

# Exploring the Impact of Nigeria's Oil and Gas Local Content Policy on Higher Education Institutions: A Social Network Analysis Approach

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## Abstract

This study employs social network analysis (SNA) to examine the impact of Nigeria's local content development (LCD) policy on higher education institutions (HEIs), specifically focusing on employment and training. Drawing from a multiplicity of stakeholders identified, these were subjected to critical scrutiny and seven key stakeholders were selected: the Federal Government, HEI lecturers, students, young employees, the Nigerian University Commission (NUC), the Nigerian Content Development and Monitoring Board (NCDMB), and industry players from both multinational and indigenous oil and service companies. Using documentary evidence and 32 semi-structured interviews, the study found a significant gap between HEL and FGN, however, there appears to be close ties with HEL and other stakeholder groups and the same is the case with FGN. Betweenness centrality values ranged from 0.0 to 1.417, with an overall network density of 76%, positioning the Federal Government as a central broker. However, a 24% residual unconnectedness suggests significant gaps in stakeholder relationships, corroborated by interview responses. These findings underscore critical implications for the development of Nigeria's HEI sector and the broader scope of policy implementation, highlighting the necessity for enhanced stakeholder collaboration to fulfil the LCD policy's objectives as per the NOGIC Act.

**Keywords:** higher education, local content development, social network analysis, stakeholder theory, Nigeria, oil and gas industry

## 1. Introduction- Nigerian Oil and Gas Industry

The exploration of oil in Nigeria has a rich history that dates to 1908, when the first oil discovery was made in Araromi, Ondo State (CRES, 2008). However, commercial activities of oil and gas began in the year 1956 in Nigeria, following a significant oil discovery in Oloibiri, Delta State, by Shell D'Archy. At that time, Shell operated under a concession that allowed it to explore petroleum resources across the entire country, effectively giving the company a monopoly on exploration and production activities. This monopoly was disrupted in 1971 when Nigeria became a member of the Organisation of Petroleum Exporting Countries (OPEC), an organisation that allows member countries to exert control over their petroleum resources through their national oil companies. In line with this new membership, Nigeria established its national oil company, the Nigerian National Petroleum Corporation Limited (NNPCL), in 1977. While some OPEC member nations opted for a more direct approach in managing their oil sectors, Nigeria adopted a Joint Operating Agreement (JOA) framework, which outlined the roles and stakes of commercial organisations in the oil industry. This period also marked the entry of several Multinational Oil Corporations (MNOCs) into the Nigerian market, including companies such as Mobil, Gulf, Agip, Safrap (Elf), Tenneco, and Amoseas (Texaco/Chevron). The awarding of onshore and offshore licenses to these corporations aimed to increase Nigeria's oil production capacity. As of now, Shell remains the dominant player in Nigeria's oil sector, still accounting for nearly 50% of the country's total daily oil production, thus retaining its position as the largest oil-producing company in Nigeria. In recent times, however, Nigeria's oil and gas industry has faced several challenges across its upstream, midstream, and downstream sectors. The upstream sector grapples with issues such as volatile oil prices, outdated laws and regulations, pipeline vandalism, crude oil theft, corruption, and insufficient government funding (Olujobi, 2021; Tseghe, 2013; Elenwo and Akankali, 2014). The midstream sector struggles

mainly with non-functional refineries and low-capacity utilisation rates (Donwa et al., 2015; Balouga, 2012; Tseghe, 2013). In the downstream sector, challenges are varied and include inappropriate product pricing and subsidy schemes, supply chain issues, insecurity, irregular gas supply, pipeline vandalism, inadequate pipeline infrastructure, and the operational issues of refineries (Donwa et al., 2015; Tseghe, 2013; Adishi and Hunga, 2017; Austin et al., 2020).

### *1.1 Local Content Development Policy and Objectives*

In the world today, there is a global yearning for countries to enhance their domestic capabilities and expertise (Ono and Lahiri, 1998). Countries are beginning to awake to the fact that specialising in areas where they have competitive advantage can only be achieved through the deployment of a country's competencies (Hofer and Schendel, 1978; cited in Reed and Defillippi, 1990). Wright et al. (1994) argue that the sustainability of a country's competitive advantage and income generation is highly dependent on the development of its human resources (skilled labour), invariably, investing in education and training is critical. Lado and Wilson (1994) emphasise that leveraging indigenous human resources serves as an effective cost reduction mechanism, hence, the development of local content is essential for sustaining economies. In Nigeria, LCD is seen as a transformative policy designed to prioritise local employment and training while reducing the importation of goods and services. This approach not only aims to create jobs but also to bolster local manufacturing capabilities, helping Nigeria to potentially avoid the 'resource curse' and facilitate a shift towards advanced capitalist development (Adedeji et al., 2016). According to Udoh (2020), LCD policy has a positive and significant impact on local value creation. This is especially evident in increased participation from local firms and the development of backward linkages, which refer to the connections between local suppliers and foreign companies that facilitate the provision of goods and services. Despite its positive intent, the LCD policy faces challenges that hinder the competitive capabilities of indigenous oil and gas companies. High costs of funds are identified as a significant impediment, placing local companies at a disadvantage compared to their foreign counterparts with better access to capital resources. In a similar argument, Nwaguru and Sylva (2022) highlighted the importance of synergy among key stakeholders across Nigeria's oil and gas companies. They argue that sequential integration and alignment among stakeholders are essential strategies for overcoming barriers related to capital formation, technology acquisition, and efficient operational processes.

