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Abdulkabir N. Adedeji
University of Maiduguri, Maiduguri, Borno State Nigeria

Muhammad O. Lawan
University of Maiduguri, Maiduguri, Borno State Nigeria

Shaufiq F. Sidique
University of Maiduguri, Maiduguri, Borno State Nigeria

Testing Validity of Observed Indicators of Local Content Policy in Nigeria: Evidence from Four-factor Measurement Model

Abdulkabir N. Adedeji[1], Muhammad O. Lawan and Shaufique F. Sidique

This paper tests validity property of the indicators that measured local content policy (LCP) in Nigeria's oil sector. Survey data were obtained for the test, using confirmatory factor analysis (CFA) method. The results obtained from a four-factor measurement model confirmed the LCP indicators to be valid. This reflects that the policy can achieve its developmental targets on local value creation with particular reference to increased local firms' participation, backward linkages, and job creation in Nigeria's oil sector. Hence, government should focus on effective implementation and compliance of the policy rather than "labour clause" as contained in the local content Act. However, government should be aware of the trade-off that the policy may entail.

Keywords: Local Content Policy, Local Value Creation, Oil Sector

JEL Classification: Q380, O13, Q3

1.0 Introduction

State interventions in strategic economic sectors, especially non-renewable sector, are hardly a new trend in many oil-rich countries. Such action has been a common strategy mostly adopted, particularly in many developing oil-resource rich countries, with the target to achieve large benefits of the resources for sustainability of their economies. One important scheme of such interventions often adopted and implemented is the so-called local content policy (LCP). LCP is a mechanism designed for creating more entrepreneurial opportunities for local oil service firms in the supply chain of the oil sector with target to capture and retain more value of the oil wealth in the host economy. For instance, the experience of oil-dependent economies, such as Norway and Venezuela, shows that LCP can potentially upturn local economic value-added through increased participation of indigenous companies and usage of locally produced input materials (backward linkages) in the petroleum sector.

[1]Corresponding Author. Tel.: +234 (0) 8075 510567, email: abidatullah@gmail.com Department of Economics, University of Maiduguri, Maiduguri, Borno State, Nigeria.

The potential of LCP for maximizing the benefits of oil-wealth and expanding the link of the oil sector to the service sector and beyond prompted the government of Nigeria to introduce the LCP in the early 2000s. In order to retain more benefit in-country, recently, the policy was strengthened to address two of the most pressing concerns for ensuring an increased local economic value in the sector supply chain and creating additional local jobs for local labour (Ovadia, 2014; Levett and Chandler, 2012; Ihua *et al.,* 2011).

In order to maintain the focus and achieve the targets, the LCP concept was defined in the Nigerian Content Act 2010 as: "quantum of composite value added to or created in the Nigerian economy by a systematic development of capacity and capabilities through the deliberate utilization of Nigerian human, materials resources and services in the Nigerian oil and gas industry". Generally, the exposition of this definition shows that the target of the policy is to encourage participation of national oil companies, create local employment and stimulate the utilization of locally produced goods and services in the sector. It is in this regards that the LCP implementation is viewed as a way to generate further benefits of the resources into the domestic economy.

Multinational oil operators are commonly seen to dominate several operations in the oil industries in developing oil-rich countries, even before the global oil booms in the 1970s. This is owing to the fact that they possess high technical skills and capital majorly require in oil development and production which are lack by local firms in these countries, including Nigeria. This led to characterize oil industry in these countries as an enclave industry on the ground that the sector rarely creates a significant developmental outcome, particularly employment opportunities (Sachs and Warner, 2001). However, it is identified that, if oil sector is properly regulated, there are various medium-small scaled oil-related business opportunities, particularly fabrication, engineering, construction, and information telecommunication (ITC) services that are associated with oil production in which local firms could successfully and actively participate and from which substantial employment opportunities could be offered (Ovadia, 2014; Adewuyi and Oyejide, 2012; Audretsch and Keilbach, 2004). Thus, state intervention for promoting and increasing local firms' participation underlines the

importance of the state's role in the operations in the sector. Local capacity building for increased firms' participation is seen as a strategy towards economic value creation which is considered to benefit local economy beyond the contribution of oil to gross domestic product (GDP).

In Nigeria, a set of instruments (interchangeably used as indicators) are designed to achieve the LC policy's target in respect to content development, as tools for motivating increased participation of indigenous firms in the supply chain in the country's oil sector. For instance, in 2006, 45 percent in content development was claimed to have been achieved and 60 percent in 2010, and in 2015, more than 80 percent was reported to have been achieved. Recently, some studies (Adewuyi and Oyejide, 2012; Antai *et al.,* 2012; Ihua *et al.,* 2011; Stephen, 2011) assessed the extent the Nigerian LCP achieved its target focused on various perspectives such as firms' participation, backward linkages and job creation. However, the findings of these studies suggest further investigation as the validity of the LC policy indicators is rarely been tested. This is more important because testing the validity will establish the actual extent the indicators are consistent and reliable. In this regard, this paper tests validity property of the indicators, in a four-measurement model, to ascertain the degree to which the indicators are valid.

2.0 Literature Review

2.1 Theoretical Framework

The theoretical analysis of the correlation between LCP and local value creation in the oil sector is often linked to the effectiveness of local regulatory policy with particular reference to increased local firms' participation, increased locally produced input materials procurement (backward linkages) and capacity building and utilization of human resources (job creation). The associations among these variables presumed to rely on opportunity theory proposed by Reynolds et al. (2001). The theory suggests that individuals will be motivated to partake in enterprises if opportunities spotted in the market in an enabling environment. Recent related studies by Ovadia (2014), Radosevic and Yoruk (2013) and Esteves and Barclay (2012) viewed that entrepreneurs

are often driven by the opportunity motivated more especially when they are given preference in entrepreneurial activities.

