,339.64	

Sources: Kihampa, 2018; Unipage, 2020a; Unipage, 2020b, THE World University Rankings, 2020

Evaluation:

Using all of these metrics, the schools are able to be evaluated based on what they are able to offer and how that should relate to producing well prepared interns and graduates who are able to adequately perform their job functions. This exhibit allows a cross reference to visualize which schools are able to provide which aspects of evaluation and provides a running total to highlight which schools are best able to prepare students for this position and should be considered for partnership.

Figure 3: Evaluation of Universities

	Arusha Technical College	Dar es Salaam Institute of Technology	Mbeya University of Science and Technology	Ministry of Water - Water Institute	Mzumbe University	Nelson Mandela African Institute of Science and Technology	Sokoine University of Agriculture	St. Augustine University	St. Joseph University	Tumaini University Makumira	University of Dar es Salaam	University of Dodoma
Civil Engineering Diploma	1	1	1	0	0	0	0	0	1	0	0	0
Bachelors	1	1	1	0	0	0	0	1	1	0	1	0
Electrical Engineering Diploma	1	1	1	0	0	0	0	0	1	0	0	0
Bachelors	1	1	1	0	0	0	0	1	1	0	1	0
Renewable Energy Technician Diploma	0	1	0	0	0	0	0	0	0	0	0	1
Bachelors	0	0	0	0	0	0	0	0	0	0	0	1
Water Resources Engineering Diploma	0	0	0	1	0	0	0	0	0	0	0	0
Bachelors	0	0	0	1	0	0	1	0	0	0	0	0
Solar/Renewable Energy Training Facility	1	1	0	0	0	1	0	0	0	0	1	1
Female to Male Student Ratio >20%	1	0	0	N/A	1	N/A	1	1	NA	1	1	1
Located Near MacArthur	1	0	1	0	1	1	1	1	0	1	0	0
TOTAL	7	6	5	2	2	2	3	4	4	2	4	4
Sources: "ARUSHA TECHNICAL COLLEGE," 2020; "DIT Dar Es Salaam Institute Of Technology," 2020; "Mbeya University of Science and Technology," 2020; "Ministry of Water Water Institute - WI," 2020; "Mzumbe University Chuo Kikuu Mzumbe," 2020; "Sokoine University of Agriculture (SUA)," 2020; "St. Augustine University of Tanzania," 2019; "ST. JOSEPH UNIVERSITY IN TANZANIA," 2019; "The Nelson Mandela African Institute of Science and Technology," 2019; "The University of Dodoma," 2020; "Tumaini University Makumira," 2014; "University of Dar es Salaam," 2020												

Based on this evaluation using the given metrics, it is clear to see that there are notable schools that stand out above the rest as potential preferred educational partners. Arusha Technical College, Dar es Salaam Institute of Technology, and Mbeya University of Science and Technology would be the schools to prioritize when considering partnerships for the sake of hiring the most prepared students to act as solar technicians. Given the extended university level training associated with these schools, these students may also be appropriate fits into slightly higher than entry level jobs to work with multiple technicians and be able to handle more high-level tasks and management activities after on the job training.

Options Other than Universities:

VETA:

Everything evaluated up to this point has been a college or university, but those are not the only options available to students who desire to undergo training of a technical nature. There are also Vocational Education and Training (VET) training centers and high schools that offer a baseline of technical training along with more general education courses. These are overseen by the Vocational Education and Training Authority (VETA). The mission of VETA is to ensure quality vocational skills by providing, regulating, coordinating, promoting, and financing vocational education and training for national socio-economic development (VETA, 2018). It is an autonomous government agency established in 1994 to carry out that mission based on its core values of demand driven services, service excellence, transparency, and teamwork (VETA, 2018).

There are currently 26 stand-alone VET training centers spread across the country which offer technical training to their students (“VETA - SKILLS,” 2020). The training pathways available to students include both electrical engineering and civil engineering, making these VET training centers very promising options to hire directly into entry level technician positions. These training centers offer a “dual apprenticeship training programme” that allows the students the opportunity to work with someone who is already in that field. In this way they are able to have a practical, hands on learning experience to supplement their time in the classroom and be more prepared upon graduation (“Dual Apprenticeship,” 2018). The employers are able to provide a working and learning environment, assign supervisors and mentors, and potentially facilitate apprentices with allowances. Benefits of this dual apprenticeship training programme include:

- Reducing mismatch between training and labor market needs
- Assurance of availability of skilled labor
- Tackling youth unemployment
- Help youth to gain professional soft skills
- Enhancing productivity
- Increase enrolment in VETA centers (“Dual Apprenticeship,” 2018)

As getting hands on experience with a solar training facility is one of the metrics to consider when looking at schools’ ability to adequately prepare their students for this role, this is a significant training method that is able to be offered. While there are no specific pathways in solar or renewable energy offered, the fact that they are able to offer experience through direct work in the field allows a similar experience to having a solar training facility on campus.

