Job role localisation in the Oil and Gas industry – The case study of Ghana

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Abstract:

International oil and gas companies and their contractors are increasingly required to localise job roles in order to comply with host government's local content legislations. This practice does not come without risks, costs and challenges for asset operators investing in these countries. As such, a progressive training and development process should be followed to enable oil and gas companies to replace expatriates with nationals with the relevant education, competencies and experience. This paper aims to analyse the viability of localising particular job roles, employing a systematic decision support approach for specific job roles and further investigating the result of early investment in the training and development of local people to enable oil and gas companies to reduce staffing costs by localising expatriate job roles. The proposed approach examines the case study of Ghana through engagement with appropriate stakeholders which endorse the validity of the results.

Keywords:

Local content; job role localisation; oil and gas; extractive industries

1. Introduction

The oil and gas (O&G) industry can transform local economies through multiple activities such as increasing employment, local entrepreneurship, poverty reduction, knowledge creation and generation of economic prosperity (Mifsud-Bonnici, 2013; Sigam & Garcia, 2012). These benefits should meet the values of the three principal stakeholders; the government, O&G industry and domestic population who should balance their strategies in order to ensure economic sustainable development. Employment opportunities are often the principal expectation from nationals as a result of hydrocarbon finds (Plänitz & Kuzu, 2015). However, there are numerous barriers to localising job roles such as limited experience, qualifications and skill levels within the local labour market, a lack of understanding amongst local people of

the parent organisation culture and the preference of employing expatriates by Multi-National Corporations (MNCs).

There is extensive literature availble on the topic of job role localisation (JRL) (Bhanugopan & Fish, 2007; Kim et al., 2017; Oppong & Gold, 2016). The majority of extractive industry literature to date relates to mining industries as gaining access to secondary empirical data within the O&G sector is challenging (Kim et al., 2017). A comperhensive review on job role localisation in the O&G industry was conducted by Pegram et al. (2018). This review highlighted the unique nature of the O&G industry, which requires high technical standards of the workforce.

Across literature, a number of definitions can be found with respect to local content and JRL. Local content can be defined as a legislation applied by governments of hydrocarbon producing nations to add value to the economy by requiring companies to employ nationals and source goods and services nationally (IPIECA, 2016; Tordo et al., 2013). Localisation is the practice of building the capacity and utilising a national supply chain and developing and employing a national workforce to meet or surpass legislated local content targets (Selmer, 2004; Bhanugopan & Fish, 2007; Petroleum Commission, 2016). Finally, JRL is the process of training and developing nationals with the appropriate education, competencies and experience to enable O&G companies to replace expatriates with nationals (Pegram et al., 2018).

The measurement, monitoring and planning of local content and JRL is a challanging process as local content issues are often intangible, hard to quantify and difficult to balance regulatory and business needs(Tordo et al., 2013). Previous studies have highlighted these challenges, which are exacerbated by long O&G project lifecycles, with frequently changing governments and company leadership, making analysis more difficult (Fayol-Song, 2013). In addtition, the majority of existing local content research has primarily examined local supply chains over local employment (Ablo, 2015; Ayentimi, Burgess, & Brown, 2016; Ovadia, 2014; Warner, 2011). Despite the limited research into local employment, local content policies have the

opportunity to advance the domestic knowledge base through building the competencies and capabilities of local people to become internationally competitive (Arthur & Arthur, 2014; Heum, 2008).

In Ghana, Panford (2014) stated that Ghana has a large and growing unemployment issue, and that the employment of Ghanaian nationals within the O&G sector can only have limited multiplier effects. Ghanaians “expected more jobs to be created in the oil industry in order to reduce the level of unemployment in the country” (Plänitz and Kuzu, 2015). However there are relatively very few jobs available within Ghana’s O&G sector (Andrews, 2014; Osei-Tutu, 2012).

Senoo & Armah (2015, p. 54) found that due to the lack of technically capable people available and the ineffective public education system to provide employable people that it “will be almost impossible and impractical to achieve the levels of local content desired in the timeframes specified.” Progress is made more chalenging to monitor due to a lack of capacity within the Petroleum Commission (Amoako-Tuffour et al., 2015, p. 12).

The various impacts of localising job roles have been studied previously (Considine et al., 2010; Swift et al., 2011). Benefits include potential cost reductions (Bhanugopan & Fish, 2007), better relationships with government and local communities (Law et al., 2004), increases retention and loyalty (Fayol-Song, 2013), removing expatriate failure (Hailey & Harry, 2008) and is more ethical (Playfoot et al., 2017). Challenges include a lack of local people within the labour market who have the required qualifications, training and experience (Selmer, 2004), high costs of training locals (Bhanugopan & Fish, 2007), poor implementation of localisation strategies (Lam & Yeung, 2010), biases towards the employment of expatriates (Hailey & Harry, 2008) and inappropriate selection, training and planning of the expatriate workforce (Law et al., 2009). Weldegiorgis et al. (2017) completed an overview and analysis of 25 different instruments, tools and mechanisms for organisations and governments to measure impact of hydrocarbon projects.

As such there is limited research into job-role localisation in the O&G industry, paralleled with the specific challenges of accessing qualified workers in Ghana, and the challenge of measuring impact. This paper aims to analyse the viability of localising particular job roles by employing a systematic decision support approach for specific job roles. Additionally, it aims to investigate the result of early investment in the training and development of local people to analyse whether O&G companies can reduce staffing costs by localising expatriate job roles. The approach investigates the case study of Ghana through engagement with appropriate stakeholders which endorse validity of the results.

