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Energy, Jobs and Skills: A Rapid Assessment in Mtwara, Tanzania

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This brief examines the energy sector in Tanzania and the acute shortage of electricians anticipated as the national electricity grid expands. This shortage results from skills gaps that can only be addressed through expansion and upgrading of vocational education and training systems. In Mtwara region, where energy supplies are being developed through exploitation of natural gas reserves, quality training for electricians exists, but not on a sufficient scale. More opportunities for practical training are needed. Increasing the number of accredited training institutions is recommended to apply some competitive pressure on the Vocational and Training Authority (VETA) to make the necessary improvements to its courses. Findings also indicate that links between training institutions and apprenticeships should be strengthened so that young graduate electricians can receive on-the-job training and mentoring by experienced trade professionals.

Introduction

Energy development in Mtwara Region on the southern coast of Tanzania is a fundamental part of the country's national energy strategy, which aims to reduce reliance on hydro-dependent power sources, in part through development of natural gas resources. Mtwara's abundance of natural gas generates opportunities for development and employment in the energy sector and for other sectors of the economy which have been held back by the lack of electricity. This study links employment potential of the energy sector with the views and challenges faced by young Tanzanians in becoming qualified and skilled electricians, a professional trade in high demand in this emerging sector.

Apprenticeships are internationally recognised as an important approach for training young people, but it is not fully understood how apprenticeship systems in Tanzania can be effectively strengthened. *Understanding Informal Apprenticeship,* an empirical study of more than 600 master crafts-persons and apprentices in Lindi and Mtwara regions undertaken by the International Labour Office (ILO), covered six skill areas: car mechanics, electricians,carpentry/joinery, local arts, plumbing and tailoring (Nubler, Hofmann & Greiner, 2009). Study findings highlighted the relatively high socio-economic status of electricians, the formal certification required to become an electrician, and the benefits of informal apprenticeships in leading to self-employment. However, the constraints to expanding the numbers and qualifications of electricians were not well understood. Therefore, a deeper analysis was undertaken of the growth and employment potential of the energy sector, one of Tanzania's most promising labour-absorbing sectors, and the demand it creates for young electricians in Mtwara and other regions of the country.

Methodology

A two-part methodology was applied in this study: i) research and analysis of the energy sector; and ii) semi-structured interviews with key informants. For the sector review, relevant data and studies were collected and analysed including the paper *Understanding Informal Apprenticeship*, which was considered in devising questions for the interviews in Mtwara.

At the national level, interviews were conducted with officials in government ministries and agencies, representatives of training institutions, and individuals in the private sector involved in energy development and the training of electricians. In Mtwara, interviews were held with senior government officials, training providers and individuals from the private sector. The study team conducted the majority of interviews together with the One United Nations Coordinator in Mtwara and with a representative from the Secretariat of the Regional Administration.

Findings

The Energy Sector in Tanzania

A reliable and affordable power supply for producers and consumers underpins economic growth, facilitates productive employment and contributes to quality of life. Electrification, however, is not widely available or reliable in Tanzania. The national grid, the mainstay of power transmission in the country, still has limited coverage. A recent survey of firms found that unreliable electricity was considered to be a major constraint in doing business in Tanzania (World Bank, 2008). Businesses, large and small, that require an uninterrupted power supply must allocate funds for the purchase of generators and fuel, which directly increases production and operating costs. Despite current shortcomings, the potential of the energy sector to increase productivity and expand employment is significant.

Energy Development in Mtwara

Historically, development in Mtwara has been constrained by the lack of electricity and by poor roads, but this is gradually changing, in large part due to the exploration for and discovery of natural gas in the region. The mmediate effects of the increased availability of electricity are already apparent. For the first time, Mtwara town has a steady water supply as a result of the reliable electricity to operate water pumps.

Electricity demand in Mtwara is expected to increase significantly with the construction of a cement factory (anticipated power use of 10MW) and a fertiliser plant (anticipated power use of 6MW); both are expected to be functioning by 2012. There is significant potential for further expansion, through use of existing capacity and through the expansion of the gas turbines providing electricity from the Mnazi Bay gas reserves, which hold an estimated 3 trillion cubic feet of natural gas. It is projected that between 2008 and 2013, 45,000 households in Mtwara will be connected to electricity through the Mtwara Energy Project (MEP)[1]. The MEP will support significant direct and indirect job opportunities, and an improved standard of living for the average citizen. The connections will use ready-made board meters, which are easy to connect and do not require sophisticated wiring, allowing for generation of local jobs in servicing the meters and households, and enabling the benefits of a clean and reliable power source to households.