Along with the training centers there are also VET high schools that offer similar training. Known as “technical secondary schools”, they are able to provide VET training to their students through the Ministry of Education and Culture (Redecker, Wihstutz, & Mwinuka, 2000). There are currently eight of these technical secondary schools spread across the country with the specific goal of linking general secondary school education with vocational skills and professional knowledge in selected technical subjects (Redecker, Wihstutz, & Mwinuka, 2000).

There are multiple technical pathways offered, including both electrical and civil engineering to prepare them for a solar technician position. There are challenges for these VETA high schools, as there is not enough technical equipment available at all of the schools for the students to be able to gain necessary hands on experience. Each school also only has around 100 new students each year, which may limit the pool of applicants as that number is divided among disciplines.

While these would be promising options for hiring entry level technicians with the expectation of further on the job training, due to the lack of on-site training facilities they would not be the best partners to be able to work with for further solar training.

Barefoot College:

To encourage the educational development of rural village women in the solar field, consider a partnership with a Barefoot College.

As the world shifts its attention to global poverty alleviation and combating climate change, the success of The Barefoot College's holistic approach built on empowering women from around the globe offers a clear plan for large-scale impact (Barefoot, 2016).

Barefoot College trains women from rural villages around the world to become solar engineers. These Barefoot College Solar Engineers learn the skills of solar electrification, water heating, and filtering water through solar powered desalination. "The power of the sun not only fuels a village but serves as a catalyst to create employment, boost income, reduce carbon emissions, save trees, and most importantly, to provide self-reliant solutions within village communities," CEO Meagan Fallone says. Though they are beginning to expand training centers more regionally, most of the training takes place for about 5-6 months in the Indian Headquarters. Following successful completion of the training program, the "Solar Mamas" return to their villages across South America, Africa, India, and Oceania with the skills and equipment to electrify more than fifty homes each

A current challenge for Barefoot College programming in Tanzania is the lack of local presence and partnerships on the ground. Additionally, the construction for the training facility located in Zanzibar will not be fully functional for approximately another two years.

Barefoot College's vision is to expand its training in order to offer technical training on construction and maintenance of solar powered water pumps. In order to encourage increased female participation in the technician workforce, consider partnering with Valentin Karm*, the Regional Director for Barefoot College in Eastern and Southern Africa to establish possible operational synergies and female focused technician training programs as Barefoot College expands its presence in the region in the coming years.

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Part V: Government Partnership Insights

Background:

The goals of many of the Tanzanian government's various departmental programs targeting workforce development can be seen to be informed by the *Development Vision 2025*. This strategic vision focused on converting Tanzania from a country reliant on subsistence farming to a middle-income nation able to capitalize on a sustainable, industrialized economic foundation. Legislation and programming stemming from the Ministry of Water, the Ministry of Education, and the Rural Energy Agency have all been markedly influenced by the broad objectives set for by the *Development Vision 2025*.

A commitment by the Tanzanian government to provide a 12-year, free and compulsory education system did a great deal to heighten the percentage of children enrolled in school as well as draw foreign investment to the educational system (Global Partnership for Education, 2019). Additionally, the pathways provided within this framework concerning TVET served to provide a foundation for establishing the skilled labor force required in achieving *Development Vision 2025* objectives. The optional pathways out of secondary school in varying levels of vocational and technical education are exhibited in *Figure 1*. While the institution of this education system worked to alleviate the disparity in educational attainment shown in *Figure 4*, significant gains are still needed to bring Tanzania in line with leading sub-Saharan nations.

Governance and Legislation:

Significant legislation has occurred in the past thirty years that was aimed at bolstering the educational foundation of Tanzania. The following summary provided by UNESCO (UNEVOC, 2016) demonstrates some of the major legislation that has specifically targeted TVET.

- The National Council for Technical Education Act (1997) established the National Council for Technical Education (NACTE) which covers technical education at tertiary non-university institutions.
- The Vocational Education and Training Act (1994) aims to improve TVET provision and management. The Act established the Vocational Education and Training Authority (VETA) which is supervised by the Vocational Education and Training Board.
- The Education Act No. 25(1987) forms the legal basis for education in Tanzania and defines the roles of national and local education bodies.

In addition, further measures such as the National Employment Policy, the National Economic Empowerment Policy 2004, and National Youth Development Policy 2007 seek to

couple human and economic development in the hopes of reaching *Development Vision 2025* goals. See *Appendix X* for a full outline of specific objectives of these policies.

