Curricula and Pedagogical Issues in Designing Oil and Gas Management Programmes in Tanzania: A Stakeholder Based Perspective

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This paper is an effort to appraise the status of human resource, identify existing knowledge and skills gap in Oil and Gas (O&G) sector in Tanzania and proposing the appropriate content and teaching methods for postgraduate programmes on O&G management basing on stakeholders' perceptions. Therefore, the paper proposes specific course content and appropriate pedagogical methods to be adopted for postgraduate degree programmes in O&G management so as to guarantee sustainable availability of qualified staff for the industry. Qualitative approach was deployed whereby data were collected through In-depth Interviews (IDIs) which used interview guides. Similar pieces of information were coded, classified into three themes, sub-themes and subjects. The analysis was based on grounded theory, whereby bits and pieces of information from various respondents were synthesized into meaningful information used for generating findings. On human resource status conceded to the one proposed by the Tanzania Government in 2014 indicating scarcity of local experts in all sub-sectors of O&G industry, meaning upstream, midstream and downstream. For the O&G management training programme to be effective, more participatory, practical oriented curricula design and development is recommended.

Keywords: Programme, knowledge, skills, oil and gas, postgraduate programme, practical-oriented training

INTRODUCTION

Tanzania has the established capacity of O&G most of which is located along the southern coast of the Indian Ocean, i.e. Songosongo in Kilwa District in Lindi region which is under exploitation for electricity production; Mnazi bay in Mtwara region which is under limited exploitation for electricity generation; Mkuranga, Coast region which is under appraisal; and Kilwani, East Songosongo area which is also under appraisal (URT, 2014). According to Lema (2012) by 2012 natural gas contributed 40% of power generation, i.e. 420 MW and upon completion of the 532 kilometres Mnazi bay-Mtwara-Dar es salaam gas pipeline, additional 2785 MW shall be supplied to the national grid. Other areas are Deep Sea Blocks 1, 3 and 4 by Ophir/British Gas (BG) Company located South East of Mafia island in the Coast Region and East of Mnazi bay in Mtwara Region; whereby some fields are under exploration while others are under appraisal; Ntorya in Mtwara by Ndovu Resources/Aminex, whereby the field is planned for appraisal. By 2013, the total discovered natural gas reserves in the country amounted to 46.5 trillion cubic feet (TCF) of which 8 TCF are from on shore fields of Songosongo and Mnazi Bay, Mkuranga, Kilwani North and Ntorya. As of August 2014, Tanzania had proven natural gas reserves of 1.43 TCM (50.3 TCF) making the country to be a significant exporter of Liquefied Natural Gas (LNG) by 2020 (URT, 2014).

O&G economies, world over require not only big capital outlay but also highly trained knowledgeable and skilled personnel. Due to high poverty levels persisting in Tanzania, it is apparent that the O&G sector will mainly depend on external capital brought to Tanzania by “investors”.

As the Tanzania Natural Gas Policy 2013 stipulates that “Natural Gas Resources found in Tanzania belongs to all...
Tanzanians; it is implicit that the same resources need to be managed in the way that benefits the entire Tanzanian society (URT, 2014). The same policy puts an emphasis on the “local content”. Local content is defined as the added value brought to a host nation (both regional and local areas in that country) through the activities of the O&G industry. Local content has two attributes, which include workforce development, through employment and training of local workforce in one hand; and investment in supplier development through developing and procuring supplies and services locally. Prior to strategizing on development of competent, competitive, capable and sustainable local labour it is necessary to appraise the existing workforce in terms of requisite knowledge and skills. This constitutes both a mechanism and the prerequisite for fostering technology and knowledge transfer (URT, 2014).

With regard to human resource capacity and availability, Tanzania is known to have few local experts in O&G industry, most of who work in public sector (URT, 2014). The existing few experts have capacities to operate and maintain facilities such as wells and gas processing plants at Mnazi Bay and Songosongo.

The value chain of O&G requires more specialized staff for various sectors of the industry. To develop workforce for the sector is not only important but also necessary for Tanzania to capably manage the newly emerging sector (URT, 2014; Lema, 2012). The government of Tanzania considers collaborating with foreign O&G companies to support development of adequate local skills necessary for effective management of the burgeoning O&G sector.