The rest of the paper is organised as follows. Section 2 presents the case study of Ghana. Section 3 uses a decision tree analysis approach for the choice of whether to localise a job role or to maintain the usage of expatriates. Section 4 presents a cost assessment of employing local employees by applying training and development investment timelines to a sample of five traditionally expatriate job roles. Section 5 discusses findings of this study, followed by some conclusions in Section 6.

2. Job role localisation in Ghana

Following the discovery of offshore commercial quantities of O&G in Ghana in 2007, production started in 2010. Initially the Government of Ghana prioritised a 'revenue-focused approach' aimed at maximising royalties and taxes without considering how long-term value could be added to the economy (Ovadia, 2016). However, this soon changed when the Petroleum Commission was formed in 2011, to regulate the country's O&G sector, under the 'Petroleum Commission Act, 2011 (Act-821)'. The Petroleum Commission is responsible for monitoring of local content activities, notably for overseeing expatriate work permits for O&G companies. Local content in Ghana is not a new concept, with the 'Minerals and Mining Law, 2006 (Act-703)' and the 'Minerals and Mining (General) Regulations, 2012 (L.I.-2173)' which had introduced a local content framework for Ghana's longstanding mining sector.

Operating companies are required to develop succession and training plans for Ghanaians to replace expatriates. The Ministry of Energy produced the "Local Content and Local Participation in Petroleum Activities – Policy Framework" in February 2010. Within this framework O&G companies are expected to achieve an overall 90% localisation within 10 years of operation (Petroleum Commission, 2016). Table 1 highlights those articles within L.I.-2204 that require companies to localise their workforce. These legislations seek to increase the number of Ghanaian workers within the workforce, however, as Arthur & Arthur (2014) found, many O&G companies are concerned about achieving the 90% targets required of them.

There are few existing studies focused on Ghana's O&G sector requirement for a skilled local workforce (Darkwah, 2013; Panford, 2014; Obeng-Odoom, 2015). By training, developing and employing Ghanaians, this has the potential to reduce costs, which in turn incentivises O&G companies to hire more local people.

Table 1: Principal L.I.-2204 articles focused on employing Ghanaians (Source: Petroleum Commission, 2013)

Article	L.I.-2204 article details
Articles 1-c, 10 and 18	The requirements for minimum recruitment of Ghanaian staff. This includes "management staff" beginning with 30%, then 50%-60% at five years and 70%-80% at 10 years. Whilst for "technical core staff" companies must commence at 20%, then 50%-60% at five years and 70%-80% at 10 years. For "other staff" companies must start at 30%, then 50%-60% at five years and 70%-80% at 10 years.
Article 17	O&G companies and contractors must submit an "Employment and Training Sub-Plan" which forecasts all employment and training expectations and a timeline for which job roles will be provided to Ghanaian workers.

	This is reported every three months, including any new Ghanaian job roles. If Ghanaians are not hired then Ghanaians are due to receive "every reasonable effort" of training.
Article 18	Requires operators and contractors to provide a succession plan for all expatriate job roles to meet the time frames required by the Petroleum Commission. Additionally, Ghanaians are required to understudy expatriates to accelerate the replacement of expatriates by Ghanaians.

Ghana has an estimated population of 27 million people (CIA, 2017). However, Ghana has an absence of local people with the skills and experience needed by the O&G industry due to "Ghana's lack of focus in training that is relevant to the specifics of the industry" according to Amoako-Tuffour et al. (2015, p. 19). Within Ghana, there are a large number of education and training institutions that offer courses in O&G related subjects, such as Takoradi Technical University, Kwame Nkrumah University of Science and Technology and Regional Maritime University. However, "the educational level of the available workforce is not sufficient enough to take positions on the oil rigs or other side industries. As a result, highly skilled workers that are needed at the oil facilities are brought in either from Accra or directly from abroad" (Plänitz and Kuzu, 2015). This is due to "the failure of the educational system to equip enough locals for the O&G industry" (Senoo and Armah, 2015). Therefore the Government of Ghana (GoG) and O&G companies must provide local people with the experience and training required to enable local people to be employable.

Ghanaians with the specific skill sets required by the operating companies are therefore a commodity in themselves, and there is a 'war for talent' and high competition for top skilled Ghanaians (Oppong and Gold, 2016).

3. A systematic decision tree approach for determining the localisation of specific job roles

In this study the viability of localising a sample of ten job roles was investigated through a structured decision tree methodology, as listed in Table 2. The ten direct job roles were chosen

139 from different levels within an O&G organisation operating in Ghana, five expatriate job roles
140 and five local job roles held by Ghanaian nationals.

141 **Table 2: List of job roles studied (Source: Pegram (2018))**

1	FPSO Company Rep Manager	6	Accounting Manager
2	Exploration Manager	7	Legal Manager
3	Production & Maintenance Manager	8	Healt, Safety and Environment (HSE) Coordinator
4	Negotiations & Business Development Manager	9	Information and Communications Technology (ICT) Manager
5	Well Operations Manager	10	Reservoir Geologist

142 Decision analysis is used widely within the O&G industry (Kolios et al., 2017; Okoro et al.,
143 2017). For example, Esteves (2008) used decision analysis for evaluating community
144 investments by extractive companies and Marcel et al. (2016) used a decision tree
145 methodology to provide local content guidance to emerging O&G producers.

146 Decision trees are a sequence of possible choices and potential outcomes that take the form
147 of a flow-chart-like tree structure, where each node denotes a test on an attribute value, each
148 branch represents an outcome of the test, and tree leaves represent classes or class
149 distributions (Han et al., 2012; Leimeister and Kolios, 2018). Decision trees are a series of
150 branches and nodes. Branches stem out from the node. There are different representations
151 of nodes. A circular symbol represents a chance node, where the outcome is uncertain; a
152 square symbol represents a decision node, where the user makes one choice between
153 options. The triangular node represents the terminal node and is the final decision (Kirkwood,
154 2002). Only one terminal node can be chosen and branches never re-join. A decision tree is
155 analysed by working backwards from the terminal node. A chance node requires a logical

156 calculation, and a decision node requires a hypothetical decision to be made. A 'decision
157 strategy' refers to the final sequence of branches and nodes (Kirkwood, 2002, p. 14). The size
158 of the decision tree is reduced by 'pruning' unused branches to show the overall decision
159 strategy.