VETA, in particular, is a focal point of the current state of workforce development capabilities as the Tanzanian government cites its formation as a mechanism that has increased the nation's ability to react "flexibly to changing labour market skills needs and to manage the skills development levy collected from enterprises." (VETA, 2020). The mandates (*See Appendix A*) of VETA demonstrate the intention to create a regulating body capable of overseeing all aspects of vocational education concerns in the country. While these stated objectives are in line with the needs of the Tanzanian labor market, there are current challenges related to the restrictions resulting from the physical locations of training centers and other limiting factors that might affect rural populations. Financing sources such as the Skills Development Levy (SDL) have allowed for the formation of government funded TVET centers across Tanzania, but *Figure 3* shows further financial, planning, and oversight commitments are necessary to improve the efficacy of these training resources.

Apart from government bodies focused on the education sector, the Ministry of Water and its policies will be critical to the efficacy of water resource planning and oversight in Tanzania. The establishment of the Rural Water Supply and Sanitation Agency (RUWASA) through Water Supply and Sanitation Act No.5 of 2019 seeks "to sustainably plan, design, construct and manage water supply and sanitation services in rural parts of Tanzania mainland (IRC, 2019)." With 25 regional managers and 130 district managers, RUWASA will be positioned to provide a more coordinated approach to water resource management than that of the previous system which relied Local Government Authorities (LGAs) for these duties. This transition would seem to put the applicable government bodies to be in a much better position to resolve disputes. Furthermore, having one cohesive body will work to increase standardization of installations and maintenance; therefore, providing for a decreased need for breadth in the skills of technicians.

Assessment:

Although significant advances have been made in establishing increased access and opportunities to education in Tanzania, the pervasive disconnects between various departments and programs of Tanzanian government that are working toward the common goals of the *Development Vision 2025* have limited the efficacy of national workforce development (SABER, 2015). Additionally, despite the previously addressed concerted efforts by the Ministry of Education to strengthen the skills of the Tanzanian labor pool, *Figure 3* shows that employers view the proliferation of skill gaps in Tanzania as some of the most severe in sub-Saharan Africa. To address these disconnects, comprehensive workforce development oversight and assessment strategies are necessary to ensure that intended outcomes are reached in the Tanzanian labor pool. Finally, early access and interest initiatives among programs have the ability to increase access to student loans through expanding the capacity of Higher Education Students' Loans Board (HESLB) to measure likelihood of successful employment outcomes and students' probability of repayment. This will serve to expand sources of financing as credit risk are increasingly shown to be mitigated.

Government Partnership/Agreement Recommendations:

A framework agreement under the Ministry of Water and RUWASA that would create two to three preferred vendors for solar powered village water systems would be an effective means of approaching both procurement and technician workforce development for community water systems. Under this agreement, in exchange for preferred vendor status, a vendor would provide the preferred educational and training partners previously outlined in this analysis with their water systems components for training purposes. Additionally, the vendor would provide specialized training for instructors at these preferred educational training partners. Conversely, the preferred status designation of vendors by the government would grant vendors exclusive ability to bid on all government sustainable village water systems projects.

Vendors who meet preliminary procurement regulation requirements would then be judged on a competitive basis measuring scope of capabilities and level of training resource contribution to determine preferred vendor status. The vendors deemed preferred would then have exclusive access to competitive bidding processes for government funded village water systems. This access would extend for a ten-year agreement length with a periodic review after five years. This period length would provide vendors enough incentive to make the capital investment in the provision of training resources to schools and technical centers. Current regulations limit framework agreements to three years which presents a clear challenge to implementation of this proposal. However, if policy amendments could be established, this proposal has the potential to deliver multiple benefits to the economic advancement of Tanzania.

In addition to reducing transaction costs and realizing continuous improvement efficiencies from resulting long-term relationships, a framework agreement that grants preferred vendor status in exchange for vendor-provided educational and training support would serve to create an accompanying workforce development supply while simultaneously deploying the sustainable village systems that will drive demand for technicians. Example preferred vendor partners, such as Grundfos and Lorentz, have the breadth of renewable products and services as well as the off-grid capabilities to accommodate the needs of community systems. Additionally, their expertise in these products would allow them to effectively provide training to educators and instructors at both the university and VETA center levels.

Conceivably, the proposed framework agreement could be extended to a wider group of vendors as training resource requirements continue to grow after the first ten-year period. With future expansion of the program, preferred vendor status could be extended to only those vendors who conduct a minimum level of manufacturing production in Tanzania in addition to the training resources provision requirement. This incentivization would encourage a holistic approach to stimulating workforce development for solar water pump technicians that addresses the unique development, educational, and employment needs of Tanzania in a simple and innovative manner.