Despite the broadly noted and acknowledged gap in terms of both “required knowledge and skills” on O&G in Tanzania, as stipulated in various government documents; the actual types of knowledge and skills required were not specified; hence, calling for the need to identify the same. More importantly is the identification of the appropriate curriculum content and teaching methods to be used in imparting such highly needed knowledge and skills to the Tanzanian workforce.

Following huge discoveries of natural gas in Tanzania, knowledge and skills shortages across the industry value chain has become apparent. This necessitated Tanzania to find ways to develop local capacity in the industry that will operate and maintain gas facilities and requisite processing procedures.

Which knowledge and skills are needed to be taught to the locals, and at what levels and methods, are aspects which needed to be articulated from the users of the products, i.e. all the stakeholders of O&G industry. This fact arises from the tenet that needs assessment; ensures about the requirement for potential and actual knowledge and skills. The product of such a process is better fitted to the specific sector, which reduces the cost of training on aspects which are not useful; hence resulting into wastage! Therefore, this paper intends to explain on the existing knowledge and skills gap on O&G industry; an aspect towards improving the state of affairs regarding human resources for effective management of the O&G sector in the country basing on perceptions of the actors and stakeholders within the sector.

The study was guided by three specific objectives which include; establishing the internal human resource capacity for managing O&G related companies, establishing the knowledge and skills gap for O&G industry in Tanzania, and formally proposing specific knowledge and skills areas to be improved for enhancing O&G management.

LITERATURE REVIEW

Estimated natural gas reserves of 43 Trillion Cubic Feet (TCF), valued at United States of American Dollars (USD) 430 billion have been found in Tanzania after exploration period of more than a half a century (Kibendela, 2013; Rex Attorneys, 2013). These discoveries raise Tanzania to become the biggest industry in terms of value and employment of thousands of people. The sector is also expected to boost energy resource which is critical for national economic growth. In 1974, natural gas was discovered at Songosongo Island in Kilwa District of Lindi Region, followed by a discovery at Mnazi Bay in Mtwara Region in 1982 (Kibendela, 2013; Rex Attorneys, 2013).

Exploration activities are underway on shore in shallow and deep waters and in some inland rift basins. By June 2012, 26th Production Sharing Agreements (PSA) was in place, signed with 18 oil exploration companies. Over 17,000 square kilometers of three dimensional (3D) seismic data have been acquired in deep sea. A total of 62 wells for both exploration and development have been drilled by year 2012, of which 53 wells are onshore basins and 9 are off shore (URT, 2012). Recent findings suggest that the country is proven to have substantial gas reserves, thus demanding for a proportionate number of knowledgeable, skilled and experienced specialized workforces to man the sector (Simbeye, 2012). Despite the long term exploration, Tanzania still has no proven oil reserves and remains dependent on imported petroleum products (Rex Attorneys, 2013).

Discoveries of huge quantities of natural gas in Tanzania, presents an opportunity for expediting national economic growth (Simbeye, 2012; Shayo, 2012). However, there is lack of management knowledge and skills for the sector which needs to be addressed properly. The way the country is likely to manage the fast growing natural gas industry poses a question of preparedness on effective harnessing the benefits of the sector. The types of knowledge and skills to be imparted to the Tanzanian O&G
workforce should be in-line with some necessary changes identified by Ngowi (2012) which are linked to the revenue authority, the parliament (which deals with legal and policy issues), and the financial sector whereby the capacity of Tanzania’s banks to handle larger international business transactions is questionable. Special skills, needed for effective running and linking all the strategic sectors, are over and above traditional ones. The natural gas economy has made the fiscal regime to change, hence new skills are needed (Mmari & Bukurura, 2015; Ngowi, 2012). Such skills like calculation of tax values on loyalties and O&G economics are highly demanded but mentioned to be missing (Rex Attorneys, 2013; Lokina & Leiman, 2014; Ngowi, 2012).

Given the fact that the ability of capacity building institutions is low, there is a call for detailed investigation on the area. However, this does not rule out the need for ensuring that capabilities of Tanzanians are developed in the entire natural gas value chain through skills development, technology transfer and research. According to the Petroleum (Exploration and Production) Act (1980) a proposal was developed on local content in respect to training and employment of Tanzanian citizens. The proposal demanded that the transfer of management and operational functions to Tanzanian nationals occur within five years of the start of commercial operation. This scenario demands for well-organized programme development (URT, 1980).