Interviews with master electricians and apprentices in Mtwara revealed that business has increased since the initial expansion of electricity in 2006. Even though becoming a qualified and certified electrician takes a number of years and is technically challenging, the trade offers good opportunities and is held in high social esteem.

[1] The Mtwara Energy Project (MEP) is a public-private partnership between Artumas Group, an oil and gas exploration and production company, headquartered in Canada and listed on the Oslo Stock Exchange (the main partner), and the Tanzanian Petroleum Development Company (TPDC) and Netherlands Development Financial Institution (both minority shareholders) for rural electrification in southern Tanzania.

Employment Opportunities for Electricians in Mtwara

Artumas Group Tanzania, the major company involved in the development of gas reserves, currently employs 67 people full-time, with an additional 150 casual labourers. There are 24 technical employees, while others are employed by the drilling and transmission companies. More than 75% of these staff currently come from outside of Mtwara, and the highest level positions filled by Mtwara residents are junior administrative positions. The company has faced a shortage of skilled people locally for operational positions, which are highly technical, and typically require trained professionals such as electrical engineers. Most positions require tertiary-level degrees or technicians' certificates from the Vocational Education and Training Authority (VETA), and all employees must participate in on-the-job training modules offered by Artumas (and delivered by Manitoba Hydro) to be eligible for promotions. The training modules are equivalent to a Trade Certificate in petroleum/oil/gas handling, and are offered as both practical sessions and in classes at the end of the day. For the average employee, approximately one year is required to progress between levels. Advanced levels required for positions such as electrical/mechanical operators, can take up to four years to complete.

Far more job opportunities are created by electricity provision. At present, 17,000 households are connected to power, and an additional 28,000 households are expected to be connected in the next three years. New connections will require installation of in-house wiring, and all customers will need secondary services, such as repairs. Demand for industrial electricians will also grow with the planned expansion in power supplies. Over the next 2-3 years, a further 300MW is expected to be added to the national grid. In turn, this will support the connection of an additional 300,000 households.

Business development in Mtwara will also add to the demand for electrical services. The number of small businesses with 5-9 employees has nearly tripled in the past three years, and over 200 new businesses with 10-49 employees have been registered. With reliable energy provision and easy access via the new Dar-Mtwara road with Mkapa Bridge over the Rufiji River, a modern tourist infrastructure can be developed, including travel and accommodation services, restaurants and recreation facilities. With access to electricity the region can expect growth in small industries such as flour mills, industrial carpentry workshops, fuel filling stations, machinery workshops, vegetable oil extraction plants, cold storage facilities, business and technology services, agro-processing and trade of fresh produce (including seafood and meats), mineral water plants, refrigeration and air-conditioning workshops, barbershops, internet and secretarial bureaus, electrical appliance shops and repairs, and electrical contractors (domestic and industrial). All of these industries require skilled and unskilled labour, and a major challenge is to ensure that enough electricians are trained to enable this development.

Education and the Labour Force

In 2009, the primary school enrolment rate was 95.9% nationally, but the quality of education remains low. Only 62.5% of pupils completed primary school in 2008 and just over a half of the pupils taking the primary school leaving examination (PSLE) passed the exam and went on to secondary school. Enrolment rates in secondary education have increased sharply in the past few years, but only 27% of students passed the Form 4 exams in Divisions 1-3 in 2008 (the MKUKUTA[2] target is 70% by 2010). Among students who complete Form 6, over one-quarter progress to tertiary studies; about 35% of these are females. Gross enrolment in higher education institutions has tripled from 2002/3 to 2008/9 (Ministry of Education and Vocational Training, 2009).

[2] MKUKUTA is the Swahili acronym for the National Strategy for Growth and Reduction of Poverty 2005-2010.

National trends in enrolment are mirrored in Mtwara, though with poorer outcomes. Pre-primary and primary school enrolment are higher than the national average with gender equity. However, a lower percentage of pupils passed the primary school leaving examination (53% of boys and 36% of girls) with slightly wider gender differences reported nationally. Over 90% of students who passed the PSLE were selected for secondary schooling in 2009. Increased access to secondary school is a relatively recent development following introduction of the Government's Secondary Education Development Programme which has prioritised the establishment of community secondary schools. In 2003, 77% of students who passed the PSLE were unable to continue their education as there were no secondary schools in the region. The region has a slightly lower percentage of teachers with grade A qualifications and slightly better pupil:teacher ratio than the national average (52 vs. 54) (MoEVT 2009). Not surprisingly, adult literacy rates are lower in Mtwara (61%) than the national average (69%) largely due to the much lower literacy rate among women in the region (54% in Mtwara, 62% nationally).