160 A logic-based classification decision tree was developed within this study to analyse the
161 viability of localising a sample of ten job roles in Ghana's O&G sector. It should be noted that
162 this work is part of a broader study with participation of 210 stakeholders who have provided
163 valuable information on local content worldwide and a further 31 people specifically
164 interviewed to discuss the local context of Ghana (Pegram, Falcone & Kolios, 2019). Relevant
165 data, including job specifications, where obtained through engagement with an asset operator
166 in Ghana. Based on initial review of literature and discussions with stakeholders, 22
167 classifications and possible outcomes were identified as illustrated in **Error! Reference**
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169 **Table 3: Classification list for decision tree with node type Source: Pegram (2018)**

Order	Classification	Node type	Order	Classification	Node type
1	Job role	Decision	**12**	Education requirement	Decision
2	Position contract type	Decision	**13**	Main responsibilities requirements	Decision
3	Number of positions at any one point	Decision	**14**	Management requirements	Decision
4	L.I.-2204 - functional role level	Decision	**15**	Internal interface requirements	Decision
5	When is the position required?	Chance	**16**	External interface requirements	Decision
6	% of positions are taken within expatriate quota	Chance	**17**	HSE compliance requirements	Decision
7	How much would this role affect political risk?	Decision	**18**	Required knowledge, technical or professional skills	Decision
8	Preference for expat or local	Decision	**19**	Personal capabilities requirements	Decision
9	Job role experience required	Decision	**20**	Languages requirements	Decision

10	Offshore or specialism experience required	Decision	**21**	Training and courses requirements	Decision
11	Experience with the O&G company from this study	Decision	**22**	Professional qualifications requirements	Decision

All ten roles were tested based on the present day scenario of 2017. Then the five expatriate job roles were tested for a scenario ten years after operations commenced for 2027, when the O&G company in this study is legislated to achieve 90% localisation. The final decision tree results reflected the current situation for each job role. Results indicated that the five expatriate job roles were correctly not localised in contrast to the five currently local roles which were appropriately filled by Ghanaian nationals. Indicatively decision trees for two roles presented below.

For the FPSO Company Rep Manager, a 12 stage decision strategy was undertaken for 2017. The final decision was “do not localise, develop succession plan”, as shown in Figure 1. The position is permanent, shared by two people working ‘back-to-back’. It is a management position required in year one of the 17 year project, when there is only a 30% requirement by the GoG for localisation of management roles. Currently, there is no significant pressure to localise due to the percentage of positions taken by expatriates being between 34%-60%. At this stage the role does not impact political risk with stakeholders. This risk may affect the relationship with regulators who will expect succession planning to occur in line with regulations and also may affect the social license to operate with the national population (Andrews & Playfoot, 2015; Selmer, 2004). As the role requires more than ten years of experience and there is no Ghanaian available, the decision was taken not to localise, but to develop a succession plan.

For the role of the Reservoir Geologist a 38 stage decision tree strategy terminated in “Localise”, as shown in Figure 2. The role is permanent, requiring one position at any one point in time. It is a technical role, required in year one, when 20% of technical staff roles are required to be localised. The role does not affect political risk, and a preference is for a local person. More than five years of experience is required but less than five years of specialist

experience. An undergraduate degree is necessary, although it is not a management role. The role requires both internal and external interfaces. The job has Health Safety and Environment requirements; knowledge, technical or professional skills; personal soft skill requirements and language requirements. No professional qualifications are required. A local person is available with all these requirements. There are training requirements, and that local person will require a small amount of further training. The final decision is that this post should be localised.