The main thrust of LCD in Nigeria is value addition to the economy, however, in achieving value addition, specific objectives are contained in the Nigerian Oil and Gas Industry Content (NOGIC) Act. These are: first consideration in exploration and contractual rights; retention of legal and financial services of the operators to Nigerian firms; first consideration for employment and training; research and development; technology transfer. This study aims to assess the extent to which the Local Content Policy has impacted HEIs in terms of capacity building and human resource development. Therefore, the focus will be on two key LCD objectives- first consideration for employment and training; research and development. This is because, invariably, the employment of indigenous manpower is largely dependent upon the higher education industry, who should provide at least, the minimum training required by graduates to be employed by the oil and gas industry, who then provide a more advanced training. This is expected to be achieved through collaboration among stakeholders in the oil and gas industry, government and HEIs, whose R and D activities should align with industry specific needs as outlined in the NOGIC Act.

### *1.2 Nigerian Higher Education Industry*

From a broad perspective, Nigeria's higher education system consists of the university and non-university sectors. While the university sector comprises federal, state and private universities, the non-university sector comprises polytechnics, monotechnics and colleges of education. That said, the entry requirements for the non-university sector appears to be more relaxed than that of the university sector (Salami, 2011; and Chiemeke *et al.*, 2009), hence the focus of this study is on the university sector.

According to the National University Commission (NUC), there are 51 federal universities, 62 state universities and 147 private universities (NUC, 2023). Despite the number of private universities, it appears that federal (and state) universities still have the largest enrolment among them (Statista, 2023). This is owing to a number of factors such as lower tuition fees and course availability (Olaleye *et al.*, 2020). On the other hand, as a result of incessant strike actions by federal and state universities, which prolongs the actual study time for students, this has become a huge selling point for private universities who assure students of a seamless teaching and learning experience with minimal disruption in their academic activities. In addition, with the growing population of the country and the increasing demand for tertiary education, the establishment of more private universities have helped to make university places available for prospective applicants.

In recent decades, the critical role of higher education in economic development, especially in resource-dependent

economies, has gained increased attention. Altbach and Knight (2007) argue that internationalising higher education is a strategic approach for these countries to improve their domestic capabilities and secure competitive advantages globally. This is echoed in the findings of the World Bank (2020), which indicates that well-structured higher education systems can stimulate economic growth in resource-rich nations, particularly in Sub-Saharan Africa. This body of research suggests that nations can leverage their natural resources more effectively by investing in human capital (Bhandari & Bhanot, 2020).

Further comparative studies, including work by Schwarz and Shavit (2016), examine the transitions from education to labour markets in resource-rich economies. Their research illustrates that the success of higher education is closely tied to how responsive labour markets are within these contexts. Newman (2017) highlights that countries must not only broaden access to education but also ensure that their curricula meet the specific needs of local economies. The implementation of LCD policies in Nigeria has shown positive outcomes, with increased participation from indigenous firms leading to local value creation, as illustrated by Udoh (2020). This suggests that tailoring educational policies to engage with local industries can alleviate some negative effects associated with resource dependency.

Case analyses have further unveiled the complexities of implementing effective higher education policies. Hassan (2018) notes that mixed-resource economies face unique challenges that necessitate tailored educational strategies. By focusing on both the successes and shortcomings within Nigeria's higher education system regarding LCD, researchers illustrate how strategic educational policies can generate job opportunities and counteract the "resource curse." However, Nwaguru and Sylva (2022) highlight ongoing structural challenges, such as high capital costs, that hinder local businesses in competing with established foreign firms. This indicates that, without systemic reforms, even well-intended policies may struggle to deliver sustainable results.

### 1.3 Research Questions

*what kind of stakeholder relationship exists between the higher education industry and the oil and gas industry?*

*To what extent is the government as a key stakeholder, involved in brokering and fostering a good working relationship between the higher education industry and other key stakeholder groups, who are involved in driving the LCD policy?*

### 1.4 Theoretical Framework

#### 1.4.1 Stakeholder Theory

The concept of stakeholders has been subjected to far reaching research over a long period of time. Various authors have considered stakeholders from different perspectives. History dates back to the work of Freeman (1984), who through his work, other stakeholder concepts have emerged. According to Mitchel *et al.* (1997), they argue that there are three key attributes of stakeholders which indicates the amount of attention management needs to give to stakeholders. These are: urgency, legitimacy and power. However, other authors that argue along the same lines appear to dwell more on legitimacy and power (Frooman, 1999; Hendry, 2005; Ackerman and Eden, 2011). Frooman (1999) derived four types of firm-stakeholder relationships from resource dependency theory. These are firm power, high interdependence, low interdependence and stakeholder power. This particular theory clearly resonates with our research as we seek to investigate the level of interdependence and interrelationship among key stakeholder groups to understand the extent to which the LCD policy has impacted HEIs in Nigeria. Along the lines of legitimacy and power, Mitchell *et al.* (1997) adds that, salience (prominence) of the stakeholder is an important attribute that should be considered in stakeholder management. There are other classifications suggested by various authors. For example, broad perspectives on the stakeholder theory have developed around three different approaches namely: descriptive, normative and instrumental (Bailur, 2006; Reed *et al.*, 2009; Freeman *et al.*, 2004; Donaldson and Preston, 1995; Friedman and Miles, 2002). From a standpoint of priority, Phillips (2003) differentiate stakeholders as normative and derivative arguing that the latter are those who have no moral obligation to the firm, while the former has a moral obligation of fairness to the firm.