Labour force participation rates are high nationally and even higher in Mtwara. Unemployment rates overall and among young people are lower in Mtwara than the national average. The vast majority of the employed people work in agriculture (data from the ILFS and NBS, TGNP & MoLEYD, 2007).

Skills Training at National Level

A limited number of young job seekers join technical training schools operated by the Vocational Education and Training Authority (VETA). VETA was established by Parliament in 1994 as an autonomous government agency to provide vocational education to meet national labour market needs. It is funded by a national levy on all employers with four or more employees. VETA runs 21 training centres in 18 regions with a total annual training capacity for approximately 12,000 students. VETA has also certified more than 200 private training institutions to run technical courses.

Approximately 45,000 students graduate with VETA certificates each year, of whom 23% are female. This falls short (in both quantity and quality) of the labour demand for technicians in Tanzania. Urban graduates tend to enter wage employment, while rural graduates migrate to towns and most frequently become self-employed.

At national level, VETA has established a directorate with responsibility for analysing the labour market in each of the nine zones of Tanzania through regular surveys at zonal level (with the onus on each zone to decide which sectors to survey). The directorate sends consolidated data to the Training Directorate, which then develops training packages in response to the skills required. To date, national surveys have been carried out in construction, hospitality and manufacturing (printing sub-sector). Surveys in the agriculture sector are in the pipeline for 2010.

The market clearly appreciates quality secondary school education combined with appropriate VETA training, in part because of the certification provided by VETA and the lack of alternative training opportunities. VETA works to develop relevant training, inviting representatives from local and national industries to participate in curriculum presentations and to provide input into training materials. Based on survey evidence, VETA reviewed its curriculum in 2005 and introduced competence-based education and training (CBET). However, CBET courses are more expensive and, therefore, are offered at fewer centres. A sustainable fee model (given government subsidies) is yet to be developed. VETA has also introduced 3-4 month field placements as a requirement within longer courses. Zonal offices link up with local industries to secure student internships. However, no incentives for private sector participation are provided, and Government / parastatal placements have also declined in recent years.

Institutional challenges also affect skills development. The Government has upgraded all 'polytechnics' to universities, resulting in a shift away from practical training towards more theoretical learning. Vocational training has ceased to produce master artisans like the European model, and many vocational training graduates must seek further academic qualifications to secure professional employment. This shift has produced a problematic skills gap in many trades and limited professional opportunities for VETA graduates, as some companies require higher technical and practical qualifications than are currently available.

The demand for more advanced technical qualifications is one facet of the problem; the content and quality of VETA courses is another challenge. A tracer study conducted in 2004 found that graduates perceived that VETA courses were too theoretical (17%), had less practical skills (10%), and were technologically outdated (22%). Over 10% of graduates felt they were not competent in their trained vocations. The workshops were considered to be ill-equipped, and the medium of instruction was Swahili yet modern technology manuals were in English. It was generally agreed that completion of a VETA course did not make youth more 'employable'. To start in self-employment, trained youth needed complementary assistance such as provision of microfinance or start-up toolkits. Over 71% of graduates did not have access to capital to purchase tools or establish workshops. Another 24% felt they lacked important business know-how, including reference materials, entrepreneurial skills, and marketing and practical knowledge (VETA 2004).

Skills Training in Mtwara

Mtwara region has 17 certified vocational training centres, of which one is owned by VETA, which has a capacity of 624 students per year. Smaller centres, either privately owned or run by religious organisations, cater for an additional 250 students. Demand for VETA places is high, usually with ten applicants vying for every place. Course offerings are fairly limited, and there are limited boarding places (180 in total). Only 50% of VETA students in the Mtwara centre are from Mtwara region, the remainder come from outside the region. Few students, if any, drop out from VETA.