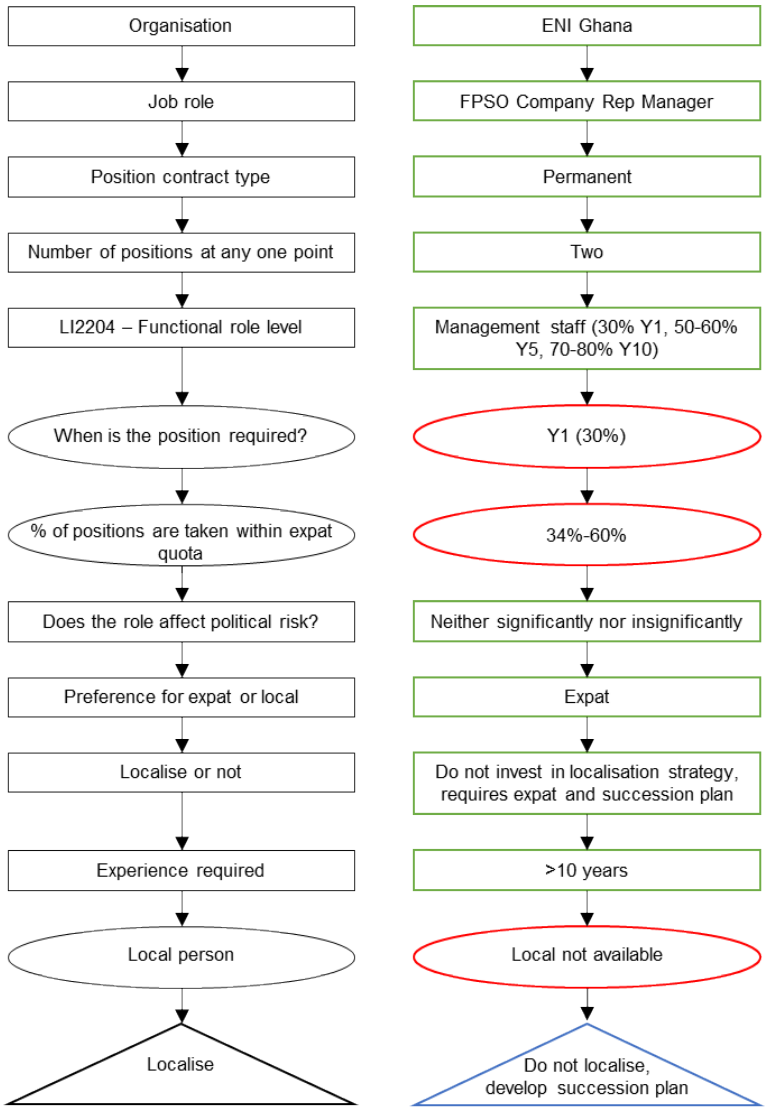

Figure 1: 2017 decision strategy for the FPSO Company Rep Manager role, source: Pegram (2018)

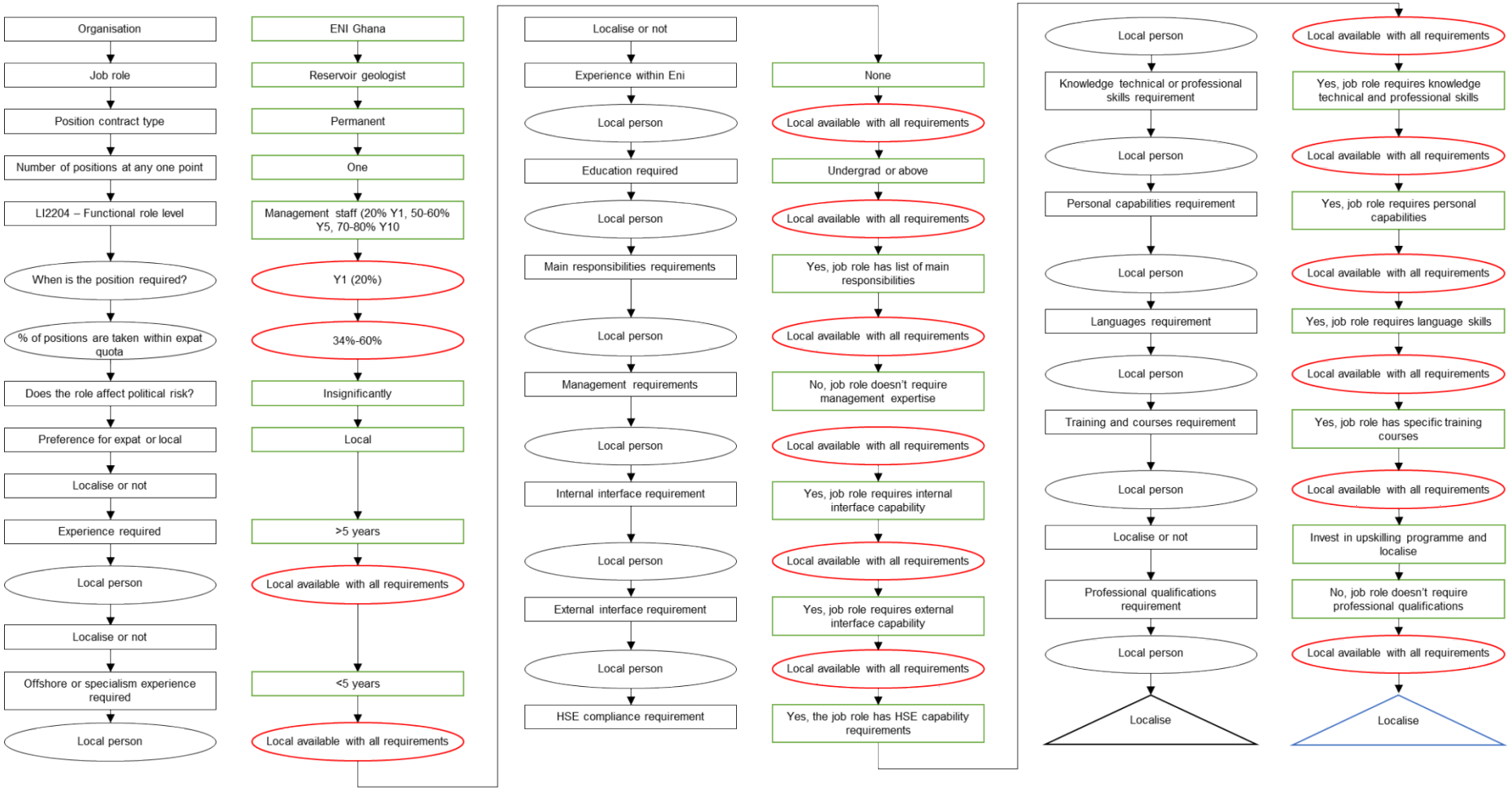

Figure 2: 2017 decision strategy for the Reservoir Geologist role, Sources: Pegram (2018)

The decision trees where reconstructed for 2027, when companies are legislated to achieve 90% localisation. Examining the same roles as earlier, for the FPSO Company Rep manager role, a 41 stage decision strategy predicted that the role in 2027 would be to “localise”, as shown in Figure 3. In 2027, the position would remain permanent and shared by two people working ‘back-to-back’. It would remain a management position required at year ten (2027), when there would be a 70-80% requirement for localisation of management roles. There would be significant pressure to localise due to the expected percentage of positions taken by an expatriate being between 67%-100%. At this stage the role would significantly impact political risk if not localised. More than ten years’ experience would still be required, it is expected that two Ghanaians would be available with the majority of the skills needed, with some upskilling needs. More than five years offshore experience would still be required. A minimum high school diploma would be required. The role has several main responsibilities: management requirements; internal and external interfaces; HSE requirements; knowledge, technical or professional skill requirements; personal soft skills; language skills requirements and training requirements. No professional qualifications would be required. As two local people are expected to be available with all requirements the decision was to localise.