Within the context of our research area-Nigeria, this is a country that is highly driven by political intricacies and power dynamics across various sectors, with the oil and gas and HEI inclusive. According to Fassin (2012), taking into consideration such settings, stakeholders can be analysed from the lens of social movement theory and institutional theory, covering a wider range of stakeholders although with a higher level of specificity, in terms of the roles each of these stakeholder groups play. Therefore, this study adopts Fassin's (2012) typology, which categorises stakeholders into, 'stakeowners', 'stakewatchers', 'stakekeepers' and 'stakeseekers'.

Stakeowners are stakeholder groups with legitimate rights and responsibilities (Constandt *et al.*, 2020). They are seen as the core stakeholder group, and referred to as 'real' stakeholders with a genuine and legitimate stake (Fassin,

2009; Fassin, 2012). On the other hand, stakewatchers are stakeholder groups who do not really have a stake themselves but protect the interest of the stakeholders (Fassin, 2009). Although they seek to have a voice in the public debate, somewhat demonstrating a possession of some level of stake, however, in reality, their legitimacy is self-proclaimed. Another category of stakeholders are stakekeepers. In modern literature, stakekeepers are referred to as gatekeepers, given that their main responsibility is to regulate and perform an oversight function over the firm (Fassin, 2009b). Finally, in the case of stakeseekers, this stakeholder group are similar to stakewatchers in that; stakeseekers do not also have a stake and in addition, they have no voice in a corporation's decision making (Holzer, 2008).

Overall, from a broader perspective, stakeholders have been differentiated into two- claimant and influencer (Kaler, 2002). A claimant is viewed as an individual or group that maintains a stake in a firm, while an influencer is viewed as any individual or group that can affect, or be affected by a firm's objectives (Freeman, 1984). Within the context of this study, the only group that can be termed a claimant are stakeholders, while the others are influencers.

### 1.5 Social Network Analysis

Technology has completely shrunk the world. Paradoxically, we live in a world that is small and wide (2015), which brings individuals in close social contact despite the distance that separates them. Generally, networks refer to the way we think about social systems and how we focus our attention on the relationships which exists among the entities that make up the system (Borgatti *et al.*, 2013). Within a firm, sector and industry, social networks do exist, which enables teams to work together and leverage on the skills and competencies of one another. These interrelationships can be further investigated using social network analysis (SNA). Ideally, stakeholder interactions should be bi-directional (Crane and Matten 2004, p. 52). However, given the typology outlined by Fassin (2012), it suggests that interrelationships among stakeholders may not be equal and opposite (Lagoke *et al.*, 2021).

SNA has now become a useful tool which has been deployed to various research such as accounting and finance (Bianchi *et al.*, 2023), criminology and social justice (Fenimore *et al.*, 2023), agriculture (Mefor *et al.*, 2023) and international trade (Dong, 2022; Zhang *et al.*, 2023). More specifically, SNA have been deployed as a methodological tool for research in higher education. Rienties and Heliot (2016) examined the extent of interdisciplinary ties that students have developed in a large interdisciplinary organisational behaviour module. This research was quite specific on a single unit of analysis. Zhang *et al.* (2021) used SNA to investigate how science and technology innovation communities (STICs) which are student led, help to bring together key stakeholders such as businesses, research centres and university staff. This constituted mainly three key stakeholder groups. Similar studies to this present study are the one by Pinheiro *et al.* (2015) who focused on U-ICs, using SNA as a methodological tool. In addition, Lagoke *et al.* (2021) deployed SNA to investigate the extent to which university curriculum is in tandem with industry requirements. Although these two studies focus on U-ICs, with the latter considering this from the perspective of a multiplicity of stakeholder groups, the novelty of this study is that we examine how the impact of a government policy affects the higher education industry, examining this through the lens of a multiplicity of stakeholders.

## 2. Methodology

This study employs Social Network Analysis (SNA) to explore the perceptions of various stakeholders in the higher education and oil and gas industries, particularly concerning the impact of Nigeria's Local Content Policy. The two main levels of SNA include ego network analysis and complete network analysis (Crossley *et al.*, 2015). In alignment with our research aims, ego network analysis was selected, as it facilitates an understanding of stakeholder perceptions from individual viewpoints without bias. Given the focus on the interrelationships among stakeholders, dyadic relationships were preferred for our investigation over triadic relationships in this analysis. This approach allows for a detailed examination of the interactions among key actors within the network of our selection rather than more complex triadic or subgroup relationships, which could dilute the focus on direct interconnections.