Although VETA has introduced work-study placements as part of its curriculum, apprenticeships (formal or informal) are not recognised or certified by VETA, with the exception of the practical apprenticeships offered at the Ndanda Vocational Training Centre (VTC). Ndanda VTC, established in 1906 by the Benedictine missionaries, offers high-quality formal vocational training. It aims to equip young people with technical and practical skills to gain employment in lower technical jobs within local industries, or to become self-employed. The Centre has, however, a very small capacity with a total of 150 students enrolled across a range of skill areas. Average annual enrolment is currently 50 students (83% male, 17% female).

Supply of Electricians in Mtwara

The number of VETA-qualified basic domestic electricians in Mtwara is estimated at below 100, although exact figures are not known. VETA is not the only training facility but information from business registrations indicates only five registered electricity, gas and water businesses, and training institutions indicate fewer than 30 qualifying graduate domestic electricians in the region per year. Most electricians are male and work in the informal economy, for which limited data are available. Some trained electricians migrate back to rural areas or to larger urban centres after training.

Skills training for more advanced, industrial level electricians, process engineers and manufacturing specialists, for which there is growing demand, is not offered by VETA in Mtwara, and most industrial contractors are brought in from Dar es Salaam when required. Currently, VETA does not offer any advanced qualifications for electricians beyond Trade

Certification Level 2 required for domestic electricians. Therefore, VETA in Mtwara offers no qualifications to fit the immediate labour market requirements of large firms in theenergy sector, such as Artumas, despite being the third largest VETA centre in the country outside of Dar es Salaam and Kigoma. Artumas will not allow internships within their facilities because of safety risks.

Electricians in Tanzania (both domestic and industrial) require VETA certification and must, therefore, take the VETA trade tests. And, although some electrical tradespeople do take the VETA trade tests without having done the course, they have often followed an informal apprenticeship to gain the necessary skills to get certification. Indeed, informal apprenticeship is the main means through which tradespeople, such as electricians, gain entry into positions in the informal economy.

Apprenticeships

The ILO study *Understanding Informal Apprenticeship* undertook detailed discussions with 600 master crafts-persons and apprentices in Lindi and Mtwara from six professional trades, including electricians. The research provides valuable information on the electrical trades sector.

Apprentice electricians averaged 21 years of age and often worked in groups of up to three, in shops with up to five other employees. Their main areas of work were repairs to fans, ovens, cookers and other small appliances, and nstallations of in-house wiring. The sector was reported to be "still small (but) it is expected that the Mnazi Bay gas project will result in reduced connection fees, which would result in higher demand for electrical installations and devices" (Nubler et al., 2009, p. 12. Most electricians had completed lower secondary school education (Form IV, O-level). Most apprentices valued their apprenticeship and confirmed that they were well respected in society. Indeed, a number of apprentices had paid higher fees for their informal apprenticeship than they would have paid for a formal course with VETA.

In interviews with employers, several respondents complained about poor quality training in formal training systems, in particular, they deplored the low level of practical skills gained by VETA graduates. All businesses were found to require a trial period at the beginning of apprenticeships, with electricians having the longest probation period (9 weeks) among the trades surveyed. Apprentice electricians were frequently required to provide their own tools, and the provision of tools and raw materials (copper wiring) was the main suggestion made by employers for success in apprenticeship.

Apprenticeships generally lasted 16 months on average, and cost approximately TZS 4,100 per month, costs borne by the apprentice as training costs. Apprenticeships not only trained young people in skills but also introduced them to customers. Most apprentices sourced initial business through their apprenticeships which enabled them to gradually enter the market as service providers. The apprentices interviewed reported learning a wide range of cognitive and technical skills. Accounting, costing, negotiating with customers and advertising were seen to be less needed than further technical skills for air-conditioning and refrigeration repair, motor installation, and rewiring.

Overall, the highest percentage of apprentices in the study with formal vocational training were electricians, because of the legal requirement to be VETA-certified in order to practice. All employers encouraged their apprentices to take the VETA Trade Tests. The National Trade Tests (Grade 1-3) contain practical and theoretical components, and exams cost approximately TZS 11,000. Language barriers for advanced courses are an issue – VETA Trade Tests 1 and 2 are in Kiswahili while Trade Test 3 is in English.

Improving the technical and practical content of VETA courses and Trade Tests could improve the quality of service provision. Nearly all apprentices interviewed in Mtwara had set up their own business, while a few (5 out of 36) were employed by a business or large

enterprise. The weekly income of an electrician in Mtwara was reported to be TZS 21,000 for those electricians who had been apprentices compared with TZS 11,000 for those with only formal training, confirming that customers were willing to pay more for electricians demonstrating work experience than those with mainly theoretical knowledge.