The final results are presented in Table 4, whereby it is not possible to localise the Exploration Manager role, whilst all four other roles can be localised.

Table 4: Final decision tree results based on 2027 scenarios (Source: Pegram (2018))

	Job role in 2027	**Final Decision**
1	FPSO Company Rep Manager	Localise
2	Exploration Manager	Do not localise, develop succession plan
3	Production & Maintenance Manager	Localise
4	Negotiations & Business Development Manager	Localise
5	Well Operations Manager	Localise

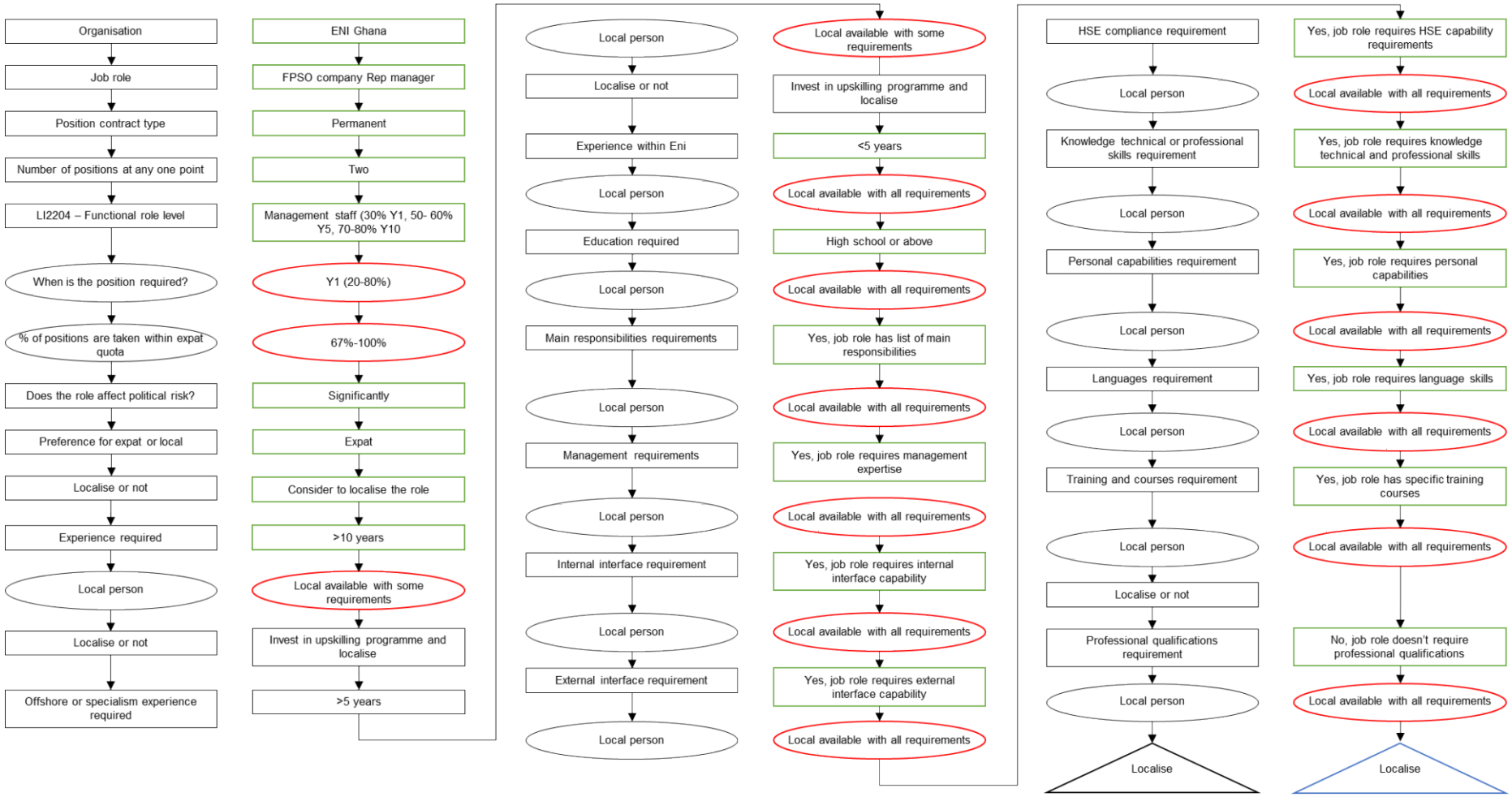

Figure 3: 2027 decision strategy for the FPSO Company Rep Manager role, Source: Pegram (2018)

4. Cost assessment of job roles localisation

For the job roles that are not localised yet (expatriate job roles) it was investigated whether costs could be reduced by localising. To do so it was assumed the need to commence from university education through to employment for each role. This required the back casting of the costs and length of time it would take for a Ghanaian to being ready to undertake that particular role. A Gantt chart methodology was adopted for the training and development investment timelines. Net present value (NPV) calculations were used in this study to quantify the value of training and development investments over the O&G company's project operational phase from this study. NPV is the difference between the current value of money over time. NPV is commonly used in business scenarios to estimate profitability of investments over time (Ioannou et al., 2018).