### 2.1 Participants

The study identified 16 stakeholder groups (primary and secondary) that are relevant to the role of development of Nigeria's HE industry. To explore the Nigerian LCD policy's impact on higher education from multiple actors, we followed the stakeholder identification and categorisation framework of Reed *et al.* (2009). This framework was instrumental in selecting stakeholders pertinent to our investigation. Also, the step-by-step guidance on undertaking a social network analysis according to Hatala (2009) was employed to undertake the analysis for this research.

Stakeholder categorisation can be in different forms- influence and power (Frooman, 1999; Ackermann and Eden,

2011), descriptive, instrumental and normative (Donaldson and Preston, 2005), dangerous or dormant (Jensen, 2002), normative versus derivative stakeholders (Phillips, 2003a; Phillips, 2003b), primary versus secondary stakeholders (Clarkson, 1995). While Primary stakeholders are argued to be those actors who should supposedly possess a direct connection with the firm, secondary stakeholders are those actors at the boundaries of the firm who may be affected by its actions but do not have any contractual connection with the firm (Collier and Roberts, 2001).

Our focus for this study were primary stakeholders. Within the context of our study, we consider primary stakeholders as those who are directly involved in driving the LC policy to achieve the objective of strengthening Nigeria's HE industry. Hence, we focus on key stakeholders who have a direct involvement in the delivery of this core objective. For the purpose of this study, we have denoted each of the selected stakeholder groups with different acronyms- Federal Government (FGN), National Universities Commission (NUC), Nigerian Content Development and Monitoring Board (NDB), higher education institution lecturers (HEL), higher education institution students (HES), young employees of oil and gas companies in Nigeria (YMP) and multinational oil and gas players (MNP).

Based on the underpinning theory for this research, Table 1 shows a detailed categorisation of the selected stakeholder groups with clear justification for their categorisation.

Table 1. Stakeholder Categorisation

s/n	Stakeholder group	Categorisation	Remarks
1	Federal Government (FGN)	Stakekeepers	The federal government are regulators and within the context of this research, they are to perform an oversight function of ensuring that the intended purpose of the policy is achieved.
2	National Universities Commission (NUC)	Stakewatchers	The NUC are the regulating body of Nigerian universities. While they occupy a primary role as regulators of HEI, within the context of our study, they are considered as stakeowners given that, the local content policy is a policy established by the government (who are regulators), in conjunction with NCDMB. Therefore, the implementation of this policy is not directly influenced by NUC. Instead, they are supposedly, beneficiaries of the policy.
3	Nigerian Content Development and Monitoring Board (NDB)	Stakeowners	The NCDMB are the primary custodian of the NOGIC Act, which encapsulates the local content policy. Although, they could be seen on one hand as co-regulators with the federal government, within the context of this study, we consider them as stakeowners given their high level of power and interest in driving the enforcement of the policy
4	Higher Education Institution Lecturers (HEL)	Stakeowners	HEI lecturers are directly impacted by the policy. More importantly, given that our study is aimed at assessing the impact of the local content policy on HEI, the lecturers are considered as stakeowners in this study.
5	Higher Education Institution Students (HES)	Stakeseekers	Considering our research question and within the context of this study, HEI students do not necessarily have an influence on the policy. Rather, this stakeholder group should be a beneficiary of the implementation of the policy.
6	Young Employees of Oil and Gas Companies in Nigeria (YMP)	Stakeseekers	While the study considers that this stakeholder group may not have a direct influence on the policy, this group are of importance to this study in that; the quality of learning they obtain from HEIs determines to a large extent, how they can navigate through the complexities of the competitive job market with their peers from foreign universities.
7	Multinational Oil and Gas Players (MNP)	Stakeseekers	Within the context of this study, multinational oil and gas players are considered as stakeseekers. Similar to our argument for YMP, MNPs are looking to recruit exceptional quality graduates, who would go on to make high impact at the workplace. Consequently, achieving the objective of the local content policy in HEI will be of utmost benefit to MNPs

Source: Authors' Analysis (2024)

After gaining ethical approval by Oxford Brookes University Research Ethics Committee (UREC) for this study, we adopted a purposive snowball technique following the selection of the seven key stakeholder groups for this study. In total, 32 semi-structured interviews were undertaken which lasted between 45-60 minutes each. This consisted of six participants each from the YMP and HEL stakeholder groups and four participants each from the other selected stakeholder groups. The questions asked were mainly to determine the level of existing interrelationships among these stakeholder groups and also in line with our research questions and overarching aim of the study.

### 3. Data Analysis and Results

As stated earlier, documentary and semi-structured interview data were collected for this study. These were

subjected to critical scrutiny using thematic analysis. Interview data were transformed to matrix form to perform SNA. The core themes which emerged were: LCD Policy and Higher Education; stakeholder responsibilities for HEI development in Nigeria; academia-government/industry practitioner interaction. We subject these core themes to critical analysis in the next section.

### 3.1 The effect of LCD Policy on Higher Education

Findings from the study revealed that, although the LCD policy appears to be intentional towards the development of Nigeria's HEI, there are no particular structures in place to set this intention in motion.