Thus, such entrepreneurial opportunities are what the LCP indicators aimed to create for local firms, and link the oil sector to service sectors for increasing more benefits of the oil wealth to majority especially through creation of numerous jobs in the oil sector. Esteves and Barclay (2011) viewed that there is a link between government intervening policy and increased participation of local businesses which in turn can increase local employments. They illustrated that government support for local entrepreneurs can stimulate economic activities and attract further investment, such that effect would be multiplied. Ovadia (2014) asserts that the effectiveness of LCP lies in its ability to increase firms' participation and create jobs.

It is argued that oil resource contributes little to the development of wellbeing in many oil-rich developing countries as the wealth yet benefit the majority in these countries (Ovadia 2014). The argument is generated on the basis that oil resource is a curse. The justifiable reasons for the curse are pointed to the dominance of the foreign oil companies and weak regulations in the sector (Ross, 2012; Ihua *et al.*, 2011; Iimi 2007). According to Iimi (2007), credible and effective government policy instruments can transform resource wealth in spurring economic development. Such policy elements mostly include: licensing regulation; ownership regulation; firm registration; labour market regulation; import tariff, tax incentives; and monitoring. Similar mechanisms were adopted in many oil-dependent economies, like Norway, for capacity building of local firms and backward linkages development within the industry (Klueh, *et al.*, 2009).

In a study (a case of Nigeria) conducted by Adewuyi and Oyejide (2012), it was found that participation of local firms in Nigerian oil sector has increased through which backward linkages also developed. They concluded that local value creation in the oil sector has been the consequence of the impact of LC policy. Though the policy indicator variables (observed items) were explored in this study but the validity of the observed items was not tested. Since the indicators are abstractive it is important to test their validity to ascertain the extent the indicators are credible and consistent in measuring the concept. This present study

confirms psychometric property of LCP indicators so as to provide insightful on their reliability and credibility and their correlation with value creation with particular reference to firms' participation, backward linkages and job creation in a four-measurement model.

2.2 Empirical Literature

Latent construct variables

LCpolicy. Adewuyi and Oyejide's (2012) seven dimensions of LC policies (licensing regulation, firm registration, ownership regulation, labour market regulation, tax incentive, import tariff and monitoring) were adapted to measure LCP. We chose these indicators considering that they are regulatory tools of oil business activities as provided in the Nigerian oil and gas industry content development Act, 2010. These indicators are particularly set in favouring local firms' participation (Adewuyi and Oyejide, 2012).

Local firms' participation. This construct was measured by five items commonly identified as motivational factors that drive entrepreneurship which includes business opportunity, environment conduciveness, technical skill, financial funds accessibility and non-financial incentives. These indicators, initially suggested by Gnyawali *et al.* (1994), are observed as factors most often drive firms in involving in business activities.

Backward linkages. Little agreement in the current literature has been reached about what defines backward linkages. It is seen as the link between local firms and their local affiliate raw materials suppliers. Consequently, there is a wide range of drivers used to capture the concept (Morris *et al.,* 2012; Adewuyi and Oyejide, 2012; Teka, 2011). However, the indicator items considered most important in measuring backward linkage include local input development, information exchange, technical upgrading, negotiation of payment and delivery and joint labour training. These items were used to gauge backward linkages in this study because they attract more attention in tenders' reports on cooperation between oil firms and local affiliate suppliers.

*Job creation***.** The concept of job creation is not difficult to understand as it often refers to as frequency of employment positions a firm creates which to be filled by workers (NBS, 2015; Davis *et al.,* 1993). A number

factors drive job creation in an industry, and specific items have not been used to measure the concept. Drawing on Hussmanns *et al.*'s (1992) study, five indicator variables, include job availability, job placement, job application, job requirement and job offer, were developed to measure job creation. The indicators were carefully selected to capture labour demand side of the supply chain in the oil sector.

3.0 Methodology

3.1 Instrument, Data and Sample size

The observed variables used in this study for measuring latent constructs: LCP; local oil firms' participation (LFP), backward linkages (LINK); and job creation (JOB), are extracted from two questionnaires. The item variables used as the measurements of the LCP, LFP, and LINK constructs are obtained from the questionnaire of oil firms developed by Adewuyi and Oyejide (2012); and the item variables that measured JOB construct are obtained from Hussmanns *et al.*'s (1992) large-scale surveys of economically active population, employment, unemployment, and underemployment. The survey contained questions about perceptions of job seekers on labour supply; however, five relevant items were selected and inverted to capture labour demand. The questionnaire was pretested by sending five copies to indigenous oil firms, using snowball approach. Based on their feedback, some questions were reconstructed, with the assistance of experts at the Institute of Agricultural and Food policy Studies, University Putra Malaysia (UPM), Malaysia, and Institute of Petroleum Studies, University of Port Harcourt (UNIPORT), Nigeria, before conducting the actual survey.

The list of 347 local oil service firms operating within nine oil-producing states in the Niger Delta region of Nigeria was obtained from the Department of Petroleum Resources (DPR). However, five states: Akwa Ibom; Bayelsa; Cross-River; Delta; and Rivers, were selected for the administration of the questionnaire. These states were chosen not only because of large concentration of local oil firms, but also because of volumes of oil business-related activities that occur in these states (Antai *et al.,* 2012). The firms were first stratified into five strata according to their location with the following population: 45 (Akwa Ibom), 77 (Bayelsa), 65 (Cross River), 52 (Delta) and 108 (Rivers). Random

sampling technique was used to choose sampling units from the population frame in each of the sample state. This method allows each element to have an equal chance of being selected without bias and provides greater validity for the study. Accordingly, 34 firms were selected from Akwa Ibom and 56 from Bayelsa, while 48, 37 and 85 were selected from Delta, Cross River and River states, respectively, which yielded a sample size of 260, represented about 75% of the population, on which the questionnaires were administered.

The target respondents are the top management or senior representative of each firm who are deemed to be appropriate respondents and are more likely to be involved with contracts activities. They are also considered to have best knowledge of the degree to which external sectoral policy influences their organizational performance. Follow up the questionnaires, multiple emails were sent and several telephone calls were made to remind the respondents and for collection. At the end of the exercise (August to December, 2014), a total of 209 of the questionnaires were properly filled out of 217 that were received. 43 companies (16.5%) across the states declined to participate in the exercise under the pretext that either they could not find time to fill the questionnaire or the exercise is not in line with their policy on privacy.