According to Kibendela (2013), such challenges need to be addressed immediately and properly for Tanzania to realize economic returns from the sector. One asks as to whether such limitations may be addressed without understanding in details the status of human resource capacity. This is in line with Kibendela (2013) who observes that lack of Skills Training Needs Assessment (SNA) in O&G sector is a continuous issue. The paper also acknowledges the lack of management knowledge and skills and underscores that scientific investigation be waged so as to determine the requisite steps to be achieved.

Vocational Education and Training Authority (VETA) has marked an increased effort in engaging and generating requisite skills for the sector in Tanzania through provision of demand driven training services for sustainable gas industry in the country, which will produce local skilled workforce (VETA, 2012). One wonders as to how can such an objective to be achieved devoid of national SNA. Skilled human capital, a prerequisite for O&G industry is considered important in raising the Gross Domestic Product (GDP) hence improve standard of living (Kibendela, 2013; Lokina & Leiman, 2014).

Several literatures such as URT (2014), Picton (2012), TO&GY (2014) and Tudor (2014) emphasize on the need for specific knowledge and skills for efficiency and expansion the industry. Engagement of VETA is of significance as it focuses on practical aspects of the sectoral demand but with an eye on production of competencies for direct and indirect applications associated with the industry. According to VETA’s perception, success in each natural gas value chain depends not only on the quality of skills deployed by job holders, in a particular phase, but also those in the preceding stage. More importantly is that the skills have to match with internationally acceptable best practices (VETA, 2012). Conversely, other countries, such as Botswana has succeeded to become world’s largest producer of diamonds by value but set up a mechanism to ensure that a significant revenue is allocated for investment in health and education (Lokina & Leiman, 2014).

The point of emphasis at this point is that skilled labour is needed in all stages of O&G production. Other than basic trades such as electrical and electronics repairers, gas plant operators, industrial machinery mechanics, maintenance workers, mobile heavy equipment, mechanics well head pumpers and the like, which VETA has identified to be the areas of engagement in training, one wonders as to how can a country move forward using the sector which it cannot manage. This calls for thinking of higher level management training on O&G management, which this paper concentrates. Thinking should not only cover semi-skilled but also highly skilled management training for running and managing the O&G sector. It is far less profitable to have the sector managed by foreigners, while locals hold non-decision making positions. As Simbeye (2012) called for well management of the sector for robust economic growth. Huge investment in human capital is hereby proposed and considered imperative (Kibendela, 2013). Tanzania is said to have a few highly trained staff in O&G but most of them employed by the Government (Kibendela, 2013), hence the private sector, which drives O&G production activities lacks knowledgeable and skilled human resource.

The skill gaps are generally considered to be both the current threat and potential threat due to ageing and low replacement of skilled workforce. Experiences in other countries such as the Netherlands and Nigeria, confirm that Mobil and Shell offered Vocational Education and Training to their workers as part of their employee development programme. Moreover, companies offered training curricula to improve competencies (Aggour, 2009). The British Petroleum (BP) implemented a USD 50 million five year programme in technology, education and culture projects to boost research and skills in O&G industry in Russian Federation (BP, 2011). How such programmes may be adopted for Tanzanian context, is an aspect which needs further investigation and scrutiny.

However, an important aspect, in this regard, is that of determining the types and levels of training required
across the O&G value chain that lead to people-centred development (Simbeye, 2012). Entry points for training at upstream, mid-stream and downstream levels should be determined particularly for management programmes. How to create synergy between local and international labour force, at management level is critical as it will affect the teaching methodology and pedagogical issues to be designed for more practical results. Lack of strategic actions to guide the right conditions, gas discovery will plunge Tanzania into further poverty (Shayo, 2012).

Despite having requisite knowledge and skills; other aspects important for O&G to benefit the entire national population is good governance underlined by transparency, accountability and strong legal framework (Mmari & Bukurura, 2015). Another indispensable aspect is involvement of all stakeholders through well planned management system backed by informed and legitimate intrinsic value that embrace inclusive development (Lokina & Leiman, 2014).