*".....I need to be honest with you, the local content development policy is supposed to extend beyond the oil and gas sector, particularly to the tertiary education sector, but there is a lot of bureaucracy and lobbying which is out of NCDMB's hands. This would delay Nigeria's tertiary education sector from directly benefitting from the LCD policy". [Mid-Manager, NDB]*

The HEI lecturers seem to corroborate this too:

*".....the impression most lecturers in tertiary education sector had was that the LCD policy would bridge the gap between academia and industry, but we are yet to see the effect of this policy [Senior Lecturer, HEL]*

In a similar study, Lagoke *et al.* (2021) found a gap between academia and industry in Nigeria, emphasising that the gap between these two stakeholder groups needs to be breached for HEIs to deliver the expected quality of graduates required by industry practitioners. In a study carried out by Agullah *et al.* (2022) on the NOGIC Act, it was found that although the policy had recorded some achievements, however, from the standpoint of human capital development, the core objective of education and training is still far from being achieved. In accordance to the Nigerian Content Human Capital Development (NC-HCD) implementation strategy, NCDMB is expected to jointly collaborate with educational institutions to develop human capital but as of yet, the extent of collaboration with these educational institutions cannot be ascertained.

### 3.2 Stakeholder Responsibilities for HEI Development in Nigeria

The study sought to investigate if stakeholders actually understood their roles and responsibilities to HEIs in Nigeria. Considering that this research is hinged on the local content policy, our interview questions were framed in light of how stakeholders perceived the policy as a key contributor to HEI development, and what their roles are, in ensuring that, through this policy, HEIs in Nigeria should experience some level of development.

Our findings revealed that stakeholders agreed that they had a direct role to play in ensuring that this is achieved, however this has been slow.

*"We have a core responsibility to ensure that the policy has a positive impact on every industry, especially the higher education sector because, this sector is the gateway to intellectual development which can positively impact other sectors" [Mid-Manager, NDB]*

*"The local content policy is a strong tool in the hands of the government for a positive turnaround in Nigeria's tertiary education sector. On our part, we acknowledge that there could have been cases of slackness in teaching and research, however, this is due to lack of adequate funding and support from the government" [Senior Lecturer, HEL]*

The government (stakekeepers) seemed to acknowledge the assertion of HEL stakeholders

*"In an ideal world, we should not be having this kind of face-off with university lecturers. As a government, we should do far more, to meet the demands for teaching and research, alongside harnessing the opportunities of the LCD policy in favour of the tertiary education sector". [Top Government Official, FGN]*

Similarly, the stakeholders agree that the responsibility of developing Nigeria's HEI should not be left in the hands of indigenous players.

*"As an organisation, we owe it a duty of care and in fact our CSR, to be a part of the development of the country's workforce, who are key to our business. A good avenue to partner with other indigenous stakeholders is through the LCD policy which I consider a viable platform". [Senior Manager, MNP]*

It appears that various stakeholder groups seem to understand their responsibilities in harnessing the objectives of the LCD policy in the Nigerian HE sector. In addition, there is a willingness to take advantage of the policy to develop the HEIs, this can be asserted from the responses of participants.

### 3.3 Relational Ties among Stakeholder Groups within the Network

In order to investigate the strength of ties and interrelationships among the selected stakeholder groups, SNA was utilised to generate matrices from the semi-structured interviews that were carried out across the stakeholder groups. This was done by transforming the qualitative responses to quantitative form, which resulted in two matrices. The first one was in valued form, which is based on a likert scale of 1 to 5, ranging from very weak (1) to very strong (5) relationship. In generating the quantitative variables, the mean of the responses on their relational ties from each respondent was taken to generate the values for the valued matrix. The implication of this is that, the strength of the relationship that stakeholder A claims to be in existence with stakeholder B does not necessarily correspond to that perceived by stakeholder B. For example, the “valued” measurement for the HEL: FGN relationship, with HEL as the “receiver,” scored an average rating of “3” (moderate relationship), but an average rating of “1” (weak relationship) when viewed from the perspective of the government as the “receiver” of the FGN: HEL relationship.

Table 2. Matrix of valued data

Receivers → Senders ↓	FGN	MNP	HES	NUC	NDB	YMP	HEL
FGN		4	3	3	3	3	3
MNP	4		3	2	5	3	3
HES	1	1		2	1	4	3
NUC	3	2	4		2	2	4
NDB	3	5	2	2		3	3
YMP	1	1	3	1	1		3
HEL	1	2	4	3	2	3	

Authors’ analysis (2023)

Federal Government (FGN), multinational oil and gas players (MNP), higher education institution students (HES), National Universities Commission (NUC), Nigerian Content Development and Monitoring Board (NDB), young employees of oil and gas companies in Nigeria (YMP) and higher education institution lecturers (HEL).

The numbers in Table 2 report the average rating of the strength of each possible relationship among stakeholders in the network on a scale from 1 (very weak) to 5 (very strong), in terms of both “receivers” and “senders” of the content of the exchange pertaining to the identified relationships.

The second matrix is in binary form, this was generated by dichotomising the valued matrix into a more interpretable format. However, we acknowledge the arbitrary nature of data generated through Likert scale measurement and from a research standpoint, the defensibility of such data. Therefore, our dichotomisation constitutes an interpretation of what we deem a relational tie among the stakeholder groups. We recode values 1 to 2 as “0”, to denote “no relationship” and values 3 to 5 as “1”, to denote the existence of a relationship. In other words, numbers ordered by column record the inexistence of a relationship from the perspective of stakeholders as “receivers,” whilst numbers ordered by rows pertain to stakeholders as “senders” of the content of the relationship exchange (De Vita *et al.*, 2016).

