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SIMPLIFIED PREDICTIVE MODELS ON SUSTAINABLE LOCAL CONTENT POLICY, AND HUMAN CAPACITY DEVELOPMENTS, IN NIGERIA'S OIL AND GAS INDUSTRY.

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ABSTRACT

Simplified predictive models were developed to determine sustainable local content policy and human capacity development in the Nigeria's oil and gas industry was carried out using secondary data from the Petroleum Technology Development Fund (PTDF) within ten years. The research was formulated on both descriptive and analytical statistical methods for the prediction of the expected capacity development value at optimum conditions based on critical industry need assessment and audit report between 2018 -2023 - a baseline study and the secondary data sets from PTDF trio-capacity development strategies from 2011 – 2021. From equations 2.1 – 2.11, it was established that challenging weaknesses could be turned into opportunities for the Fund. A comparative analysis of the Skills Gap Audit (SGA) and Simplified Predictive Models (SPM) was carried out using arithmetic mean, standard deviation and correlation coefficient from the assumed mean of the unclassified data. Tables 2.1 - 4.5 and Figures 2.1 and 2.6 are reference commonality data sets. The results established that more key performance indicators were captured in the SPM models (mean of 23.04 and deviation of 0.4) against the imputed values in the SGA, (mean 4.52 and deviation of 0.5) respectively. This research is useful for policy formulation and decision-making on local content policy formulations and capacity development programmes in Nigeria.

Keywords: Predictive models, Local Content, policy, Human Capacity, Oil and Gas.

INTRODUCTION:

Several studies have been carried out on the role of sustainable local content policy, human capital development and the Nigeria oil and gas industry performance enhancement productivity (Ozim, 2010). The term local content has been defined according to NNPC (2006), as the quantum of composite value added or created in the Nigerian economy via the utilization of Nigerian human and material resources for the provision of goods and services to the petroleum industry within acceptable quality, health, safety, and environmental standards to stimulate the development of indigenous capabilities. This definition, according to (James et al 2018), emphasizes that the essence of local content is to develop an economic engine for growth, driving employment, wealth creation, and improved linkage between the oil and gas industry and other sectors of the economy. However, this paper is premised on the robust contributions of the Petroleum Technology Development Fund (PTDF) in the past ten years using key performance indicators and data sets from 2011 - 2021 to assess the impacts of the intervention programmes of the Fund in the actualization of the local content initiative in Nigeria. Aside the assertion that PTDF is an agency saddled with the enormous task of developing technology and building capacity, is the fact that PTDF is the only government agency in the oil and gas industry in Nigeria with the mandate to develop technology for the industry, (Gusau, 2022). Therefore, local content policy as it relates to the mandate of the Fund must be seen to be sustainable and implementable based on the need of the industry. The Nigerian petroleum industry is dominated by expatriate workers, while indigenous oil companies, on the other hand, are left to be at a disadvantage in a technologically insolvent state. According to (Ozigbo, 2008), Nigerian companies are unprepared to get oil service contracts and other benefits in the industry. For instance (Nwosu et al. 2006), on the other hand, provided a succinct definition by citing that local content is the combined contributions to any of the myriad of activities, operations, or inputs in the crude oil and natural gas extraction process, which are made by Nigerian registered companies in which Nigerians virtually own a majority of the equity. Furthermore, (Shumway 1988) adopted the frequency domain approach to established trend with little variation of the event over time in content estimation. Human capacity development is about managing transformations, people's capacities, institutional capacity and a society's capacity change over time. Most successful countries have developed and implemented local content policies to maximize the profits and benefits realized from their oil endowment, which in return improves the economy and the lives of the citizens as well. The adaptation of local content in the oil and Gas sector in Nigeria is crucial in the improvement of the nation's economy (Uwem, Mary and Olusola, 2020). However, sustainable policies on local content are a subset of measures capable of achieving the desired goals that are politically feasible and commercially viable. Understanding the carrying capacity concept is essential for formulating sustainable policy, especially in local content development for the oil and gas industry (ScienceDirect, 2009). This is one crucial ground that distinguishes PTDF's relevance in the industry. The Skills-gap audit report shows the feedback of over 3000 past beneficiaries of various PTDF capacity development programmes, carried out by the Fund in the order of major concentration which include Engineering Design / CAD (17.39%), Welders Training & Certification Programme (26.09%), M.Sc. (26.09%), Welding and Fabrication (8.76%), ULSEP (8.70%), Train-The-Trainer Welding Certification Programme (4.35%), and 4.35% Ph.D. Flowing from the above, the PTDF carrying capacity needs to be strengthened with robust legal and legislative provisions to increase its operational frontiers and strategically advance its mandate to contain the local content needs of the industry–improving on the celebrated achievements in the last twenty years.