Under covariance-based methods, sample size is an important issue when statistical power of the analysis is considered. Following Westland (2012), the sample size used for the study was tested given the number of observed variables (22), latent variables (4), anticipated effect size (0.15), desired statistical power level (0.8), and probability level (0.05). The computed result suggests that a minimum of 169 observations will be sufficient to achieve statistical power. Thus, 209 observations used are deemed fit.

3.2 Measurement Model

Measurement model often considered as a framework that links theory and data, and confirmatory factor analysis (CFA) commonly used to test the relation. In CFA analysis, certain conditions necessarily need to be fulfilled to establish the link. Basically, the theory assumes that each observed indicator that measures exogenous (or endogenous) construct comprises two components: a true score and a random measurement error, which is assumed to be normally distributed with a mean of zero

(Kline, 2011; Hair *et al.*, 2010). More so, the indicators are assumed to be continuous variables and significantly represent only a construct; and each indicator should be attached with a unique measurement error that accounts for other variances that are not explained by the model. However, the measurement error must be uncorrelated with each other and construct variables in the model, and the covariances between the construct variables are not hypothesized, but the constructs are only assumed to share variance.

The relationship between the indicators and the corresponding latent construct could be reflective or formative depends on underlay theory (Hair *et al.*, 2014). The main difference between a reflective measurement model and a formative is that, in the former, indicators are assumed to be caused by underlying latent construct variable, and any indicator changed would not affect the meaning of the construct. While in the latter, the indicators assumed to cause the latent construct variable, and are ultimately determined the construct. Thus, a change in any of the formative indicators potentially affects the construct (Hair *et al.*, 2014; Thompson, 2005). Traditionally, reflective measurement model has long been typical specifications in many social sciences research due to its flexibility.

Accordingly, first-order reflective measurement model allows arrows to point from latent constructs (Y_i) to their respective indicators (x_i). As shown in Figure 1, the indicators are endogenous variables and each has two causes: one from its construct and other from its measurement error (e_i). Correlations between latent constructs are indicated with double-head arrows.

The implication is that if the evaluation of the construct variable change, all indicators that measure a particular construct will simultaneously change to indicate relative importance of the observed variable. In addition, the magnitude of variation explain by indicators are assumed to be positive, significant and expected to moderately high in value. Such value often refers to as factor loading that indicates internal consistency and reliability of the observed indicators. Overall, the model is assumed to reasonably fit the data when generated fit indices are equal or above the thresholds suggested in the literature.

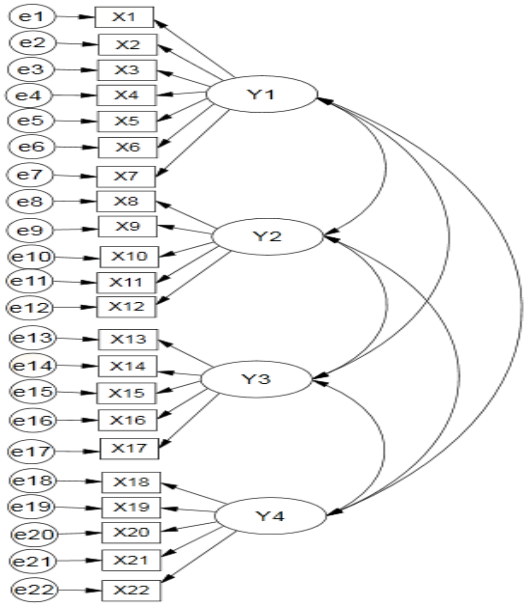

Figure 1: Reflective measurement model

In this study, a four-factor measurement model was specified to test validity and reliability of the observed indicator items measured LCP, LFP, LINK and JOB constructs. The advantage of this model over single model lies in its ability to detect the degree of correlations among the indicator variables (convergent validity), and correlations among the latent constructs (discriminant validity) (DeVon *et al.*, 2007).

3.3 Pre-analysis and CFA Method

Exploratory analysis

Pre-analysis - exploratory analysis was first conducted, using varimax-rotated component method in SPSS, version 21, to identify how the items are grouped under the same dimension and their weights on the constructs. We used "option" provided in the software to suppress item(s) with factor loading(s) below 0.4 for easy identification of significant items in the component. A factor loading greater than 0.4 is said to be sufficiently loaded on its factor and deemed adequate for inclusion in the model (Hair *et al*., 2014; Shaufique *et al.*, 2009). In addition, Kaiser eigenvalue criterion was employed, as a rule of thumb, an eigenvalue ≥ 1 indicates that a significant amount of variance is explained by the component.

Table 1 presents factor extraction analysis results. The item variables are significantly grouped under respective factors as theoretically defined. The factor loading values that indicate the degree of association between each item and their corresponding factor are above 0.4. This indicates that the items shared a high proportion of variance that is captured by corresponding constructs. The eigenvalues are greater than 1: factor 1 (LCP construct) has an eigenvalue of 5.786; factor 2 (backward linkages) with an eigenvalue of 2.811; factor 3 (firms' participation) has an eigenvalue of 1.978; and factor 4 job creation has an eigenvalue of 1.806.