Table 3. Matrix of “binary” data

Receivers → Senders ↓	FGN	MNP	HES	NUC	NDB	YMP	HEL
FGN		1	1	1	1	1	1
MNP	1		1	0	1	1	1
HES	0	0		0	0	1	1
NUC	1	0	1		0	0	1
NDB	1	1	0	0		1	1
YMP	0	0	1	0	0		1
HEL	0	0	1	1	0	1	

Authors’ analysis (2023)

Federal Government (FGN), multinational oil and gas players (MNP), higher education institution students (HES), National Universities Commission (NUC), Nigerian Content Development and Monitoring Board (NDB), young

employees of oil and gas companies in Nigeria (YMP) and higher education institution lecturers (HEL).

The numbers in Table 3 are “dichotomised,” binary data transformations. “0” denotes “no relationship” and “1” denotes the existence of a working relationship.

The broad results from the binary data suggests that there are existing (uni-directional and bi-directional) relationships among various stakeholder groups. However, a critical consideration of key stakeholder groups such as HEL and FGN shows the willingness of HEL (“1” relationship as a sender) in establishing a working relationship with FGN, however this is not the case with FGN -the stakekeepers (“0” relationship as a receiver). Similarly, NDB:HEL shows a “0” relationship while HEL:NDB indicates a “1” relationship. In both cases, we see a willingness on the part of HEL to establish a relationship, however, this is not the case with FGN who are meant to be the stakekeepers and NDB who are co-stakeowners with HEL. As stated earlier, two key objectives of the LCD policy are: first consideration for employment and training; and research and development. However, with such level of relationship exhibited by these stakeholder groups (HEL and NDB; HEL and FGN), these two objectives deserve to be brought under scrutiny.

Surprisingly, we observe a bi-directional relationship between FGN and NDB (FGN:NDB denotes a “1” relationship and NDB:FGN denotes a “1” relationship), who are stakekeepers and stakeowners respectively within the context of this study. Sadly, this existing bi-directional relationship has not had sufficient impact on HEL to at least exhibit similar kind of relationship with at least one of these two key stakeholder groups (FGN and NDB). Expectedly, there is a bi-directional relationship between HEL and NUC (HEL:NUC denotes a “1” relationship and NUC:HEL denotes a “1” relationship) but there is no evidence of any existing relationship between NDB and NUC (NDB:NUC denotes a “0” relationship and NUC:NDB denotes a “0” relationship) who are both key stakeowners within the network. Meanwhile, unsurprisingly, bi-directional relationship exists between NDB and MNP (NDB:MNP denotes a “1” relationship and MNP:NDB denotes a “1” relationship). This is because these two stakeholder groups enjoy an ongoing work related mutual relationship.

The sociogram in Figure I reveals a spring embedding analysis which uses both distance and direction to demonstrate existing relationships among actors within a network. Although these are not measured to scale, they provide a visual comprehension of the existing connections and direction of interaction among actors. In summary, what counts is the relative distance between points, which are arbitrary. Each of the stakeholder group selected are represented by nodes as shown in Figure I.

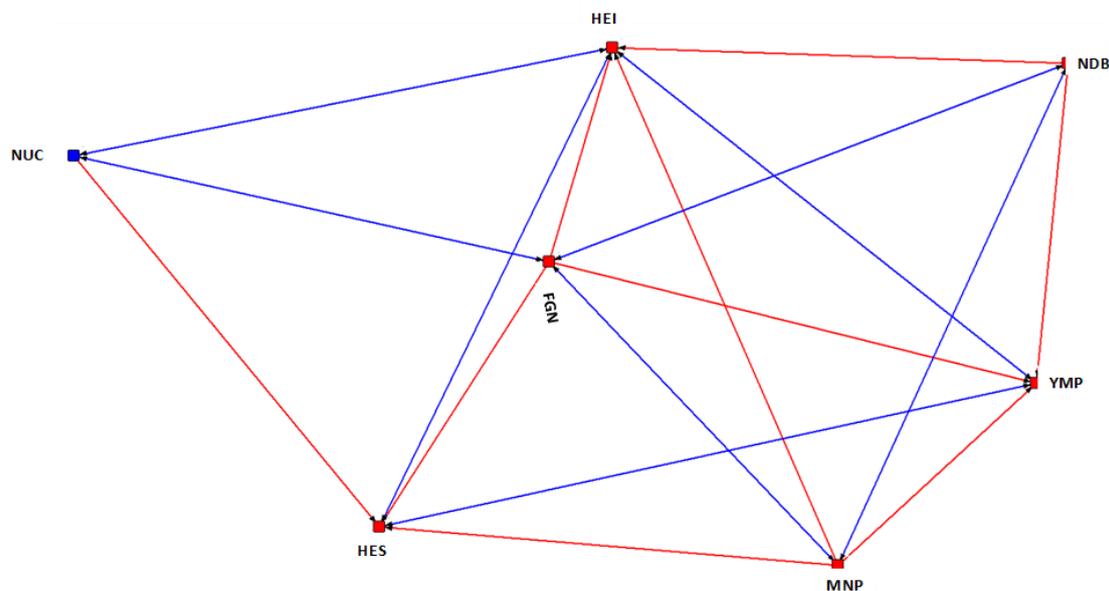


Figure 1. Spring Embedding Analysis

Source: Authors’ Analysis (2023) Graphic generated using network analysis software: UCINET 6.0 (Borgatti et al., 2002).