The timelines were designed to provide two very important outcomes. The first was a temporal assessment of how long the training and development would take. This would provide insight into whether the localisation of the sample of job roles could be achieved during project's 17-year operational phase. The second was a financial assessment to calculate whether the estimated cost of training, developing and employing a local person for each job role was less than employing an expatriate throughout the operational phase.

Back cast timelines require the "creation of a target vision of what is to be realized" (Ashina and Fujino, 2013). Therefore, JRL viability was the independent variable, and the dependent variables were the characteristics of each job role, such as education, experience and training required.

Education and training cost data was collected based on the requirements of each job role using websites and discussions with universities and training providers in Ghana and worldwide. These costs, together with costs such as estimated salaries, additional remunerations, travel, accommodation and annual buffers were considered.

The target localisation year was 2027, ten years after the first oil production within the O&G project from this study, when 90% localisation is expected to be achieved by the GoG. It was then possible to temporally backcast from 2027 all of the experience, education and training requirements. Therefore, working backwards from 2027 the years required for experience and education were calculated to the point in time when each training and development programme would need to commence. In each case, this would enable the Ghanaian person who had completed the training and development programme to be hired for seven years from 2027 until the completion of the O&G project from this study's operations phase. This backcasting process established the length of time required to localise each job role.

For each job role, the costs were calculated for all experience, education and training requirements. This included calculating the costs of university scholarship at an appropriate Ghanaian university, accommodation costs and additional costs. An estimation of salary and additional remuneration was included for all national and international experience requirements. This led to an estimation of all training course costs (including flights, accommodation and additional buffers) throughout the training and development phase. This included all courses necessary to ensure the individuals on the training and development programme would have the qualifications, competencies and experience required for employment in each role. Additionally, in each case, using actual corporate expatriate data, the cost of employing an expatriate was calculated for ten years up to the 2027 localisation date, as an expatriate would be required until the point at which a local person could replace them. An additional buffer of $10,000 USD per annum was included for any additional unknown costs.

A comparison was then made of the cost of employing an expatriate for the duration of the operations phase with the cost of the training and development plan and consequent years of employment for a local person. NPVs were calculated using the Weighted Average Cost of Capital (WACC) for the home country of the operating company and Ghanaian WACC figures; respectively WACC values of 7.76% and 13.04% were used in the NPV discount rate

calculations for expatriates and local people salary (Damodaran, 2017). In the calculations for the local person, it was necessary to combine two discount rates to account for the ten years of employing an expatriate.

The different job role timelines and particular NPV calculations have been completed while results are indicated for the role of FPSO Company Rep Manager. The FPSO Company Rep Manager role would require a 15 year training and development programme including a three year degree and 12 years of experience, as shown in Figure 1. The programme would have needed to begin in 2012, five years prior to commencement of the O&G project from this study's operations phase in 2017 for two local people to be ready for employment in time for the 90% localisation target set for 2027. There would be a requirement for two people working back-to-back, so the calculations are based on two local people completing the development programme.

In the modelling no salary costs were included during the university degree. There was an assumption that a scholarship, accommodation and additional costs associated with the degree training would be provided by the operator for two Ghanaians; followed by a three month intensive English language course in Ghana including accommodation and costs. The individuals would then be employed for seven years in Ghana with annual total remunerations of $42,250 USD per person per annum. This would be followed by five years employment abroad with annual total remunerations of $106,279 USD per person per annum. During that employment, there would be 20 national and international training courses to meet the required competencies, costing approximately $101,817 USD per person. During the first ten years of O&G project from this stud's operations, the two expatriates would work back-to-back, costing approximately $240,010 USD per expatriate per annum. Additionally a buffer of $10,000 USD per person per annum was included in the 15 year development programme for additional unknown costs. From 2027, the two Ghanaians would replace the expatriates as FPSO Company Rep Managers with estimated remuneration of $106,279 USD per person per annum. They would stay in their position for seven years until 2033, at the end of the

operations phase. Considering the salaries of two Ghanaians, an NPV of -$2,365,909 USD is estimated. In comparison employing two expatriates for the full 17 years operations phase would result to an NPV of -$4,794,834 USD for two expatriates. This is 2.03 times the cost of employing two local people.

Assuming a 0% discount rate, the local development programme would cost -$8,484,008 USD, whereas employing two expatriates would cost -$8,160,340 USD, as shown in **Error! Reference source not found.**.

Table 5: NPVs for two FPSO Company Rep Managers (Source: Pegram (2018))

Discount rate in NPV calculation	Local development programme (USD)	Expatriate (USD)
0%	-$8,484,008	-$8,160,340
7.76%	-	-$4,794,834
13.04% including 7.76% for expatriates	-$2,365,909	-
0.36%	-$8,158,441	-

This represents a 0.36% discount rate between the costs of developing two local people compared to employing two expatriates. NPV values for all five job roles using corresponding WACC discount rates suggest that it is more cost effective to localise than to employ an expatriate, as summarised in Table 6.

Table 6: Summary of NPV calculations using 2017 Ghanaian and home operator country WACC oil and gas sector discount rates (Source: Pegram (2018))

Job role	Local development programme (USD)	Expatriate (USD)	Outcome
FPSO Company Rep Manager X2	-$2,365,909	-$4,794,834	**Localisation reduces costs**

Exploration Manager	-$1,653,408	-$3,012,004	**Localisation reduces costs**
Production and Maintenance Manager	-$1,362,315	-$3,012,004	**Localisation reduces costs**
Negotiations and Business Development Manager	-$1,708,057	-$3,012,004	**Localisation reduces costs**
Well Operations Manager	$-1,642,870	-$3,012,004	**Localisation reduces costs**

5. Discussion

5.1. Decision analysis of job role localisation

The decision trees for all ten job roles in 2017 represented reality, whereby the final decision for the five positions currently held by expatriates was not to localise and for the five positions held by Ghanaians was to localise.