Table 1: Factor Extraction Analysis Results

	Factor					
Observed Items	***1***	***2***	***3***	***4***	***Communality***	***Cronbach's α***
Licensing regulation	0.797				0.671	0.903
Ownership regulation	0.816				0.683	
Firm registration	0.800				0.657	
Labour mkt regulation	0.817				0.678	
Tax incentive	0.707				0.533	
Import Tariff	0.731				0.562	
Monitoring	0.780				0.687	
Business opportunity			0.776		0.616	0.752
Environ conduciveness			0.616		0.472	
Tech skill			0.412		0.357	
Fin accessibility			0.726		0.555	
Non-fin incentive			0.701		0.510	
Inputs development		0.810			0.676	0.775
Info exchange		0.709			0.540	
Tech upgrading		0.764			0.635	
Negotiation of P & D		0.633			0.416	
Labour training		0.636			0.433	
Job Availability				0.592	0.525	0.730
Job Placement				0.648	0.575	
Job Application				0.662	0.462	
Job Requirements				0.747	0.620	
Job Offer				0.704	0.518	
Eigenvalues	*5.786*	*2.811*	*1.978*	1.806		
% of variance	*26.30*	*12.78*	*8.99*	8.21		
Cumulative %	*26.30*	*39.08*	*48.07*	56.27		

Note: Factor 1 = local content policy, factor 2 = local firms' participation, factor 3 = backward linkages, factor 4 = job creation.

The communality which indicates the amount of variance in a variable accounted for by the factor solution was computed. A value equals 0.4 and above is considered as practically large amount, such item is retained. All the items have communality values greater than 0.4, except technical skill item, which has a value (0.375) less than 0.4. Though the item weakly accounted for by the factor solution, but has a significant loading, thus, it was retained for further diagnostic. The total variance explained by the four factors was 56.3 percent, indicating that all the items were moderately sufficient to further measurement model analysis.

Overall, Cronbach's α value was given as 0.853, which above cut-off point of 0.70, indicating that all the observed indicator items are reliable and consistent.

The level of consistency (i.e. unidimensionality) of the indicators of each latent construct was also examined through extraction of single factor. For LCP indicators, the Cronbach's α coefficient was given as 0.903, and for LFP indicators, Cronbach's α of 0.752 was produced, while Cronbach's α of 0.775 and 0.730 were obtained for LINK and JOB indicators, respectively. These values were above the threshold of 0.7 (Hair *et al.*, 2014), indicating that all the indicators are internally consistent and reliable to be used as measurement and adequately measured the construct variables.

3.4 CFA Procedure

Validity test using CFA method involves testing convergent validity, discriminant validity and nomological validity of a measurement model. Convergent validity comprises composite reliability (CR) and average variance extracted (AVE). CR was applied to test the degree to which the indicator variables converge and share proportion of variance. The CR value varies between 0 and 1; a higher value implies a higher level of reliability of the items (Hair *et al.*, 2014). A cut-off point of 0.7 or above for CR is required to establish that the indicator items are reliable, and that they shared a high variance with the latent construct. Also, a minimum value of 0.5 for AVE is required to establish that the indicators are converged.

Discriminant validity, which confirms the extent latent constructs are distinctly different (Houston, 2004; Bertea and Zait, 2011), was evaluated by examining AVE for each construct. This is established when the square root of AVE of each latent construct is greater than the construct's highest correlation with other constructs in the model. In addition, we employed heterotrait-monotrait (HTMT)[2] method, recently suggested by Henseler *et al.* (2015), to further check the degree to which the latent variables are distinctly different. HTMT criterion is based on disattenuation correlation between two constructs. When a HTMT value

[2]HTMT is computed by taking the geometric average of the correlations of indicators across constructs measuring different constructs (heterotrait ratio) and divided by the correlations of indicators within the same construct (monotrait ratio) (Henseler et al., 2015).

between two latent constructs is less than 0.85, discriminant validity is established (Henseler *et al.,* 2015). This method is proven to have a high sensitivity over the traditional methods: Fornell-Lacker and cross-loading criteria, in detecting discriminant validity problem. Lastly, nomological validity, which confirms the degree the latent construct variables are related to each other, was assessed by examining the significant of the intercorrelation value between construct variables in the model.

3.5 CFA Method

The validity property of the indicator items in the model was tested using CFA technique. CFA has wide applications especially in the area of scale development and construct validation. More so, the strength of this method lies in its ability to allowing correlation of error variances for minimising the difference between estimated and observed matrices (Alumran *et al.,* 2014; Hair *et al.,* 2010). The measurement model was analysed using covariance matrix estimation in AMOS, version 22. The analysis was conducted using maximum likelihood (ML) estimation. ML produces efficient and unbiased results and estimates generated by ML are proven to be fairly robust even if multivariate normality assumption is violated (Hair *et al.,* 2010; Schumacker and Lomax, 2010).

Assessing how well the model fits the data, multi-criteria indices which include chi-square (χ^2), normed chi-square (χ^2/df), comparative fit index (CFI), Goodness-of-fit index (GFI), Incremental fit index (IFI), Tucker–Lewis index (TLI) and Root Mean Square Error of Approximation (RMSEA) were applied. Among these indices, the CFI > 0.90, TLI > 0.90 and RMSEA < 0.06 thresholds are important to be attained to conclude that the measurement model relatively fits the observed data (Alumran *et al.,* 2014; Tang *et al.,* 2013; Schreiber *et al.,* 2006; Schmidt *et al.,* 2005; Hu and Bentler, 1999). Although, there is no general consensus on exact specific cut-off value for fit indices or number of indices to be observed, but, generally, when three or more of the indices indicate a good fit, then there is probably a good fit (Hoe, 2008; Schreiber *et al.,* 2006).

4.0 Results

4.1 Model Assessment

The appropriateness of the measurement model in comparison with data was first examined. As shown in Figure 2, CFI, 0.876; TLI, 0.862; and IFI, 0.881, values were less than the acceptable cut-off point of 0.90; and the RMSEA value, 0.07, was greater than the recent threshold value of 0.06. This indicates that the model poorly fits the data. However, all the standardized factor loadings were significantly loaded on their respective latent constructs at the 1 percent. In Table 2, the factor loadings are presented, ranged from 0.34 to 0.83, indicating that the items are reliable. Among all, two items: requirement (0.343) and offer (0.356), were weakly loaded on JOB construct as their loading values were lower than 0.4. This indicates that the variance shared between the two items and JOB was relatively smaller than measurement error variances. The R^2 values of these indicators (0.12 and 0.13) were also less than the acceptable cut-off of 0.20. These outcomes require the two items to be dropped, but we retained them because their factor loadings were statistically significant, and also they measured an important aspect of JOB construct (see Hair *et al.* 2014).