METHODOLOGY

The paper adopted qualitative approach that deployed an exploratory design in addressing the study problem. A variety of stakeholders were involved in the study which included two government ministries, which include Ministry of Education and Vocational Training and Ministry of Energy and Minerals. The key players of the sector, meaning O&G companies, were involved in the study. Companies that participated include Stat Oil (T) Ltd, SONGAS (T) Ltd, SWALA Energy (T) Ltd, Heritage Rukwa (T) Ltd and PETROBRAS (T) Ltd. Other organs involved in the study are Energy and Water Utility Agency (EWURA), Tanzania Revenue Authority (TRA) and Tanzania Ports Authority (TPA). These were stakeholder organs in O&G industry. The National Environmental Management Council (NEMC) was consulted as it has the responsibility on cleaner extraction, processing and transportation of the O&G products for environmental sustainability.

In-depth Interviews (IDIs) were conducted, using Interview Guide, to collect detailed information with regard to availability of qualified staff to man various sectors of the O&G industry ranging from upstream, mid-stream and downstream. One representative from each selected company and/or organization was interviewed. Information and data collected was on existing knowledge and skills gaps, areas of competence needed in the sector and a list of modules, how best to train students in the areas in terms of teaching methods and examination procedures. Such qualitative information classified into three themes which are knowledge and/or skills gaps, types of knowledge and/or skills needed and pedagogical methods. Each of the three themes was divided into two sub-themes and subjects. The procedure was found satisfactory in identification of existing knowledge and skills gaps and how to effectively address them.

Analysis was done through linking the like information bits and pieces basing on the grounded theory, whereby responses were aligned on a table for comparing and contrasting. Similar bits and pieces of information on the specific issues were linked for generation of study findings on the status of O&G knowledge and skills; areas to be included in the O&G curricula and in proposing the basic requisite pedagogical aspects for O&G programmes in Tanzania.

Table 1: The Participants of the Key Informant Interviews by Companies and Activities

<table>
<thead>
<tr>
<th>SN</th>
<th>COMPANY</th>
<th>ACTIVITY</th>
<th>NO. OF RESPONDENTS</th>
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<tbody>
<tr>
<td>1</td>
<td>PETROBRAS (T) Ltd</td>
<td>Exploration</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>SWALA ENERGY (T) Ltd</td>
<td>Exploration</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>HERITAGE RUKWA (T) Ltd</td>
<td>Exploration</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>SONGAS (T) Ltd</td>
<td>User of Gas for Electricity Production</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>STAT OIL (T) Ltd</td>
<td>Exploration and Drilling</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>EWURA</td>
<td>Energy, Water and Utility Regulator</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>NEMC</td>
<td>Environmental Protection</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>TRA</td>
<td>Taxation</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>TPA</td>
<td>Import/Export (port)</td>
<td>1</td>
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<td></td>
<td><strong>TOTAL</strong></td>
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Source: Field Survey, 2014

Presentation and Discussions of Findings

The O&G companies involved in the study dealt with a wide range of activities within the entire value chain of O&G industry, which include exploration, processing, marketing, sales and electricity production. This fact calls for knowledge and skills development in all sectors of the industry. The status of skills and how to fill in the knowledge and skills gaps are aspects explained that cover this section.

The Status of Human Resource in O&G Sector in Tanzania

Availability of Local Experts

When asked to the comment on availability of local human resources, it was observed that there was an acute shortage. Responses such as “rarely available”, “we rarely have specialized staff from within Tanzania” and “average” tended to underline the shortage of knowledgeable and
skilled staff specialized for the sector. Some of the companies indicated that the shortage was eminent particularly in more specialized fields within O&G industry.

To substantiate this finding, one of the respondents said the following: 
“It is not a secret saying that there are very few skilled and knowledgeable people in O&G related disciplines, namely exploration, drilling, processing, transportation and others. This situation covers the whole range from lowest to highest cadres. In this way, we are forced to employ foreigners for the higher cadre and a few trainable lower cadre Tanzanians to work for our companies”.

**Performance of Available Local Human Resources**

All the IDIs participants from stakeholder organizations, meaning NEMC, financial institutions and TRA indicated the need to introduce O&G management programmes as the sector was in acute scarcity of local human resource. This finding concedes to the overtly acknowledged by the Government of Tanzania (URT, 2014). Therefore, the O&G sector and nation at large was consequently called upon to address the observed scarcity of competent workforce, an aspect highly demanded in the newly emerging economic sector.