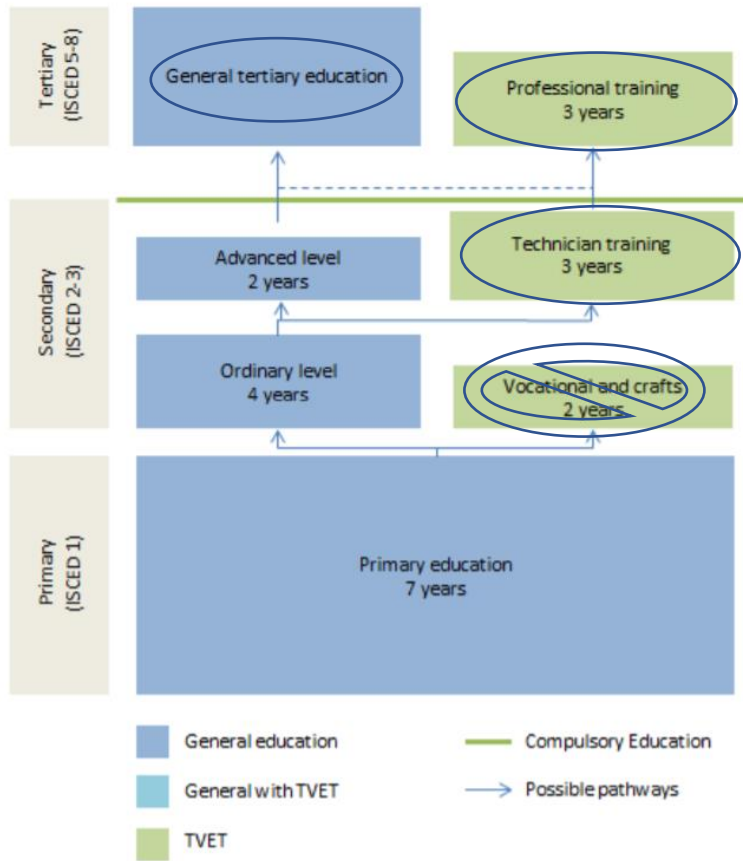
Future Possibilities:

An effective workforce development proposal will demonstrate the need for increased government interdepartmental cooperation and the deployment of capital to achieve measurable

outcomes. Mr. Mutazamba, assistant director of operational planning in the Ministry of Water, suggested in 2015 “things are changing, new technologies are coming up. You can’t resist good technology that offers you cheaper costs for what you need” (World Bank, 2015). Significant work has occurred since Mr. Mutazamba’s 2015 statement, but there is additional work required to create the capacities within the Tanzanian workforce to effectively maintain systems that use new technologies; therefore, capitalizing on the intended far-reaching economic effects that include not only the provision of water resources but also employment across Tanzania. This certainly highlights the need to finance dedicated solar TVET programs that prepare the Tanzanian workforce to capitalize on employment opportunities resulting from these emerging technologies. Additionally, a preliminary public-private partnership program that holistically addresses the unique needs of the GWI franchise model has the opportunity to serve as a case study that will demonstrate to the Tanzanian government the need for the implementation of robust TVET resources targeting the growing need of solar technician skills. This is not to discount the role that private training programs will play in the sustainable village water systems labor market, but the existence of public responsiveness to the growing need for technical literacy as far as solar power is concerned.

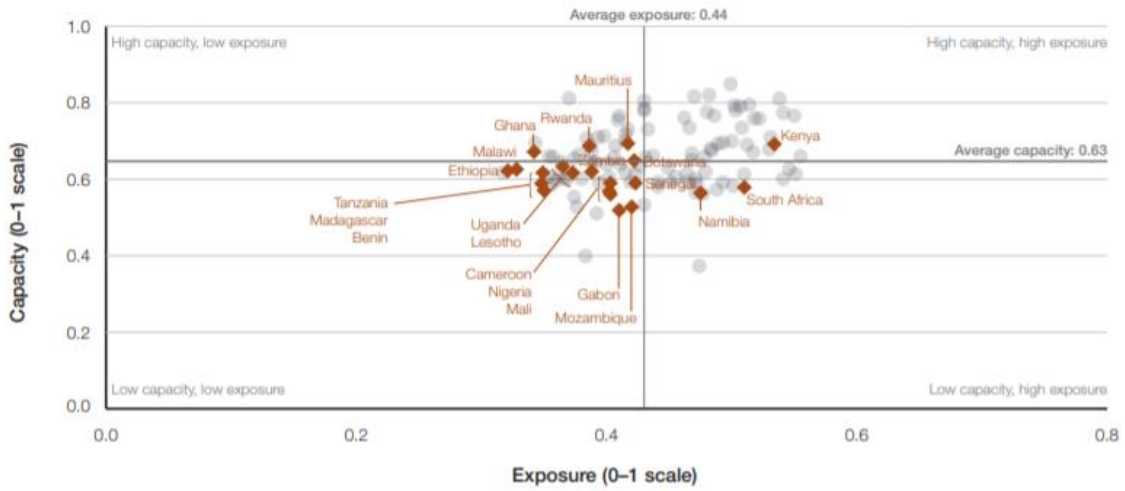
Figure 1 demonstrates the critical pathways that will be addressed in our recommendations to effectively approach solar technician workforce development needs within the compulsory education system in Tanzania as well as beyond into tertiary education degree programs. How specific recommendations will leverage the compulsory primary and secondary education system to target the technician, professional, and general tertiary education areas in unique ways will be subsequently discussed in our incentivization section. Furthermore, our assessment of the needs of the franchisor as far as solar technicians are concerned shows that the vocational and crafts pathway will be inadequate in providing the necessary comprehensive technical skills.