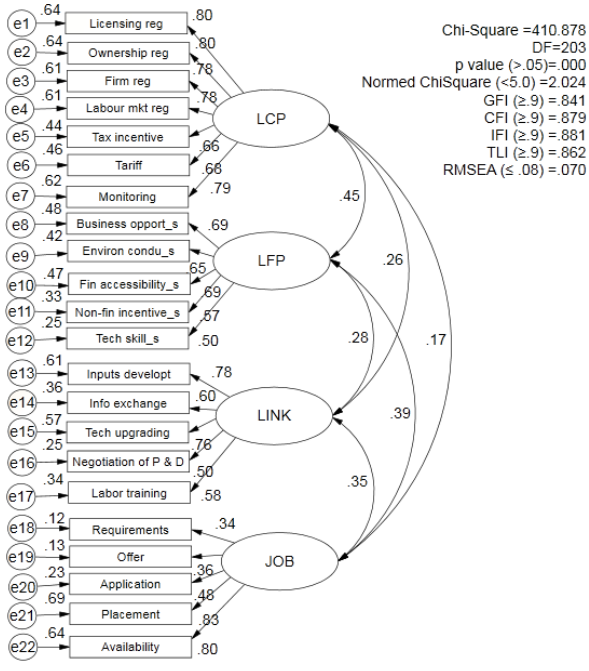

Figure 2: Measurement model

An examination of modification indices (MIs) suggests evidence of misfit as standardized residuals of tax incentive and tariff (45.04) loaded on LCP construct, and requirement and offer (45.11) indicated to share relatively high covariances with each other. This signal to be problematic as the square roots of these values was greater than acceptable degree of error of 4.0 (Hair *et al.*, 2010). Thus, this warrants to re-specify the model. The model was re-specified by correlating the pairs of residuals belong to same latent constructs, as suggested by Hooper *et al.* (2008), shown by earrings in Figure 3. Thus, the re-specified model was reassessed.

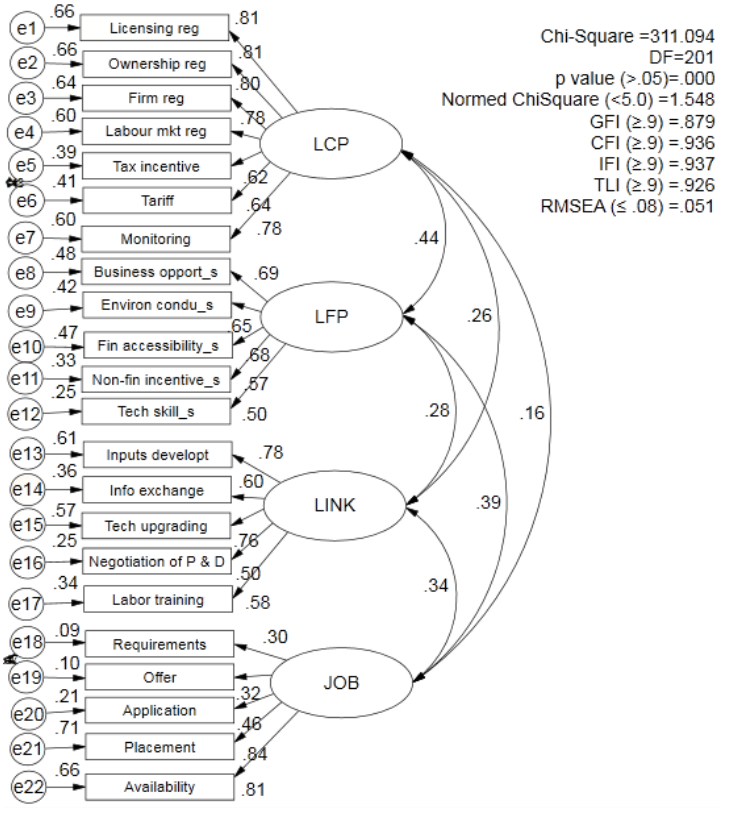

Figure 3: Modified measurement model

In modified model, Figure 3, the standardized factor loadings of all observed indicators were statistically significant at the 1 percent (see Table 2). This indicates that the measurement variables are adequately measured their respective latent constructs, reliable and consistent (Radosevic and Yoruk, 2013). The model fit was assessed based on the following fit criteria. The χ^2 value is statistically significant, given its

value as 311.09 (df=201, n=209) and p=0.000, indicates that the model has a poor fit. However, χ^2 has found not reliable to assess a model fit because the index said to be sensitive to large sample size (Hooper *et al.*, 2008; Mueller and Hancock, 2008; Hu and Bentler 1999). Normed chi-square (i.e. CMIN/df) is suggested as an alternative model fit measure to χ^2. CMIN/df value was found within recommended range of 3.0, attests that the measurement model well fits the data.

Table 2: Factor Loadings of the Indicator items

Initial Measurement Model			Modified Measurement Model	
Constructs	**Items**	**Factor Loadings**	**Items**	**Factor Loadings**
LCP	Licensing reg	0.800[c]	Licensing reg	0.810 [c]
	Ownership reg	0.800*	Ownership reg	0.814*
	Firm reg	0.781*	Firm reg	0.798*
	Labour mkt reg	0.780*	Labour mkt reg	0.777*
	Tax incentive	0.664*	Tax incentive	0.621*
	Tariff	0.681*	Tariff	0.639*
	Monitoring	0.786*	Monitoring	0.777*
LFP	Business opport	0.719 [c]	Business opport	0.694[c]
	Eviron condu	0.645*	Eviron condu	0.647*
	Tech skill	0.496*	Tech skill	0.497*
	Fin accessibility	0.685*	Fin accessibility	0.685*
	Non-fin incentive	0.574*	Non-fin incentive	0.572*
	Inputs develop	0.780 [c]	Inputs developt	0.779 [c]
LINK	Info Exchange	0.603*	Info Exchange	0.601*
	Tech upgrading	0.754*	Tech upgrading	0.756*
	Negotiation: P&D	0.499*	Negotiation: P&D	0.499*
	Labour training	0.579*	Labour training	0.580*
JOB	Availability	0.803*	Availability	0.814 [c]
	Placement	0.833*	Placement	0.841*
	Application	0.477*	Application	0.459*
	Requirements	0.343*	Requirements	0.301*
	Offer	0.356[c]	Offer	0.317[c]

Note: Factor loadings are standardized.
[c] = constraint factor loading
* 1% significance level.