The responses portrayed that though the available local human resource plays a vital role in the sector, skills gaps, observed in terms of performance were eminent and adversely affect the sectoral performance. Only few tasks, particularly at managerial level, were noted to be undertaken by nationals. In this way, foreigners tended to dominate the higher positions, leaving nationals holding low cadre positions, hence benefiting less from the sector. Participation of Tanzanians in activities related to O&G has intensive impact for the industry’s stability attained through local capacity building and for integration of other economic sectors; a critical factor for generation of multiplier effect needed for poverty reduction to the majority of the citizens. If not properly balanced, the dominance of foreign workforce may lead into systematic income drain, as most of the revenues shall end up into pockets of foreign nationals. This aspect is verbally addressed by the National Natural Gas Policy (2013) whose reinforcement shall depend very much on political will of the political leadership. A synthesis of information collected from the respondents indicates that there was scarcity of skilled labor demanded by the O&G sector in Tanzania (URT, 2013).

This situation could be confirmed by the respondent’s voice which represented views of the majority of the respondents by saying:
“As you might be aware that O&G exploration and drilling are high–tech, scientific processes which need high grade professional staff. Therefore, it is in no way one can deploy non-professionals for such high skill and specialized knowledge demanding tasks. Very few local have requisite knowledge and skills for the tasks which are associated with complicated technical assignments”.

Based on the above quotation, training of local people becomes indispensable in case Tanzania has to control and benefit from the O&G sector. What is of critical significance is on what should be taught and how should the teaching be conducted for maximum imparting of the skills and knowledge.

**The Skills Gaps as Identified by Stakeholders**

All the stakeholder organizations were of the opinion that the training courses on O&G should be designed and start being offered soonest as it deems timely and relevant for the newly emerging O&G economy, which needs people with the right capacity in terms of both knowledge and skills.

The proposed thematic areas to be covered by the training programmes included exploration, extraction, storage, transportation and marketing. These activities demanded for people with such knowledge and skills, being observed to be scarce in Tanzania at both operational and management levels.

At operational level, the required skills mentioned include support skills for maintenance of operations such as welding, mechanics, electrical, electronics, mobile machine repairs, pipe fitting, machine operation, pump repairs, pumping, boiler operation etc. These are types of knowledge and skills, which Vocational Education and Training Authority (VETA) has engaged in teaching. Following long term involvement of VETA in low skills training on O&G, it can be said with optimism that the gap, at lower level, is practically slow but surely being progressively bridged.

Tackling it at O&G management level, the respondents indicated that; such knowledge and skills involved areas of law contracts, finance, accounting, project management, economics and taxation; were recommended to be included in the curriculum. High level skills call for rapid engagement by technical colleges, institutes of technologies and universities, most of which do not have O&G programmes. At this point, it is implicit that there is an evident gap in knowledge and skills regarding the O&G industry, which needs to be addressed.

When asked to mention the areas the programme should focus, a variation of responses was observed. The one of the significant voices raised during the IDIs was quoted as follows:
“Scarcity of local human resources is observed throughout management of the entire value chain of O&G sector, i.e. upstream, mid-stream and downstream. This calls for a holistic designing of a training programme on the management of O&G. Other areas which need attention include marketing, transportation, extraction and processing”.

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_Curricula and Pedagogical Issues in Designing Oil and Gas Management Programmes in Tanzania: A Stakeholder Based Perspective_
From the above direct quotation and responses from other O&G companies’ staff, it became apparent that holistic management of the entire O&G sector should be the scope to be covered by the programme so that the programme products are able to manage all activities in the O&G sector. Though respondents differed in terms of opinions on the programme focus, as some mentioned the whole value chain of O&G while others emphasized on specific parts of the value chain, it was observed that all the three sections of the value chain were mentioned. This convinced the author to conclude that a complete and effective O&G programme, would be crucial as it will expose the learners to the wide range of knowledge and skills related to the sector.

Proposed Programme Course Content

Respondents from O&G Companies, when asked to mention some important specific areas to be considered as part of course content for the postgraduate programme in O&G Management, a variety of similar responses were obtained, whereby one of the higher voices directly captured from one of the respondents during the IDIs profoundly said:

“This is an important area for us (Stakeholders in O&G sector) to be fully involved because we are the ones to employ the graduates of the programme. The kind of the product we need is the one who graduates and can actually do the requisite job effectively and efficiently. Not just a person who knows much about O&G. in this way I can comfortably mention some key and indispensable subjects for the MBA Programme on O&G Management, which are Project Management, Financial Management, Financial Accounting, O&G Contract Law ...”