All the decision trees for the expatriate roles were short, each with only 12 stages. The common reason for not localising each role was due to a requirement for more than ten years of experience. There were no Ghanaians with sufficient experience available within the labour market to occupy these positions. In each case there was no need to continue down the decision tree process as this was determined as too significant a barrier for localising the role. As is commonly highlighted in JRL literature, “where the multinational firm needs or wants to hire host country nationals, the availability of local nationals with the necessary education and skills often becomes a major problem” (Briscoe and Schuler, 2004). The implication of this is that companies are unable to hire locally, so are forced to find alternative solutions. This includes hiring expatriates, the poaching of staff from other industries or costly training and development initiatives.

The decision trees largely shared common sub-decisions. All five job roles were permanent and managerial. Within the local content L.I.-2204 legislation, there is a minimum of 30% localisation of management roles in Ghana at this stage in the operation phase (Petroleum

Commission, 2013). In 2017 there was not significant pressure to localise due to the low percentage of positions taken by expatriates and none of the roles significantly impacts political risk with stakeholders. However, if another organisation had filled the same type of job role within the same time frame, then the Petroleum Commission's expectations to have a Ghanaian in that role would be likely to increase. For all five roles there is a preference within the O&G company within this study for an expatriate to occupy the role, as has been found in the literature (O'Donnell, 2000; Oppong, 2015). These results reflect Cooke, Wood, & Horwitz's (2015) and Amankwah-Amoaha & Debrah's (2011) findings that MNCs across Africa struggle with a shortage of local talent due to market failings, inadequate investment in workforce development and high competition for top talent. Within the O&G industry a shortage of local skills forces companies to use expatriates to sustain operations (Ismail, 2010; Ngoasong, 2014).

All local roles had 38 stage decision strategies. The five decision trees found that all local job roles could be localised in 2017. As Selmer (2004) recognised the recruitment and retention of local employees is fundamental to localisation being successful.

There were a mix of management roles and technical roles with a combination of competencies, qualifications and requirements for each of the job roles. Ghanaian legislation requires 20% localisation for technical core staff for year one. All roles were permanent requiring only one person in each and all had insignificant impacts on political risk. All roles required more than five or ten years of experience and only two required more than 5 years of specialised experience. With the exception of the Reservoir Geologist role, each had transferable skillsets from other sectors, for example accounting, ICT, HSE or law. Transferable skills provide an opportunity for local people accessing job roles across different sectors, cultures and contexts; however it is essential to avoid hiring 'ghost workers', who are employees that only exist on paper, or hiring unqualified nationals just to fulfil quotas (Al-Waqfi and Forstenlechner, 2010).

As the skillsets were transferrable for the local job roles, it was believed plausible to find a local person with sufficient experience in each role. Furthermore, the education system had relevant courses for each of the five roles, as such it was deemed feasible to recruit at the required education level of high school through to undergraduate for each role.

The complexity of localising all ten job roles is presented in

Figure 4. The job roles in the green and orange boxes can be localised most easily as they require either 'low skill & low experience' (green box) or 'high skill & low experience' or 'low skill & high experience' (orange boxes). In contrast, all five expatriate job roles are in the red box, which requires 'high skill & high experience'.

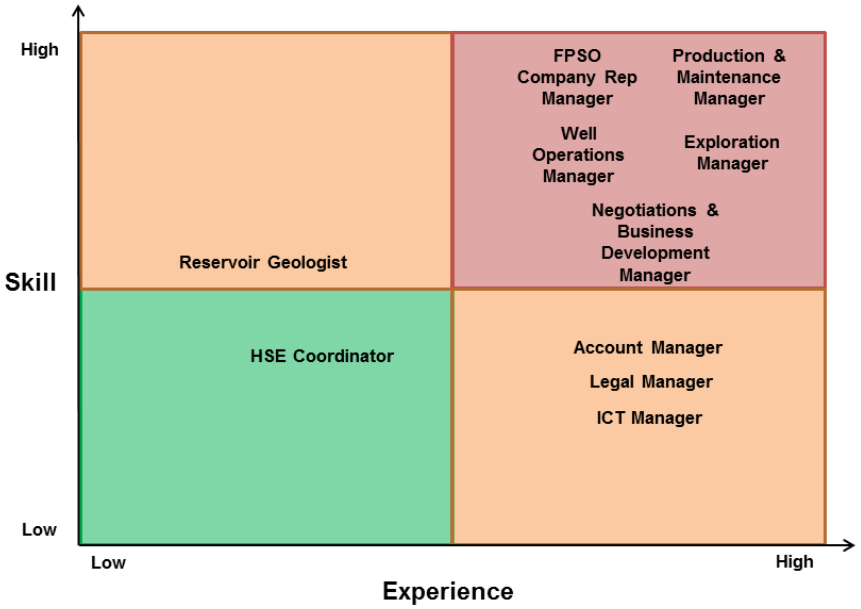

Figure 4: Job roles skill and requirement matrix, Source, Pegram (2018)

The 2027 Exploration Manager decision tree had 12 stages, with the final decision not to localise. In 2027, there is a legislated requirement for 70-80% localisation (Petroleum Commission, 2013). The decision tree has shown how there would remain a preference for an expatriate, a requirement for someone with significant experience, knowledge of internal processes and technical skill. As a result, the role would remain filled by an expatriate. This is in line with the JRL literature whereby higher skilled positions tend to be taken by expatriates

as they are considered too high risk to be localised due to their technical complexity (Bhanugopan, Ramudu & Fish, 2007; Kim et al., 2017; Oppong and Gold, 2016).