More importantly, the fit index values of CFI (0.94), IFI (0.94) and TLI (0.93) were well above cut-off point of 0.90, and RMSEA value (0.05) is less than conservative cut-off of 0.06, with 90 percent confidence lower limit of 0.04 and upper limit of 0.06. This indicates that re-specified model well reproduced our data.

4.2 Confirmatory test

Table 3 presents convergent validity and discriminant validity results. CR values for LCP (0.90), LINK (0.78), JOB (0.70) and LFP (0.76) are well above 0.7, fulfilled the required threshold, thus, this confirmed

that convergent validity has been established. Likewise, the AVE values of each construct are greater than correlations with other constructs which also established convergent validity (Alumran *et al.,* 2014). Noticeably, AVE values of JOB and LFP constructs are less than 0.5, a required value to pass convergent validity test. However, it has been suggested that convergent validity can be established when CR values corresponding to a latent construct exceed its respective AVE (Hair *et al.,* 2010). Based on this criterion, convergent validity of all the latent constructs can be claimed to have been confirmed. This implies that all measures have psychometric quality and reliably measure their respective constructs.

Table 3: Convergent validity and HTMT discriminant assessment

	CR	AVE	MSV	ASV	LCP	LINK	JOB	LFP
LCP	0.900	0.565	0.198	0.096	**0.752**	0.55	0.29	0.95
LINK	0.782	0.425	0.116	0.087	0.256*	**0.652**	0.55	0.68
JOB	0.698	0.354	0.152	0.098	0.158**	0.341*	**0.595**	0.51
LFP	0.758	0.389	0.198	0.144	0.445*	0.284*	0.390*	**0.623**

CR=composite reliability. AVE=average variance extracted. MSV= maximum shared variance. ASV=average shared squared variance. HTMT= Heterotrait-Monotrait correlation ratio. HTMT values are in highlighted cells.
. * 1% significance level
** 10% significance level

The distinctiveness of the latent constructs in the model is conducted through assessment of discriminant validity. The HTMT criterion is employed by extracting inter-item correlation matrix (see Appendix) of the observed variables to construct average heterotrait and monotrait correlation ratios between latent constructs. Table 3 (highlighted cells) presents HTMT ratio of correlation between two constructs: given as 0.55 (LCP and LINK); 0.29 (LCP and JOB); 0.55 (LINK and JOB); 0.68 (LFP and LINK); and 0.51 (LFP and JOB). These ratios were below the stringent threshold value of 0.90 (Henseler et al., 2015; Teo *et al.*, 2008; Gold *et al.,* 2001), except HTMT ratio 0.95 (LCP and LFP) marginally above the threshold, indicates a high correlation between LC policy and firms' participation. However, the value was below an inference threshold of 1. Accordingly, all the HTMT values are not more than 0.95, indicate that the constructs are different, thus, discriminant validity can be claimed to have established. This suggests that all the four

construct variables in the measurement model are distinctively different and reflects that each latent variable shared a high variance with corresponding observed items more than the shared variance of items by other latent variables in the model. More so, in Table 3, discriminant validity is established since the square roots of the AVEs (diagonal bolded values) are higher than correlation values among the constructs, in the lower left off-diagonal. Discriminant validity is also established by AVE values of each latent construct greater than the corresponding maximum shared variance (MSV) and average shared variance (ASV) values (Hair *et al.*, 2014).

5.0 Conclusion

This paper analyses the validity property of the indicators that measured LC policy in oil and gas sector in Nigeria. It further assesses the correlation between the policy and value creation with particular reference to local firms' participation, backward linkages and job creation which the policy targets to promote. . Survey data were obtained and analyzed. First-order reflective constructs was derived from indicator items using CFA method. The measurement model was confirmed to adequately fit the data, as fit indices that were observed fulfilled evaluative criteria suggested in the literature.

The factor loadings of the modified model were substantially significant, and the CR values are well above the threshold, revealing that the items that measured individual latent construct were internally consistent and reliable. Equally, the result shows that licensing regulation and ownership regulation are the most relative important indicators among those that measured LC policy. This implies that the more the operating license is issued to local firms, with less cumbersome, the more they would be motivated to participate in the activities and have a large equity share in the sector. However, tax incentive policy seems not to do enough in opening the industry to local firms.

Interestingly, based on our findings, the LC policy's instruments were confirmed to be valid, indicating that the policy can achieve its development economic targets if properly harnessed. Equally, it was found that there exist positive correlations among LC policy and other latent constructs in the model. This result strengthens the views that oil resources can spur value-creation in supporting broad-based economic

development. As effective policy instruments may enhance increased local firms' participation in the sector supply chain, develop backward linkages and generate more employment through which the oil-wealth could benefit majority citizens (Ovadia, 2014; Adewuyi and Oyejide 2012; Obuaya, 2005). The correlations between LCP and LFP, and between LCP and LINK are stronger than the correlation between LCP and JOB. This demonstrates the policy's priority target, and as such, it shows the policy may work in practice.

The findings support that non-renewable energy, especially oil and gas, is not a curse as previously perceived. The resources can generate spin-off effects if well managed. More so, despite that oil industry may characterize with high technology and capital intensive which may limit job creation, several intermediary goods and services which require soft skills are needed in oil exploration and production operations that offer numerous employment opportunities. Hence, if local firms are actively handled supply-chain, and if such activities are carried out in-country, more jobs would be created for local labours and the communities affected by oil extraction would benefit more from their resources. Thus, the government should focus on enhancement of the policy tools for increased local value creation. However, the trade-off should be aware, as policy enforcement may crowd-out business opportunities in non-oil sectors.