The participation of stakeholders ensures utility of the programme content as it will be in tally with the requirements of the industry. The programmes shall address real human resource requirements in all the sections of the O&G industry, i.e. downstream, middle stream and upstream. It hereby being proposed that whenever necessary separate programmes for the sections be prepared for more specialized knowledge and skills outcomes. Such programmes have to bear more concrete course content directly applicable in the field.

Hereunder, are some of the specific responses, regarding the entire list of subjects and their respective descriptions summarized from the IDIs. They were mentioned to be indispensably included in the programme:

i) Project Management
This is a course considered important for effective management of O&G projects. It is critical for profitable effective management as it involves cost benefit analysis, calculation of return on investment and the like. It is important for profitability and hence determining life of the project.

ii) Financial Management
This course entails management of finances in respect to O&G projects. It involves calculation and setting of some useful indexes and parameters applicable for decision making within O&G sector. Operations and progress of the sector, financially is influenced by such knowledge and skills taught in this subject.

iii) Financial Accounting
This is accountancy related to O&G sector. It is specialized type of course as it involves huge capital outlays and vast revenue volumes. The transactions involved in the sector require high skills and knowledge to manage the same. Specialized type of knowledge and skills are needed for such accountants who should work and manage the O&G sector.

iv) O&G Contract Law
Contracts are the gist of O&G companies’ presence and progress. Therefore, contracts are considered to be the heart of O&G industry. Knowledge and skills on contracts and contract management is of great importance to every O&G Company. O&G companies require highly competent personnel in O&G contracts and contract management. Profitability of such companies, right from the onset depends on the nature and character of contracts which established the same.

v) O&G Economics
Economics of O&G is a course which translates into special skills on designing requisite tax regimes, calculating royalties and the like. The knowledge and skills in this area is considered important and required for effective collection of revenues and payment of requisite taxes to the government. It includes dispensation of knowledge and skills on specific calculations of taxes specially tailored to the O&G sector.

vi) O&G Valuation and Quality
This is a specialized course which deals with setting of standards for O&G products, an aspect which is critical for determining quality of the product hence its value. It is an important skill and specialized knowledge that provides for promotion of O&G business.

vii) Energy Policy and Environment
This course creates an understanding of the policies and legal framework in which O&G companies operate. It is a course which dispenses knowledge and skills that ensure O&G projects comply with acceptable environmental standards as stipulated by law of the land, such laws are in place to ensure sustainable environmental status for the benefit of the current and future generations.

viii) Geophysics
This is a scientific course with a focus on basic knowledge for geologists. It is a course critical for upstream section of the O&G industry. Geology is the programme to the supply side, which enables exploration, extraction and processing of O&G.
ix) Data Analysis
This deals with analysis of data associated with geological surveys. It is part of interpretation of seismic data collected using modern technologies that sense presence and/or absence of oil and/or gas in the oceanic reef. It is a specialized technological course which is important for exploration phase of the O&G industry.

x) Technical Audit
This is the subject dealing with valuation of O&G products basing on specific knowledge and skills. This course is considered critical for determining the quantity and quality of O&G products extracted, processed, transported and sold/bought. It is the subject on methods of verifying standards and quality of O&G products.

xi) Pipeline Pigging (Clearing the Oil/Gas Pipeline)
Since pipelines get dirty after long term continuous use, there are knowledge and skills required to clean the same. The task requires specialized types of knowledge and skills to be undertaken. It is an important task for efficient transportation of O&G products using pipelines. In this course, various methods of pipeline cleaning are taught/learned in both theory and practice.

xii) O&G Profit Distribution
O&G are petro products whose profit determination and distribution is complex and need to be known. The sector brings together several companies ranging from exploration, drilling of wells, extraction, processing, transporting to selling, each company has to be remunerated accordingly. The methods of distributing profits, among several participating companies, are complex but critical for efficient business management. The profit should be in tally with the clauses stipulated in the signed contracts. This aspect is covered in the specialized course called O&G Profit Distribution.

xiii) Taxation for Oil and Gas Revenue
This point was not expected to me mentioned by the O&G companies as O&G industry is generally characterized by external investment, whose primary objective is to rip super profits. Basing on the assertion by Ngowi (2012) training on taxation for O&G revenue is of criticality in an effort for enhancing the government's capacity to collect revenue from such a new and vibrant sector.