Conclusion

Electricians are in increasing demand in Mtwara and throughout Tanzania as the national electricity grid expands. Quality training for electricians exists but is scarce and of insufficient scale. More opportunities for practical training are urgently needed. Competition from additional training institutions would provide some pressure on the Vocational and Training Authority (VETA) to make necessary improvements to its courses, and links to apprenticeships should be strengthened so that new entrants may be supported by experienced trade professionals.

Macro-level changes are also having a significant impact on the direction and development of the energy sector, particularly in Mtwara where the largest deposits of natural gas are located. Electricity provision to both households and businesses in Mtwara is expected to expand, and labour force training must be improved to meet the demand. Mtwara region faces a significant shortage of electricians, and VETA and private training institutions are not yet equipped to address this shortfall. Based on these findings the following recommendations are put forward for consideration by the Government and other key stakeholders in the energy and vocational training sectors.

Recommendations

At the National Level

- Commission a study as part of development of the energy sector's national expansion plan to determine the sector's employment and productivity potential (direct and indirect).
- Provide resources for rapid implementation of skills development for existing workers and young entrants into the electricity sector to address the gap in industrial and household tradespeople.
- Review vocational education with a view to strengthening practical training, upgrading vocational occupations and developing a cadre of master tradespeople nationally.
- Expand and upgrade VETA Trade Certification for course graduates, including electricians and other key trades such as welding, process engineering, manufacturing, and health and safety inspection (oil and gas).
- Increase the number of training institutions to provide competition for VETA and spur improvements in quality practical training opportunities.

In Mtwara

- Highlight electricity as a growth driver within regional planning in Mtwara, and its potential for employment of young people.
- Strengthen data collection systems within the Regional Secretariat on employment and business growth in Mtwara, particularly in the energy sector. This should include the monitoring of earnings and conditions of work generally, and gathering information to determine potential employment in key growth sectors.

- Undertake a socio-economic baseline study of Mtwara to establish a comprehensive set of baseline data to be followed by regular surveys at 3-4 year intervals. The research programme should consider the impact of specific growth sectors in the region, such as energy.
- Improve practical training through collaboration with larger businesses to develop technician training courses and increase placements within companies. Incentives should be considered for industries that are able to offer on-the-job training for new entrants and for workers who upgrade their skills.
- Initiate training in industrial electrical installation and introduce Trade Test Level 3 for electricians in at least one location in Mtwara. The Trade Test Level 3 will require introduction of complementary English language training.
- Expand and upgrade informal apprenticeship systems (perhaps through formalisation) to provide practical entry-level mentoring.
- Develop a scheme for business start-up kits to facilitate the hire/purchase/grant of start-up tools and to provide technical assistance from skilled and experienced electricians for training of trainers (i.e., upgrading master electricians in new areas such as air-conditioning repair, refrigeration, house and business wiring, electro-domestic appliance repair and service, etc.). Such a national initiative could usefully be piloted in Mtwara.
- Support expansion of small- and medium-sized businesses through training (Start Your Own Business courses) provided in evening classes in Mtwara town, and through links to secondary schools, VETA and private training facilities. Harmonisation of the provision of skills, tools and facilities, micro-credit and apprenticeships might be considered for specific vocations, such as electricians, through micro-business centres.
- Conduct research on the availability of credit for small businesses (including those started by youth entrepreneurs) in Mtwara. This study should examine existing credit unions, and schemes implemented by Government, development partners and NGOs.

References

Nubler, I., Hofmann, C. & Greiner, C. (2009). *Understanding informal apprenticeship: Findings from empirical research in Tanzania.* International Labour Office (ILO), Skills and Employability Department. Geneva: ILO.

Ministry of Education and Vocational Training (MoEVT). (2009). *Basic Education Statistics in Tanzania (2005-2009) – National Data.* Dar es Salaam: MoEVT.

National Bureau of Statistics (NBS), Tanzania Gender Networking Programme (TGNP) & Ministry of Labour, Employment and Youth Development (MoLEYD). (2007). *Analytical report for the Integrated Labour Force Survey 2006.* Dar es Salaam: NBS, TGNP & MoLEYD.

Vocation Education and Training Authority (VETA), South East Zone, *Report on Survey of Gender Effectiveness Tracer Study, 2004.*

World Bank. (2008). *An assessment of the investment climate in Tanzania, Volume 1.*

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