Figure 1: TVET formal, non-formal and informal systems



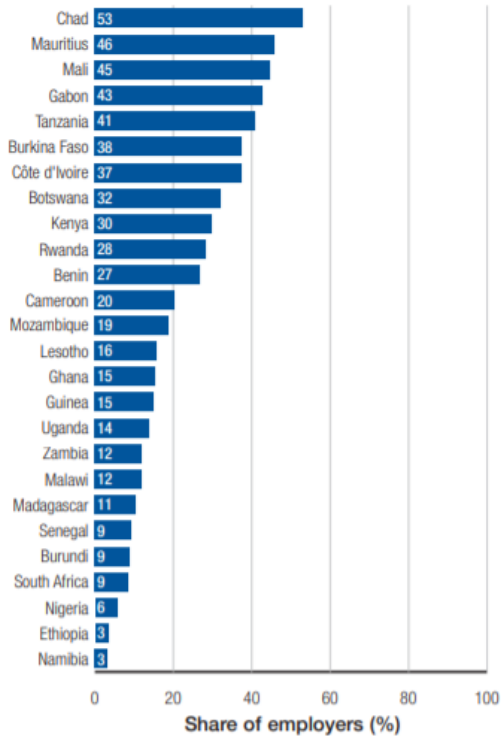
Compiled by UNESCO-UNEVOC from UNESCO-IBE (2010). World Data on Education VII Ed. 2010/11. United Republic of Tanzania. Geneva: UNESCO-IBE.

Figure 2: Africa's capacity to adapt and exposure to the future of jobs



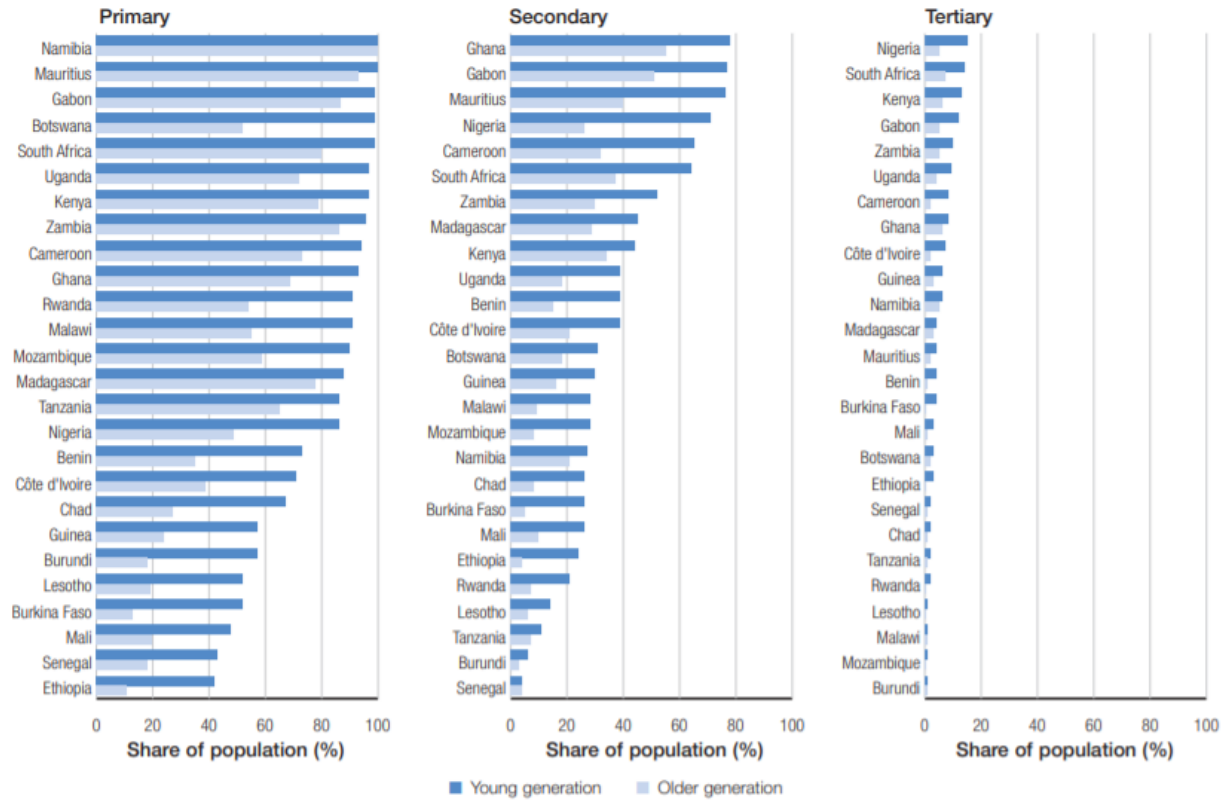
Source: World Economic Forum analysis.