2.0: MATERIALS AND METHODS

The present work utilize qualitative and quantitative (mixed method) approaches for secondary data gathering and analysis from the investigation of the role of sustainable local content policy on human capacity development in Nigeria's oil and gas industry focusing on the Petroleum Technology Development Fund (PTDF). The mixed method approach was favored because this research is both quantitative and qualitative in nature. The gathered secondary data spanning between years 2001 and 2021 consists of numbers and names of institutional upgrade projects, information communication technology (ICT) centers, centers of excellence, professorial chairs, training, overseas undergraduate programs, overseas masters' programs, overseas PhD programs, research grants and patents.

In addition, a simplified statistical model was developed in this work for both descriptive and comparative purposes on the selected existing data sets and arranged in tabular form (see Tables 2.1 – 2.5, and Figs.2.1 – 4.6) that represents the quantum populations. Certain variables that relate to the measure of impact conditions in the oil and Gas industry are equally reflected the narrations and in the linear model equations to ascertain the relationship between the actual data and the expected impacts under ideal situations.

The first principle is that PTDF intervention impact assessment is a function of several other factors such as project time, project rate, fund's concentration rate, production time, the actions of beneficiaries, and the presence of monitoring and evaluation etc. Mathematically, the above is reduced to equation 2.1, thus:

$Pintv = KP_tP_RBFcM_E$…………………………………………………………………2.1

Where Pinvt represents PTDF interventions, Pt represents Project time, Pr represent project rate, Fc represents Fund concentration, B represents Beneficiaries actions, M_E represents Monitoring and Evaluation, and K is a factor of constant representing government policy and politics etc.

$Pintv= KP_t^{-x3} P_R^{x3}B^{x3} F_C^{x3} M_E^{x3}$…………………………………………………………….2.2

Equation 2.2 is a geometric relationship that when linearized yield:

$Log\ Pintv = \log k + X_3 \log P_t + X_3 \log P_R + X_3 \log B + X_3 \log F_C + X_3 \log M_E$……………2.3

The coefficients X_3+ X_3 …… and X_3 and the independent variables P_t^-, F_R, M_C, B are kept at the same cycle in the measured sample sizes. Both descriptive and analytical statistics are used for arithmetic mean, standard deviation, coefficient of correlations and assumed mean for the comparative data. Where, X = arithmetic mean, XA is the assumed mean and D_1, D_2 are Deviations from each data point. The simplified equation below helps to illustrate the relationship between the Skills-Gap Audit (SGA) represented as the estimated values and the

Secondary Data Sets (SDS) represented as the actual values on the Fund's intervention programmes.

$$X = X_A \sum_{i=1}^{N} \left(\frac{D1,2}{N}\right) \qquad 2.4$$

Where the determination of the Project rate (Pr) is considered prime in the intervention schemes, equation 2.3 is rearranged for the actual and the estimated values thus:

$$a_1 = \frac{n \sum X_1 Pr - \sum X_1 \sum Pr}{n \sum X_2 Pr - (\sum X_1)^2} \qquad 2.5$$

$$\frac{\sum Pr - a_1 \sum X_1}{n} \qquad 2.6$$

The standard error of estimate of Pr then becomes:

$$\text{SEOE}= \sqrt{\frac{\sum(Pr - Pr\,e\,st)^2}{n}} \qquad 2.7$$

Which when expanded to accommodate the unknown terms becomes:

$$\text{SEOE}=\left(\frac{\sum Pr^2 - ao \sum Pr - a1 \sum x1Pr}{n}\right) \qquad 2.8$$

The multiple variables of equation 2.2 could be modeled in a complex statistic advanced beyond the scope of this work using both the SGA and SDS respectively.