Other areas this paper proposes to be covered in the programme curricula, which were not mentioned by O&G companies and the stakeholders include: O&G Reserve Management and Investment Analysis for O&G. The above areas could not be mentioned, particularly by O&G companies as they are characteristically regarded as confidential; in fact, they constitute source of companies' profitability. However, for Tanzania government, these are strategic areas for the country’s economy to benefit.

Proposed Programmes Design and Related Pedagogical Issues

The respondents were also asked on how to make the programme meaningful. The question focused on the designing and the associated pedagogical issues. One of the respondents, during IDIs, on the proposed programme design and teaching methods for O&G management courses had the following to say:

“The programmes for O&G should not be too theoretical as the sector needs people who can do the work appropriately basing on the required knowledge and skills. Such programmes should be practical oriented coupled with pragmatic curricula. In as much it should emphasize training individuals ‘to do’ not just ‘to know’ about specific processes which are actually part of the day to day activities of O&G sector. Whenever possible experienced employees from the sector be invited to teach at the colleges and universities. The students should be taught skills and they actually learn by doing. To be precise the classroom should be turned into a laboratory whereby the laboratory technician and professionals facilitates the teaching/learning while at the same time the learner dominates the process”.

Responding to this same question, on the programme design, the participants from all 9 organizations mentioned the following aspects to be the important features of the required programme design:

i) There should be a mixture of both theories and practical whereby the later was recommended to be given an upper hand. This implies that there should be more practical than theoretical in terms of both the content (curriculum content) and form (teaching methodology).

ii) Full involvement in the industry after theoretical sessions that combine lectures and discussions in class, there should be a kind of field attachment (industrial training) meant to foster skills and knowledge acquisition.

iii) The course content should be aligned to what is actually taking place in the field.

iv) Environment and Business Opportunities - this subject area was proposed by NEMC to enhance industrial safety and sustainability issues.

The mentioned combination of features compels one to think for a need to shift the paradigm from “teacher based” to a more pragmatic curriculum, which is essentially “learner based”, sometimes termed as “individual learning” whereby learners take responsibility and have ownership of their learning (Faraday et al., 2010; Cator et al., 2014). This emerging epistemological scenario stands to be compulsory particularly with regard to training for O&G sector which refers to “deeper learning.” The nature and character of the sector necessitates for the paradigmatic change.
Another in-born feature noted from the respondents’ views is that of the need to shift from the traditional use of a “teacher”, meaning a person vested with knowledge on the subject matter, to the practitioner, a person who has vast experience on what is being taught. The paper considers such a shift to be an important quality for skills teaching; which holds the thinking that ‘experience tends to surpass theoretical knowledge’, whose applicability enables for the transfer of such knowledge and skills to reality. This is likely to bring about a big challenge to learners who may (sometimes) not manage such a transfer; while at the same time may cause shortage of skilled technical staff who are highly needed by the sector. Practical training and industrial visits are recommended as the trainees shall get exposed to the real situation where they can actually “learn by doing”.

The respondent from the National Environmental Management Council (NEMC) was of the opinion that the programme should include “environmental and business opportunities” in the course content. This is critical for ensuring environmental safety and sustainability of the sector.

General Comments on Human Resource Development for the O&G Sector

A broad range of responses were given when the respondents were asked to give their general comments about the postgraduate degree programmes in O&G management. Arguing the same point, one voice of the respondent of the IDI sessions said as follows:

“In case Tanzania has to benefit from the O&G sector, a lot of investment is needed on training of local human resource on O&G technical and management skills. This will ensure the vast involvement of local people in the industry. It will enable the meaningful and broader proportion of the population to enjoy the direct and indirect benefits of resources at different levels, which are exploration, drilling, processing, transportation, selling, exporting etc. Short of that the majority shall remain to be the on-lookers, benefitting nothing or very little from the resource”.

The suggestions as captured from all the respondents, regarding programme designing and the teaching/learning methods to be adopted during programme designing were as follows:

“To make the graduates of the programme able to work effectively and efficiently within the O&G sector should be the primary and utmost aim of the programme. The training should be designed to include less theory coupled with more practical and actual work sessions referred to as industrial training whereby learners get a chance to learn while in the real work situation”.