Figure 3: Share of African employers perceiving inadequate workforce skills as major constraint



Source: World Bank Enterprise Surveys.

Figure 4: Educational achievement of Africa’s young and older generations



Source: World Economic Forum, Human Capital Index 2016.

VI. Incentive Management

Background:

The World Bank has identified elements that need to be in place to affect high-quality transformations in the retention of workers, including quality training and an enabling work environment. A study by Amde, et.al argues the importance of a convergence between individual and organizational goals and expectations related to financial incentives, working conditions, and career path. Dissatisfaction with payment coupled with lack of opportunity to advance one’s career and marketability of a new skill and/or qualification lead to trained personnel turnover (Amde, et. al). Amde, et. al, further implies that incentive implementers need to focus on the best possible alignments between training relevance, recognition, and career advancement potential. Post-training engagement is also very important; much of the available literature establishes the importance of recognizing and supporting individuals that are responsible for spearheading change.

Introduction:

The premise of the recommendation for an incentive structure is to create a sustainable system that begins with early exposure to the technical field through a solid foundation of continuing education programs for technicians who have committed to the SVWS workforce. The proposed incentive structure closely resembles the recommendations outlined in the World Economic Forum's 2017 publication on the Future of Jobs and Skills in Tanzania:

1. Ensuring the 'future-readiness' of curricula
2. Early exposure to the workforce and career guidance
3. Investing in developing and maintaining a professionalized teaching workforce
4. Providing a robust and respected technical vocational education and training (TVET)
5. Investing in digital fluency
6. Creating a culture of lifelong learning
7. Openness to education innovation

Payment structure:

The recommended payment structure is an incentive-based preventative maintenance model, like the Whave Preventative Maintenance Model in Uganda. In order to incentivize local technicians, they will get bonus payment based on the number of days a well is functional, instead of getting paid to make repairs they choose this structure because payment upon system failure creates greater potential for mistrust and/or dishonesty among technicians. In the payment upon system failure model, Technicians are sometimes suspected of less-than-ideal work in the hopes of a future payout from a subsequent breakdown (Whave, 2019). Under the payment-by-well-functionality model, technicians are incentivized to provide high quality maintenance service and timely breakdown repairs. The results of this model are promising; from Whave's structure, technicians were found to have higher job satisfaction in this arrangement, and communities are more likely to experience reliable service and reduced breakdowns. Nonetheless, with incentives that are better aligned across systems, trust between the customers and operators improves. As a result, willingness to pay within the community increases and this indicates greater financial sustainability in the long run (Whave, 2019).

Non-financial incentives include:

- Mobile phones
- Motorbikes for rural areas

It is recommended that each Technician have a mobile phone in order to ensure timely and effective communication among franchise owners, villages, and technicians. This communication method will enable timely repair and maintenance procedures and allow team members to collaborate and share best practices. For those living in more remote areas, it is recommended that each technician is given a motorbike to travel to their worksite. Their motorbike allowance is contingent upon each technician following safety guidelines for operation, which includes avoiding travel after dusk.