With less consideration on the direction of the ties within the network, it is evident that there is existing local centrality. However, the position of global centrality is occupied by FGN. This reflects the role of this particular

stakeholder group as stakekeepers, FGN are the regulators and it is expected that all the stakeholder groups should have a relationship with them, whether uni or bi directional. From Figure I, it can be seen that nearly all the stakeholder groups exhibit a bi-directional relationship with FGN with the exception of HEL (higher education lecturers), HES (higher education institution students), and (YMP) young employees of oil and gas companies in Nigeria. This result clearly highlights the gap between the higher education sector and the government, which corroborates the findings of Lagoke *et al.* (2021). According to Nwapi (2015), since 2010 when the policy was signed into law as an act (NOGIC Act), its implementation has been marred with corrupt and undue practices owing to conflict of interest and broad discretionary power among other factors.

Table 4. Centrality measures in social network analysis

<b>Id</b>	<b>Main Component</b>	<b>Degree</b>	<b>Betweenness</b>	<b>Closeness</b>	<b>Harmonic Closeness</b>	<b>Eigenvector</b>	<b>2-Local Eigenvector</b>
FGN	1	6	1.417	6	6	0.434	28
MNP	1	5	0.25	7	5.5	0.393	26
HES	1	5	0.667	7	5.5	0.379	25
NUC	1	3	0	9	4.5	0.249	17
NDB	1	4	0	8	5	0.330	22
YMP	1	5	0.25	7	5.5	0.393	26
HEL	1	6	1.417	6	6	0.434	28

Authors analysis (2023)

In a broader sense, rather than considering the position(s) of specific actors within the network, that is, not just their ego network, we thought to critically investigate the entire network. In view of this, we considered betweenness and eigenvector centrality measures. Rather than consider an actor in isolation of the others, betweenness and eigenvector centrality takes into consideration the rest of the network when computing a score for an individual actor. Betweenness centrality measures the number of times a node lies on the shortest path between other nodes. In other words, how strategically an actor is placed within a network, which determines the number of ties such an actor would have with other actors within that network. In social networks, nodes with high betweenness centrality often serve as connectors between actors within the network. From table IV, FGN and HEL have the highest betweenness centrality (1.417). This suggests that these two actors are highly influential within the network, however, from earlier analysis, they both appear not to have a bi-directional relationship with each other.

Similarly, eigenvector centrality is used to measure the level of influence of a node within a network. It is the sum of an actor’s connections to other actors, weighted by their degree centrality (see Prell, 2015, p. 101). Each node within the network will be given a score or value, invariably, the higher the score, the greater the level of influence within the network. As with the case of betweenness, FGN and HEL have the highest eigenvector centrality values (0.434), which further demonstrates the influence of these two actors within the entire network

### 3.4 Network Density

In conclusion, we analyse the density of the network, which gives an overall assessment of how connected the actors within the network are. Although this is a general assessment, it provides an overall picture of the level of interconnectedness of the entire network (Meyer and Rowan, 1977). We use the equation:

$$\frac{l}{n(n - 1)/2}$$

According to Hatala (2006), *l* represents the number of lines (ties) present and *n* the number of nodes and the density falls within a range of 0 to 1. Invariably, ‘0’ represents no density (connection), while ‘1’ represents complete density (connection). From the computation, a value of 0.76 was obtained, which suggests that there is a 76% connection among the actors within the network. Although this represents a good level of interconnectedness, the interrelationship between two key stakeholders (FGN and HEL) needs to be further strengthened.

## 4. Discussion

This paper aimed to assess the impact of the Nigerian Oil and Gas Local Content Policy on the development of its Higher Education Industry. A total of seven stakeholder groups were selected for this research and categorised into stakeholders, stake seekers, stake watchers and stakekeepers (Fassin, 2012). Three core themes were addressed to

answer the research questions- the effect of the LCD policy on higher education, stakeholder responsibilities for HEI development in Nigeria and relational ties among stakeholder groups within the network.

Our findings on the effect of the LCD policy on higher education suggests that HEIs are yet to reap the benefit of the policy, owing to bureaucracy and the gap between academia and government on one hand, and the gap between academia and NDB on the other hand. Within this network, these two key stakeholder groups (FGN and NDB) appear to be ‘powerful’ in driving the achievement of these objectives. Although within our classification, NDB are classified as stakeowners, however, they also have an oversight over the policy, howbeit in conjunction with the government. This resonates with the assertion of Kaler (2002), who suggests that some stakeholders are ‘influencers’ who can affect or be affected by the firm.