This study is limited in some aspects. Cautions should be taken when interpreting the results as summated scales were used as LCP indicator items which may make interpretation difficult. In addition, the items used to measure JOB construct are newly developed, thus, more indicators may need to be explored; perhaps, there may be potential items which are presently not captured. More so, we recognized that the AVE values for JOB, LINK and LFP constructs were below threshold point, which signal that large measurement errors remain in the items that measured these constructs than the variance explained by the constructs. Future research should consider ways to minimize the errors as such approach could improve the AVEs. Nonetheless, the theoretical prediction of the possibility of the LC policy to achieve increased local value creation in the oil sector in Nigeria is empirically confirmed for the first time in this paper.

References

Adewuyi, A.O. and Oyejide, T.A. (2012). Determinants of Backward Linkages of Oil and Gas Industry in the Nigerian Economy. *Resources Policy*, 37: 452–460.

Alumran, A., Hou, X., Sun, J., Yousef, A.A and Hurst, C. (2014). Assessing the construct validity and reliability of the parental perception on antibiotics (PAPA) scales. *BMC Public Health*, 14:73.

Antai, Sylvester, A., Anam, Ekpenyong, B. and John, I.J. (2012). Entrepreneurship as a Strategy for the Economic Development of the Niger Delta Region of Nigeria. *European Journal of Business and Management*, 4 (17): 89 – 99.

Audretsch, D.B. and Keilbach, M. (2004). Entrepreneurship Capital and Economic Performance. *Regional Studies*, 38 (8), 949-959.

Bertea, P. and Zait, A. (2011). Methods for Testing Discriminant Validity. *Management and Marketing-Craiova*, (2), 217–224.

Davis, S.J., Haltiwanger, J. and Schuh, S. (1993). "Small Business and Job Creation: Dissecting the Myth and Reassessing the Fact". National Bureau of Economic Research Working Paper No. 4472, 1-46.

DeVon, H.A., Block, M.E., Moyle-Diane, P., Ernst, D.M., Hayden, S.J., Lazzara, D.J., Savoy, S.M. and Kostas-Polston, E. (2007). A Psychometric Toolbox for Testing Validity and Reliability. *Journal of Nursing Scholarship*, 39 (2), 155-164.

Esteves, A.M., Franks, D. and Vanclay, F. (2012). Social impact assessment: the State of the Art. *Impact Assessment and Project Appraisal*, 30 (1), 34-42.

Esteves, A.M., and Barclay, M.A. (2011). Enhancing the benefits of local content: integrating social and economic impact assessment into procurement strategies. *Impact Assessment and Project Appraisal*, 29 (3), 205–215.

Gnyawali, D.R. and Fogel, D. (1994). Environments for Entrepreneurship Development: Key Dimension and Research Implications. *Entrepreneurship Theory and Policy*,18(4): 4-63.

Gold, A.H., Malhotra, A. and Segars, A.H. (2001). Knowledge management: An organizational capabilities perspective. *Journal of Management Information Systems*, 18(1), 185–214.

Hair, J.F., Black, W. C., Babin, B. J. and Anderson, R. E. (2010). "Multivariate Data Analysis". (7th Ed.). Prentice Hall, Englewood Cliffs.

Hair, J. F., Hult, G.T.M., Ringle, C.M. and Sarstedt, M.M. (2014). "A Premier on Partial Least Squares Structural Equation Modeling (PLS-SEM)". SAGE Publications, California, U.S.A.

Henseler, J., Ringle, C.M. and Sarstedt, M.A (2015). New criterion for assessing discriminant validity in variance-based structural equation modelling. *Journal of the Academic of Marketing Science*, 43:115–135.

Hoe, S.L. (2008). Issues and Procedures in Adopting Structural Equation Modeling Technique .*Journal of Applied Quantitative Method*, 3(1): 76-83.

Hooper, D., Coughlan, J. and Mullen, M. (2008). Structural Equation Modelling: Guidelines for Determining Model Fit. *The Electronic Journal of Business Research Methods*, 6: 53–60.

Houston, M.B. (2004). Assessing the Validity of Secondary Data Proxies for Marketing Constructs. *Journal of Business Research*, 57(2): 154–161.

Hu, L.T. and Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives, Structural Equation Modeling, *A Multidisciplinary Journal*, 6(1): 1-55.

Hussmanns, R., Mehran, F. and Verma, V. (1992). "Surveys of economically active population, employment, unemployment and underemployment: An ILO manual on concepts and methods". (2nd Ed.). A publication of International Labour Organization, Geneva.

Ihua, U.B., Olabowale, O.A. Eloji, K.N. and Ajayi, C. (2011). Entrepreneurial implications of Nigeria's oil industry local content policy: Perceptions from the Niger Delta region.

Journal of Enterprising Communities: People and Places in the Global Economy, 5(3): 223–241.

Iimi, A. (2007). "Escaping from the Resource Curse: Evidence from Botswana and the Rest of the World". IMF Staff Papers, 54(4).

Kline, R.B. (2011). "Principles and Practice of Structural Equation Modeling". (3rd Ed.). Guildford Press, New York, U.K.

Klueh, U.H., Pastor, G. and Segura, A. (2009). Policies to improve the Local impact from Hydrocarbon Extraction: Observations on West Africa and possible lessons for Central Asia. *Energy Policy*, 37: 1128–1144.

Levett, M. and A.E Chandler, (2012). "Maximizing Development of Local Content Across Industry Sectors in Emerging Markets". A Report of Center for Strategic and International Studies. May.

Morris, M., Kaplinsky, R. and Kaplan, D. (2012). "One thing leads to another" – Commodities, Linkages and Industrial Development. *Resources Policy*, 37: 408 – 416.

Mueller, R.O. and Hancock, G.R. (2008). "Best Practices in Structural Equation Modeling". In J. W. Osborne (ed.). Best Practices in Quantitative Methods. London: Sage Publications.