Team based incentive structure:

The incentives will be team based, where each district manager will have teams of 4-5 technicians covering different clusters of villages (depending on the size of the districts). Team-based incentives are recommended because of the high potential for innovation through collaboration. Several studies prove that team-based incentives create and emphasize the need for collaboration across the organization, and these incentives benefit the organization by being:

- **Achievement-oriented:** Focusing on shared goals drives performance and creates greater impact on organizations in a shorter time
- **Self-actualizing:** Group decision-making and problem solving encourages teams to grow and develop the capacity to meet evolving community and capacity needs
- **Affiliate building:** Inspire collaborative and cooperative behaviors and communication which support cross-organizational performance and deliver shared organizational goals

Group incentives create strong bonds among teams, and a joint study by the International Society for Performance Improvement and The Incentive Research Foundation found that “Incentivized teams increased their performance by 45%; incentivized individuals increased performance on an average of 27% (Marshall, 2013). It is important to note that the types of goals an organization emphasizes may influence the degree to which team incentives work. In the context of Sustainable Water Systems, quality control heavily outweighs quantity control. This structure further supports the efficacy of a team-based incentive model, as studies show that for organizations that focus attention on accuracy (or quality goals), team incentives that encourage cooperation, cohesion, and information sharing will generate better results. Conversely, when an organization focuses attention on speed (or quantity goals), then team incentives may be less effective (Santos, et.al, 2015).

Key Performance Indicators:

The Key Performance Indicators (KPI's) to implement as part of the incentive package directly measure operating functionality and productivity, including:

- Total breakdowns/total water points
- Average down days per month
- Percentage of villagers (customers) served
- Proper record keeping; technicians must accurately update records each week

Mobile Record Keeping platforms:

Free for anyone in the world to use, the Surveyor Mobile App that [mWater](#) provides is an attractive option to build the foundation for mobile record keeping among all Technicians.

The Surveyor Mobile App boasts the following functionalities:

- ✓ **Reliable mobile data collection:**
 - Free mWater app is available in the Android store or through a mobile or desktop web browser window.

- Designed for field work - work online, offline, or on poor quality internet connections
- Field-proven sync technology means no data loss, even for incomplete responses
- Add surveys to water points or other things you want to track and view past responses in the app
- ✓ **Design forms and manage responses:**
 - The mWater portal provides a secure, cloud-based survey management platform
 - mWater's visual form designer allows you to see and test the form as you create it
 - View data from the field in real time; edit or reject responses; and create approval chains
 - Visualize, filter, and export data
- ✓ **Collect data in teams**
 - Create and manage groups of users to control access to forms and data
 - Multiple deployments allow the same form to be sent to different users without them seeing each other's data
 - Manage who can view, update or attach new data to sites
- ✓ **Built for collaboration**
 - Control the privacy level of sites and form data separately
 - Share basic site info without sharing your survey responses, allowing others to add their own data
 - Build maps and visualizations that include data from multiple surveys or site types
 - The mWater API is a secure way for programmers to access your data to incorporate into external websites and software applications

Educational advancement opportunities (a tiered approach):

Education interventions are a top attraction for students working in rural and remote areas. Rotations in a rural setting may influence student's subsequent decision to work in an underserved area (Dolea, et.al, 2010). The incentive structure for educational advancement opportunities includes:

Level I. Mentorship program/job shadowing for local secondary school students

In the villages where the solar-powered wells operate, Sustainable Village Water Systems (SVWS) will send out information about the well(s) in their village, how they operate, and the local benefits it provides to the local secondary schools. Technicians who opt in will exchange contact information with the school and notify the school officials when they are coming into town for routine maintenance or repairs and invite small groups of interested students to shadow them. The goal of this informal job shadowing program is for local secondary schools to expose students to careers in electrical engineering and in the solar field, and spread awareness regarding two year vocational schools that will provide the formal training and preparation for this career path after they complete their secondary education.

- Existing technicians who agree to take on a mentor/job shadowing relationship for students in local secondary schools with interest in electrical engineering will receive a bonus of \$5* per shadowing session.

Benefits of job shadowing programs

Job shadowing provides a far more realistic preview of the “day in the life” of the worker. Job shadowing is most effective when expectations are discussed in advance and the day is structured accordingly. A tour of the worksite, a discussion about job responsibilities, and anything a professional can “show and tell” in the workplace is a good start. Attending meetings and a short debrief at the end of the day, to reflect on the experience, are also beneficial practices (O’Donnell, 2019).

For organizations such as Sustainable Village Water Systems, job shadowing is an investment in the future. Though carving out time to meet with young people (or those interested in a new career path) doesn’t pay immediately, but the branding boost and the potential pipeline of talent it can create may make it a worthwhile endeavor (O’Donnell, 2019).

Similarly, showing a front-line employee the demands and rewards of moving up the ladder to management can be a powerful development and retention tool. For skilled trades roles such as the Sustainable Village Water Systems technician, this program can show learners how an individual’s efforts contribute to larger goals subsequently generate interest in the career field (O’Donnell, 2019).