Equation 2.8 is useful to evaluate the standard error of estimate of project rate on every cycle which by implication is the standard error of estimate of project rate on project time per cycle since;

$$SEOE \approx \sum(a_i x_i) \qquad 2.9$$

It follows therefore that as xi increases, ai also increase.

In the same principle, the Coefficient of Correlation (COCOREL) becomes:

$$COCOREL = \frac{\sum(P_{rest} - P_r)^2}{\sum(P_{rest} - (P_r)^2} \quad \text{......} 2.10$$

This is also expanded to accommodate unknown terms thus:

$$COCOREL = \frac{a_o \sum P_r + a_1 \sum xiP_{r_{es}}t - \sum(P_r)^2/n}{\sum P_{rest}{}^2 - \sum(P_r)^2/n} \quad \text{......} 2.11$$

Table 2.0: Feedback & Analysis of PTDF Beneficiaries (2018 -2023), Skills Gap Audit Report.

S/No.	PTDF HUMAN CAPITAL DEVELOPMENT (HCD) PROGRESSION	% COVERAGE
1	Underwater Welding	0.00%
2	Welding & Fabrication	8.70%
3	Advanced Underwater Welding	0.00%
4	Geosciences (Geophysics and Geology)	4.35%
5	Engineering Design/CAD	17.39%
6	Helicopter Underwater Safety	0.00%
7	Welders Training and Certification Programme	26.09%
8	BOSIET	0.00%
9	Occupational Health and Safety	0.00%
10	Train-The-Trainer Welding Certification Programme	4.35%
11	Instrumentation & Control Systems	0.00%
12	Facilities Engineering & Maintenance Management	0.00%
13	Marine Engineering & Operations	0.00%

14	M.Sc (OSS)	26.09%
15	Ph.D (OSS)	4.35%
16	M.Sc (LSS)	0.00%
17	Ph.D (LSS)	0.00%
18	ULSEP	8.70%
19	Logistics & Supply Chain	0.00%
20	Other Related Courses	0.00%

2.1: Algorithm for Evaluating Standard Deviation

Get the average corrosion rate

Also get the deviation from average

Subtract the average from deviation

And square the value obtained

The sum of average and divide by N

**The square root of the value obtain is **

The standard deviation computed

START

Get (CR,Nma,d); N: =5

$a=(\sum CR)/N$

S2: =(a-d)2

Count = CR.

```
                Get ((∑ CR)/N** obtain value of a

                Get (a-d)2** obtain value of S2

        While count = K + 1
        |
        |   Do until
        |   Get (a-d)2/N
        |       Then
        |       Get (S.d) **Square root of S2 **
        |           End
        |       Data: a,d, S2, S.d.
        End
Stop
```

3.0: RESULTS AND DISCUSSIONS

3.1: RESULTS

Every raw data remains statistically deceptive, invalid, and non-informative until it is transformed by way of analysis to give reasons for making decision. The trend requires diligent and persistent effort, systematic thinking, and intelligence of established principles and standards in translating the raw data into useful results with which to do business. A proper and detailed systematic approach of data analysis is required, and the outcome clearly stated as shown in tables and figures of the expected results below:

3.1.1: Qualitative Data Analysis.

Every data set is presented in three cycles to enable the frequency per counts matched with the basic assumptions in the simplified model equations, and to apply the principles of descriptive statistics and qualitative analysis. Table 3.1 represents vocational and skills-based training specifically designed to bridge the gaps in technical manpower in the Oil and Gas industry. A total of 7510 skills manpower had been trained per average of three cycles, with the distributions showing a combined training in capacity enhancement, industry-based training and welders training representing 75.5% of the total trained skills. The fractional representation is shown in the pie-charts, Fig3.1. Table 3.2 represents the number of intellectual property and patents registered from two streams of research and development intervention programmes namely, the professorial endowment and the grant research respectively. A total of seven patents are registered and the grant research represents 43% of the patent valuation while endowment has 53% distribution.