Nigeria National Bureau of Statistics (NBS). (2015). "2014 Job Creation Survey Report". www.nigerianstat,gov.ng.

Nigerian Oil and Gas Industry Content Development Act, 2010. http://ncdmb.gov.ng/images/GUIDELINES/NCACT.pdf

Obuaya, T. (2005). "Local Content Implementation in Nigeria: A Road Map". Paper presented at the Nigerian Oil and Gas Conference, Abuja, Nigeria.

Ovadia, J.S. (2014). Local content and natural resource governance: The cases of Angola and Nigeria. *The Extractive Industries and Society*, 1: 137–146.

Radosevic, S., and Yoruk, E. (2013). Entrepreneurial Propensity of Innovation Systems: Theory, Methodology and Evidence. *Research Policy*, 42: 1015– 1038.

Reynolds, P.D., Camp, S.M., Bygrave, W.D., Autio, E. and Hay, M. (2001). "The Global Entrepreneurship Monitor 2001 Executive Report". London Business School and Babson College, London.

Ross, M.N. (2012). "The Oil Curse: How Petroleum Wealth Shapes the Development of Nations". Princeton University Press, New Jersey, U.S.A.

Sachs, J. D. and Warner, A. M. (2001). The curse of natural resources. *European Economic Review*. 45(4-6): 827–838.

Schmidt, S., Muhlan, H. and Power, M. (2005). The EUROHIS-QOL 8-item index: psychometric results of a cross-cultural field study. *European Journal of Public Health*, 16(4): 420–428.

Schreiber, J.B., Nora, A., Stage, F.K., Barlow, E.A. and King, J. (2006). Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results: A Review. The *Journal of Educational Research*, 99(6): 323-337.

Schumacker, R.E. and Lomax, R. G. (2010). "A Beginner's Guide to Structural Equation Modeling". (3rd ed.). Taylor and Francis Group, New York, U.S.A.

Shaufique, F.S., Lupib, F. and Joshi, S.V. (2009). The Effects of Behavior and Attitudes on Drop-Off Recycling Activities Resources. *Conservation and Recycling*, 54: 163–170.

Stephen, B.A. (2011). Local Content Policy in Oil Sector and the Capacity Utilization in Nigerian Manufacturing Industry. *Business and Management Review*, 1(6): 82 – 92.

Tang, J., Folmer, H. and Xue, J. (2013). Estimation of awareness and Perception of Water Scarcity among Farmers in the Guanzhong Plain, China, by means of a structural equation model. *Journal of Environmental Management*, 126: 55 – 62.

Teka, Z. (2012). Linkages to Manufacturing in the Resource Sector: The case of the Angolan Oil and Gas Industry. *Resources Policy*, 37: 461 -467.

Teo, T. and Lee, C. B. (2010). "Examining the Efficacy of the Theory of Planned Behavior (TPB) to Understand Pre-service Teachers'

Intention to use Technology', Curriculum, Technology and Transformation for an Unknown Future", in proceedings of the Ascilite conference, Sydney, 968–972.

Thompson, B. (2005). "Exploratory and Confirmatory Factor Analysis: Understanding Concepts and Applications". American Psychological Association, Washington, D.C., U.S.A.

Westland, J.C. (2012). Erratum to Lower bounds on sample size in structural equation modelling. *Electronic Commerce Research and Applications*, 11: 445.

Appendix A

'MT Correlation Matrix

	LC policy							Local Firms' Participation					Backward Linkage					Job Creation				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Licensing reg	1.00																					
Ownership reg	.702	1.00																				
Firm reg	.661	.682	1.00																			
Labour mktreg	.580	.631	.641	1.00																		
Tax incentive	.503	.466	.435	.541	1.00																	
Tariff	.493	.480	.440	.541	.689	1.00																
Monitoring	.616	.591	.592	.619	.530	.597	1.00															
Business opport_s	.221	.142	.238	.117	.154	.136	.290	1.00														
Environ condu_s	.288	.264	.346	.233	.266	.178	.377	.486	1.00													
Tech skill_s	.280	.186	.255	.229	.268	.255	.315	.274	.374	1.00												
Fin accessibility_s	.260	.165	.145	.160	.182	.263	.293	.503	.396	.313	1.00											
Non-fin incentive_s	.145	.112	.130	.143	.196	.216	.286	.415	.286	.229	.482	1.00										
Inputs developt	.083	.118	.088	.117	.157	.182	.148	.066	.145	.231	.063	.090	1.00									
Info exchange	.184	.197	.143	.185	.147	.128	.147	.098	.165	.197	.080	.230	.533	1.00								
Tech upgrading	.179	.210	.138	.162	.119	.169	.174	.148	.146	.250	.106	.137	.579	.380	1.00							
Negotiation of P & D	.176	.165	.119	.053	.083	.084	.095	.164	.102	.242	.053	.057	.368	.441	.342	1.00						
Labour training	.071	.105	.060	.131	.110	.134	.095	.031	.130	.154	.140	.094	.429	.223	.563	.232	1.00					
Availability	.106	.072	.007	.094	.146	.072	.083	.172	.179	.252	.161	.232	.259	.209	.112	.110	.159	1.00				
Placement	.139	.083	.100	.087	.180	.108	.109	.233	.238	.262	.202	.192	.247	.127	.112	-.006	.037	.693	1.00			
Application	.075	.176	.089	.074	.066	.052	.156	.121	.148	.175	.110	.117	.213	.159	.193	.215	.179	.353	.365	1.00		
Requirement	.031	.081	.043	.068	.074	.138	.064	-.090	.023	.151	.026	-.107	.201	.143	.087	.059	.068	.200	.252	.367	1.00	
Offer	.046	.061	.051	.098	.027	.136	.111	.026	.088	.205	.054	.012	.093	.117	.114	.154	.215	.223	.253	.317	.521	1.00

Note: Heterotrait(HT) correlations cells highlighted=correlations matrices of indicators measured different constructs. Monotrait (MT) correlationsare in plain cells= correlations matrices of indicators within the same construct.