Our findings on stakeholders’ responsibilities for HEI development found that FGN- the regulators admitted that a lot more in terms of support should be provided in ensuring the effective implementation of the LCD policy. Similarly, NDB admitted that the lifeblood of the country’s workforce is the HEI sector, hence the need to also bear some of the responsibility in ensuring that HEIs reap the dividends of the LCD policy. In another development, the MNP stakeholder group considers it as part of their CSR to develop human capacity, by working with stakeholders such as NDB and FGN to achieve this. Overall, it appeared that these three stakeholder groups admit some level of responsibility in driving the policy, which is considered a huge step to success given that, our earlier analysis of the networks revealed a good working relationship among these three stakeholder groups (MNP, NDB and FGN). That said, expectedly, the gap between HEL and FGN should be closely breached to facilitate a better working relationship. Similarly, adequate structures should be put in place to establish a bi-directional relationship between NUC and FGN, which we consider a key advantage. On one hand, the FGN performs an oversight function over all the other stakeholder groups and on the other hand, the NUC perform an oversight function over the HEIs. Therefore, there is a possibility to leverage on these regulating functions by the FGN and NUC to further bring the HEL and FGN into a closer working relationship.

Our investigation on stakeholder groups’ interaction revealed that FGN occupies a position of global centrality within the network (Figure I). This is quite unsurprising as this stakeholder group are regulators and should perform an oversight function, as well as bringing other stakeholders together, in close working relationship. That said, the results are quite striking in that; there appears to be a gap between HEL and FGN, because HEL exhibits close ties with other stakeholder groups and the same is the case with FGN, except for the gap between these two key stakeholder groups (FGN and HEL). This result is corroborated by the findings obtained from betweenness and eigenvector centralities.

## 5. Policy Implications

The Nigerian Local Content Policy in the oil and gas sector seeks to build indigenous capacity, with universities expected to supply graduates equipped with foundational knowledge before industry-specific training occurs. However, weak relationships between government and academia, as well as between universities and industry, undermine this vision. The result is a persistent skills gap, where graduates are inadequately prepared for industry needs, forcing companies to shoulder the burden of extensive remedial training. This dynamic also risks overdependence on industry-led, firm-specific training, which may deliver short-term benefits but fails to embed broad-based and sustainable indigenous expertise. At the same time, the exclusion of universities from meaningful engagement deprives them of opportunities to access research funding, shape curricula, or contribute to innovation and knowledge generation.

In contrast, the strong government-industry relationship raises concerns of policy capture, where oil companies’ operational priorities outweigh the long-term national goal of systemic capacity development. The lack of integration among the three key stakeholders produces fragmented outcomes, falling short of the collaborative “triple helix” model that drives innovation elsewhere. The policy implication is clear: without deliberate investment in strengthening trust and collaboration between universities, government, and industry, the Local Content Policy risks becoming narrowly industry-driven rather than a sustainable tool for building Nigeria’s indigenous human and institutional capacity.

## 6. Conclusion

Drawing from the comprehensive analysis of the Nigerian Oil and Gas Local Content Policy’s impact on the development of higher education institutions (HEIs), it is evident that the policy harbours significant potential to enhance the intellectual capacity and value addition within Nigeria’s HEI industry. However, the realisation of this potential is impeded by bureaucratic challenges and a lack of structured implementation mechanisms.

The policy’s intent to bridge the academia-industry divide and foster indigenous manpower development through

HEIs is clear. Yet, the absence of concrete structures to operationalise this intent has resulted in a disconnect between policy objectives and actual outcomes. The policy's effectiveness is further compromised by bureaucratic inertia and lobbying, which delay the tertiary education sector's direct benefits. The study underscores the pivotal roles of various stakeholders, including the Federal Government, the Nigerian Content Development and Monitoring Board (NCDMB), and multinational oil companies. While these stakeholders recognise their responsibilities in policy implementation, there is a consensus that more proactive measures are needed to expedite the policy's impact on HEIs.

Social network analysis reveals a complex web of stakeholder relationships, with the Federal Government occupying a central regulatory role. Despite this, the network analysis indicates a substantial 24% residual unconnectedness, highlighting the need for improved inter-stakeholder relationships, particularly between the government and HEIs. To bridge the identified gaps, it is recommended that bi-directional relationships be established and strengthened, especially between the government and HEIs. This would facilitate better alignment of HEIs with industry needs and ensure that the policy's objectives are met more effectively.

## **7. Limitations**

We acknowledge some limitations in this study. First, the study's findings are based on a specific sample of stakeholder groups which may create some bias. However, given that our selection model was guided by the research question, it was imperative that we stuck to the stakeholder groups which were selected for the study. Second, we acknowledge that the selection of these stakeholder groups and the size of the sample could limit the generalisability of the findings, however, this study should be seen as a first step in creating an awareness for further studies which would examine the role and possibly, the impact of policy on intellectual and capacity development from the standpoint of HEIs. Third, the study focuses specifically on Nigeria, and as such, its applicability to other geographical contexts may be contested. That said, the model and theoretical underpinnings for this current study may be adopted for future studies that could explore strategies for enhancing stakeholder engagement and collaboration considering larger stakeholder groups on one hand, and various countries on the other hand.

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## **Authors contributions**

Dr Oluwatosin Lagoke, the lead author designed the framework for the study and the survey instruments. In addition, the analysis was run by the lead author. Adewale Ogunmodede, wrote the review on the higher education in Nigeria and also a good part of the discussion and findings section. Dr Adekunle Toromade did the writing on the Nigerian economy, policy and parts of the methodology. All authors read and approved the final manuscript.

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## **Data availability statement**

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

### Data sharing statement

No additional data are available.

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