Fundamental goals of the Fund's upgrade intervention programme in the Nigerian Universities, and selected Departments with needed manpower for the oil and gas industry, includes the provision of modern infrastructural buildings and equipment for teaching -learning processes comparable to the standards obtainable in advanced economy globally. The upgrade intervention programme covers engineering, science, geoscience, information and communication technology and military science etc. Essentially,52 upgrade centers, 146 ICT centers, and 2 centers of excellence, totaling 200 of the infrastructural intervention programmes, of the infrastructural interventions are analyzed in this work.

Table 3.1: Vocational and Skills-based training for the Oil and Gas Industry.

S/N.	AREA OF STUDY	NUMBER
1.	WELDERS TRAINING AND CERTIFICATION PROGRAMME	1,717
2.	ENGINEERING DESIGN TRAINING PROGRAM (EDTP/DETP)	1,664
3.	INDUSTRY BASED TRAINING FOR STAKEHOLDERS	1,975
4.	SPECIAL TRAINING & EDUCATION SCHEME - HELICOPTER PILOT	20

5.	INSTITUTIONAL CAPACITY ENHANCEMENT TRAINING PROGRAMME	1,978
6.	POST-AMNESTY CAPACITY BUILDING PROGRAMME	156
	TOTAL	**7510**

Under vocational training, (Table 3.1) above, 7510 trainees in six categories were trained and equipped for the Oil and Gas industry. It is further simplified into categories with 23% of the total representing the welders training programme. 22.2% representing engineering design programme, 26.3% is the fractional percentage, representing industry-based training, 0.3% accounted for special training, 26.3% representing institutional capacity enhancement training programme while 2.1% accounted for post amnesty capacity building programme. These essential training of the Fund affirm the mandate of training Nigerians as technicians and craftsmen for the Oil and Gas industry and conserving foreign exchange for Nigeria.

Table 3.2: Patents from Research and Development (Intellectual Intervention).

S/N.	RESEARCH/INSTITUTION	RESEARCH FOCUS	PATENT TITLE
1.	Ahmadu Bello University Zaria, Prof A.S Ahmed	Potentials and Development of Zeolite Catalyst for Nigerian Oil and Gas Industry from Kankara Clay	Potentials and Development of Zeolite Y Catalysts from kaolin Using Novel Processing Method.
2.	University of Benin, Prof T.O.K Audu	Development of Sustainable Technology for Bioenergy from Non-Edible Oil Seeds	Development of Sustainable Technology for Solar Photo-Voltaic Bio-Diesel Production from Non-Edible Oil Seeds
3.	University of Port Harcourt Prof Adewale Dosunmu	Database for Wellbore Stability Management in the Niger Delta	Development of Stress Detection Software on Database for Wellbore Stability Management in the Niger Delta
4.	University of Port Harcourt (IPS) Prof MichealOnyekonwu	Control of Fine Migrations Reservoirs Using Nanoparticles	Control of Fine Migrations Using Aluminium Silicate Nanoparticles

5.	Delta State University Abraka Prof. Frank Oroka	Production of Fuel Briquettes and Biogas from Water Hyacinth Cow-Dung Mixture for Domestic and Industrial Application	Production of Fuel Briquettes and Biogas from Water Hyacinth Cow-Dung Mixture for Domestic and Industrial Application
6.	University of Ibadan Prof. Sunday Isehunwa	Flow Assurance Studies of the Offshore Niger Delta Advance Thermodynamic	Petroleum Products Adulterate Meter
7.	Ahmadu Bello University Zaria, Prof A.S. Ahmed	Potentials and Development of Zeolite Catalyst for Nigerian Oil and Gas Industry from Kankara Clay	Development of ZSM-5 Zeolite from Kaolin at Low Pressure and Shorter Crystallization time Using Novel Processing

Table 3.2 represents an aspect of the intellectual intervention programme of the Fund and focuses on research and development patents. Seven patents have been registered and acquired as breakthrough in the funding of indigenous research for global impact in the oil and gas industry. These novel technologies and patents are products of extensive research activities of the PTDF, available for domestic utilization, commercialization, and deployment for industrial utilization.