All four other job roles would be localised within the 2027 scenario. Each would fall into the 70-80% localisation target. Whilst there would be a Ghanaian available for each role with all required skills and competencies, some further training, coaching and mentoring would be necessary.

When testing the decision trees for the 2027 scenarios, the results suggested that with time it would be possible to localise job roles. It would however require flexibility with experience requirements in order to meet the 2027 localisation quotas set out by the Petroleum Commission in LI-2204. For example the Production & Maintenance Manager job specification states a requirement for more than 12 years industry experience, which in theory means the role could not be localised in less than ten years, and some consideration to reducing experience requirements would be needed.

5.2. Cost implications of job role localisation

Previous JRL studies have suggested that JRL reduces costs, because the costs of employing expatriates is greater than employing local people (Dickmann et al., 2017; Fayol-Song, 2013; Lam and Yeung, 2010). Whilst the costs associated with training and developing local people can be very high (Bhanugopan and Fish, 2007; Worm et al., 2001), it can enhance the output of local employees, increase motivation, reduce staff turnover and encourage a culture of learning within an organisation (Gomes et al., 2015; Huselid, 1995). Despite claims of cost reduction in the JRL literature, there are no empirical studies quantifying the differences between localising job roles compared with employing expatriates, nor do they quantify the timeframes or costs associated with localisation, as this study attempts.

By communicating with training organisations and universities it was possible to access information about the time and costs associated with specific education, training and development programmes identified as requirements for each role. This data was included

within the Gantt chart timelines to backcast when training, education and development investments would need to commence, as has been previously applied by Ashina & Fujino (2013) and Saudi Aramco (2017).

The five job roles would require 13-15 year training and development programmes, including three years of public education and between 10-12 years of industry experience. All job roles would require one individual to participate in the training and development programme, with the exception of the FPSO Company Rep Manager which would require two people.

During the university education phase, the Ghanaians would not be paid any salary, but the operator would cover scholarship and accommodation fees at a Ghanaian education institution. Many organisations assume the quality of education abroad is superior to that provided locally (Mazzarol and Soutar, 2002), therefore often companies provide international scholarships. However, those who return can assume social prestige and have values and ideas not applicable for their home nations or they may not return at all (Kim, 1998). Furthermore, Playfoot et al., (2017) explain that for JRL to be sustainable, O&G companies should invest in building the capacity of local education systems and provide local scholarships. Through greater investment into building the capacity of local education institutions by industry to ensure there is alignment between educators and industry. Through these early interventions and investments, it is possible to produce a cadre of nationals with the skills needed across the sector. Sigam & Garcia (2012) suggested that the government and O&G companies must be directly involved in building local education capacity or else companies are forced to hire high proportions of expatriates.

Within the timelines, it was assumed that Ghanaians would be employed straight after an intensive language course. Employment of Ghanaians would range from two to five years in Ghana, where Ghanaians would be paid a local remuneration package worth $42,270 per annum. All roles would require international experience, which would range between five to eight years, where Ghanaians would be paid an expatriate remuneration package of $106,279 per annum (Africa region’s combined median base pay and other compensation data within

Society of Petroleum Engineers' (2017) salary survey. Once Ghanaians have the required experience, they would return to Ghana maintaining the same remunerations package ($106,279 per annum). Costs included expatriates in positions from 2017-2027 during the development programme of the Ghanaians.

The NPV was calculated for each training and development investment timeline. This included calculating an expatriate working for ten years and subsequent seven years employment of a Ghanaian. A second NPV was calculated for employing an expatriate for the seventeen years of operations. Comparing these two scenarios would show whether the costs of employing an expatriate would be greater than training, developing and employing a local person. For all five job roles the NPV calculations suggested that it is more cost effective to localise than to employ an expatriate. The cost of localisation varied between 1.76 and 2.21 times when compared to the cost of employing an expatriate. The composite total of localising all five roles was less expensive by $8,110,291 USD, representing 1.93 times difference.

Therefore, companies would be likely to reduce costs by localising job roles rather than employing expatriates. This suits the business, whilst aligning with the values of local people who seek employment and with government who seek value addition through local employment (Kim et al., 2017; Marcel et al., 2016). Furthermore, the results add to the existing JRL studies that claim JRL reduces costs.

6. Conclusions

A standardised logic-based decision tree was applied to a sample of ten job roles, in order to assess the viability of localising particular job roles. Decision trees were employed as an effective tool that can be used as a methodology to assess the viability of localising job roles over different time frames. Training and development investment timelines were modelled on a sample of five expatriate job roles to quantify whether the costs of training, developing and employing local people was less than the costs of employing expatriates. The results showed

459 that investing in the training and development of local people can reduce costs for O&G
460 companies.

461 The decision trees and training and development timelines highlighted that the experience,
462 qualifications and competencies required for a job role will determine how easy it is to localise
463 a particular role. Certain roles may be deemed too high risk to localise by an O&G company,
464 and others require significantly more investment in education, training and development.
465 Furthermore, companies must understand and adapt to the local context as this can add
466 barriers, limitations or indeed opportunities to support JRL.

467 Under pressure of localisation targets, companies to date have needed to be flexible in job
468 requirements in order to meet the targets, with early promotion of local employees. This study
469 has shown that a systematic approach to decision making and investment could mitigate the
470 risk of advancing people too quickly. The backcasting of investments highlighted the need for
471 companies to invest early in training local people ahead of the operations phase for O&G
472 companies to be in a position to comply with localisation quotas.

473 **Funding**

474 This research did not receive any specific grant from funding agencies in the public,
475 commercial, or not-for-profit sectors.

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