Level II. Completion of a successful summer internship/shadowing opportunity after the first year of vocational school with guaranteed full time employment as a technician after school in a rotation.

- After successfully completing their first year of their vocational program, students will have the opportunity to intern with a skilled technician for one summer. They will be matched with technician who has graduated vocational school and under direct supervision, will be eligible to work for a reduced wage. If their supervisor recommends them for a full-time offer post completion of Technical school, then the student have guaranteed entrance into the post-graduation rotational program.

Level III. Once the student is ready for full-time employment, they will enter a rotational program within their preferred district. The technician will complete three six-month rotations in different areas within their district. Upon completion of the rotation, technicians will be able to choose their preferred location(s) and be assigned accordingly (pending availability and job vacancies).

Implementing a rotational program to avoid potential job vacancies in the more undesirable rural areas is key. Exposure to different areas could make technicians more comfortable in an area they were previously unwilling to go. Just as job rotations broaden geographical exposure, they also broaden employee networks, further preparing the rotated employee for leadership roles. Employees learn the different working styles and cultures within each area, as well, which encourages collaboration (Leddy, 2017).

Upon successful completion of the rotational program, technicians will gain access to remote continuous learning. Programming through the Association for Talent Development (ATD) is recommended given its flexible structure, robust offerings, and remote capabilities. The recommended program alignments include (but are not limited to):

1. New Employee Onboarding Certificate:

Objectives:

- i. Learn how to develop an onboarding program, from business case to implementation, at your organization.
- ii. Refresh the content of an existing onboarding program.
- iii. Improve employee engagement by providing tools for successful new hire integration.
- iv. Increase new hire ROI

2. Coaching Certificate:

Objectives:

- i. Practice core coaching competencies and hone your ability to apply them to coaching conversations.
- ii. Integrate and evaluate multiple sources of data and make interpretations that help clients achieve agreed-upon results.
- iii. Develop and maintain an effective coaching plan with clients, manage ongoing progress, hold clients accountable for actions, highlight and celebrate successes, and adjourn the coaching process.
- iv. Develop successful coaching competencies and skills by applying a comprehensive model to individual, team, and organizational coaching initiatives.

3. Microlearning Certificate

Objectives:

- v. Quickly and efficiently create learning content that expedites a learner's mastery of specific skills and enables you to meet both stakeholder and client needs.
- vi. Use the MILE model to develop bite-sized learning programs that your employees will not only want to use, but also share with others.

- vii. Determine the best way to assess learning and measure the organizational impact of your program so you can continuously improve

Benefits of ATD remote learning options:

- ✓ *Learn whenever you want:* Get the training you need, when you need it, by selecting any of our 100+ programs that are available publicly in major cities around the world or delivered privately on-site
- ✓ *Learn the way you want:* You and your organization can use your learning pass toward ATD workshops and certificate programs that are available online, or on-demand.

Level IV. After the technician completes of three years of service for the Sustainable Village Water Systems, they will earn a full scholarship to a diploma program.

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Appendix A

Roles Of VETA

i. Providing vocational education and training;

VETA provides training through 33 vocational training centres and institutes that it owns. Also, it provides training to vocational teachers through its Vocational teachers Training College in Morogoro.

ii. Coordinating vocational education and training;

VETA coordinates more than 700 VET institutions owned by other VET providers in the country, providing training in form of long courses, short courses and tailor-made courses. Also, VETA conducts Labour Market Surveys to determine skills demanded by labour market.

As well, the Authority establishes and maintains close linkage and partnership with other training providers at national and zonal levels.

iii. Regulating vocational education and training;

VETA regulates provision of vocational education and training in the Country through Registration of VET Institutions; Accreditation; Setting Standards; Curriculum Development; Auditing for Compliance; Assessment; and Certification.

iv. Financing and managing VET fund;

VETA finances and manages VET Fund for Vocational Education and Training. The main source of VET Fund is employers contribution of Skills Development Levy (SDL). Employers with four and above employees contribute 6% of their employees salaries as SDL.

Some other sources of VET fund are Government development projects; development partners contributions; funds from internal sources like income generating activities and training fees.

v. Promoting Vocational Educational and Training

VETA is charged with the role of promoting vocational education and training in the Country. VETA believes that the public can support VET if it is provided with adequate information about VET goals and activities. Promotion is carried by communicating VET to different stakeholders including the Government, parents, employers, employees, and donors. Other targets include current and prospective trainees, instructors; VET graduates legislators, trade unions, NGOs and the media.

VETA uses different media in communicating VET to stakeholders: through advertisement, VET week activities, public presentations, trade fairs and exhibitions and publicity. Others include newsletters, annual reports, brochures, VET catalogues, website and other promotional materials.