Deduced from the respondents’ views, the programme should lead into producing people with high grade competence in managerial skills and knowledge to efficiently manage the O&G sector. The specific suggestions and the key points noted from the IDIs, regarding programme design and pedagogical issues for effective O&G training design and development were as follows:

i) The programme has to build capacity to Tanzanians, hence content should be carefully selected (to include local content) for making the programme more effective.

ii) The content of the programme should address concrete demand of the O&G sector in Tanzania regarding its management.

iii) Financial aspects of management have to be included in the curricula which should merge theory and practice.

iv) The body of knowledge and skills should include more of practical skills, which refers to technical knowledge.

CONCLUSIONS

There has been an overt existence of gaps in knowledge and skills for the O&G industry among Tanzanians. Only a small number of Tanzanians had academic and professional qualifications to efficiently operate and manage the sector. In this manner, the observed knowledge and skills gap in O&G sector is evident and adversely affects productivity of the industry. This gap needs to be fully addressed.

The internal human resource capacity in Tanzania’s O&G sector is still low. This was signified by presence of a small number of Tanzanians holding technical and managerial positions in O&G related companies. It was noted further that the highly educated staffs, with O&G specializations, are mostly employed by the Ministry of Energy and Mineral Resources and/or the Tanzania Petroleum Development Corporation (TPDC).

The thematic areas, on which the training has to focus, include the entire value chain of O&G industry, which include exploration, drilling, processing, transportation, marketing and the like. The training on management therefore forms only part of the whole body of skills and knowledge demanded within the sector.

The specific areas observed posing the knowledge and skills gap include, Project Management, Financial Management, Financial Accounting and O&G Law. Other areas include O&G Economics, O&G Valuation Quality, Energy Policy and Environment, Geophysics, Data Analysis, Technical Audit, Pipeline Pegging and O&G Profit Distribution. Additional areas such as Taxation for O&G Revenue, O&G Reserve Management and Investment Analysis for O&G constitute an important part of the training.
The paper profoundly observes the need for involvement of stakeholders in all critical stages of the programme development process, which includes programme designing, curriculum designing and development, proposing teaching methodology and whenever possible in the actual teaching/learning process. The stakeholders referred to, in this context; include O&G Companies, O&G Regulatory Authority, O&G Transporting Companies, the Ministry dealing with O&G, Revenue Authority, Ports Authority, National Environmental Management Council and O&G selling Companies and others. Such stakeholders are important for bringing forward courses to be included in the programme and for evaluating the programme content and format prior to its implementation.

At pedagogical level, more participatory teaching methods are encouraged; while experienced experts from O&G industry have to be involved in the teaching. Practical training, sometimes referred to as industrial training, should constitute an important component of the training. Applied knowledge and ‘hands on’ skills should be emphasized for more useful educational outputs. The ultimate aim should be on producing graduates with the “right know how” for the O&G sector. The paper reiterates that vast areas of specializations, regarding O&G sector need to be addressed for development of the full human resource capacity for the sector.

RECOMMENDATIONS

Based on the above conclusions, the paper recommends that training on O&G management should be designed so that it addresses the existing knowledge and skills gaps. The training should focus on both operational and management level requirements as suggested by the main stakeholders of the same sector.

To improve the existing human resource capacity, through training and re-training in O&G and related disciplines, the training programme should hinge on competence-based curricula designed for specific level of application. The motive behind should be to produce graduates who fully engage in the sector by displaying high level performance, reflected by high level competence built through the programme. This may only be achieved through practical-oriented teaching/learning methods which make use of experienced trainers from O&G industry so as to mesh theory and practice.

It is proposed that the opted pedagogy for O&G programmes be more participatory so that knowledge learned and skills acquired are reflected in terms of competence, with the methodological emphasis on “learning by doing”. Learners have to be exposed to specific case studies, projects and the learning environment of the typical application of knowledge and skills they have been taught.

Training and capacity building mechanism have to be carried out based on actual skills gaps, which originate from perceptions of those in the concerned sector and the requisite knowledge and skill needs for effective government revenue collection. Practical training and field work are made compulsory parts of training as they are known to enforce the teaching of skills and skills development concurrently.

In the event that O&G experts being used in teaching O&G programmes lack pedagogical skills, special training of trainers (ToT) be designed to articulate the experts on how to handle teaching/learning process in the classroom, during practical training and in work laboratories.

Lastly the paper visualizes a need to shift the paradigm from “teacher-based” to a more pragmatic curriculum, which is essentially “learner-based” as emerging to become compulsory particularly with regard to training for O&G sector.

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