3.1.2: Quantitative Data Analysis

Due to the nature of the secondary data gathered, tables and figures were used instead of mean and standard deviations as required in quantitative analysis.

Accordingly, Table 3.3 represents Overseas Scholarship Programme for the MSc category, with a total of 4632 scholars from three cycles. The distribution of trained scholars in their various field of specialization is shown in Fig 3.2 below.

Table 3.3: O.S.S. M.Sc. Scholarship (Intellectual interventions).

S/N.	AREA OF STUDY	NUMBER
1.	ENGINEERING	1,770
2.	GEOSCIENCES	348
3.	ENVIRONMENTAL	227
4.	ENERGY STUDIES	319
5.	INSTRUMENTAL ANALYTICAL/NANO SCIENCES	50

6.	INDUSTRY/OFFSHORE & OCEAN TECHNOLOGY	267
7.	GAS REFINING, MINERAL EXPLORATION ANDPETROCHEMICAL	9
8.	CHEMISTRY AND PURE SCIENCE	183
9.	BIOLOGY/MICROBIOLOGY/ BIOTECHNOLOGY	104
10.	OCCUPATIONAL HEALTH AND SAFETY	132
11.	INFORMATION TECHNOLOGY/COMPUTING	314
12.	ELECTRICAL POWER & MECHATRONICS	20
13.	ASSET AND OPERATIONS MANAGEMENT	47
14.	ECONOMICS (PETROLEUM, ENERGY, OIL & GAS)	18
15.	ACCOUNTING/FINANCE	555
16.	LAW AND POLICY	65
17.	SUPPLY CHAIN MANAGEMENT	93
18.	OTHERS (General Studies)	111

Table. 3.4: Comparative Analysis between Skills Gap Audit and Secondary Data Set (%)

S/No.	SGA_1	SDS_2	D_1	D_2
1	8.70	22.86	-3.3	-0.14
2	4.35	6.98	-7.65	-16.02
3	17.39	22.16	5.39	-0.84
4	26.09	26.29	14.09	3.29
5	4.35	26.33	-7.65	3.33
6	26.09	67.56	14.09	44.56
7	4.35	32.44	-7.65	9.44
8	8.70	8.70	-3.3	-14.30

Σ	100.02/8 =12	187.16/8 = 23	4.02/8 = 0.5	29.32/8= 0.4

The level of comparison between the data sets used for analysis in this work with reference to the Skills Gap Audit report (2018 -2023) as presented in Table 2.1 further subjected to simple arithmetic mean and deviation using the assumed mean method of the unclassified data. The assumed mean equals the arithmetic mean of the data plus the mean of the deviation from the assumed mean (Ngaage, 1999).

3.2: DISCUSSIONS.

Although the Nigerian Content Act came into effect in 2010, the Petroleum Technology Development Fund had been involved in capacity development programmes from 2000. Thus, the aggregate data for this work reflects its years of contribution to local content development through capacity development activities enshrined in its core mandate. The variation in the actual interventions at the M.Sc level and the projected figures based on the simplified linear model is also shown in Fig.3.4. From the trends in figure 3.4, the engineering family has the highest peak because the oil and gas industry is driven by high technical manpower needs from the engineering family, the management and accounting family is the second highest because human resources is needed to manage materials and all the equipment for operation. The geoscience family is the next in rank, especially because most of the operations of the geoscience family are concentrated at the upstream sector of the value chain. Very interesting distributions in this plot are the growing demand for health and safety as well as the need to care for and preserve the environment. These two areas of human capacity building need to be scaled up as the world prepares for energy transition and divestment from the fossil fuel era under the Petroleum Industry Act (PIA). The irregular distributions and the expected projections are seen in Fig. 3.4 using the simplified statistical model from the fundamental assumptions in equation 2.1 – 2.11 above.

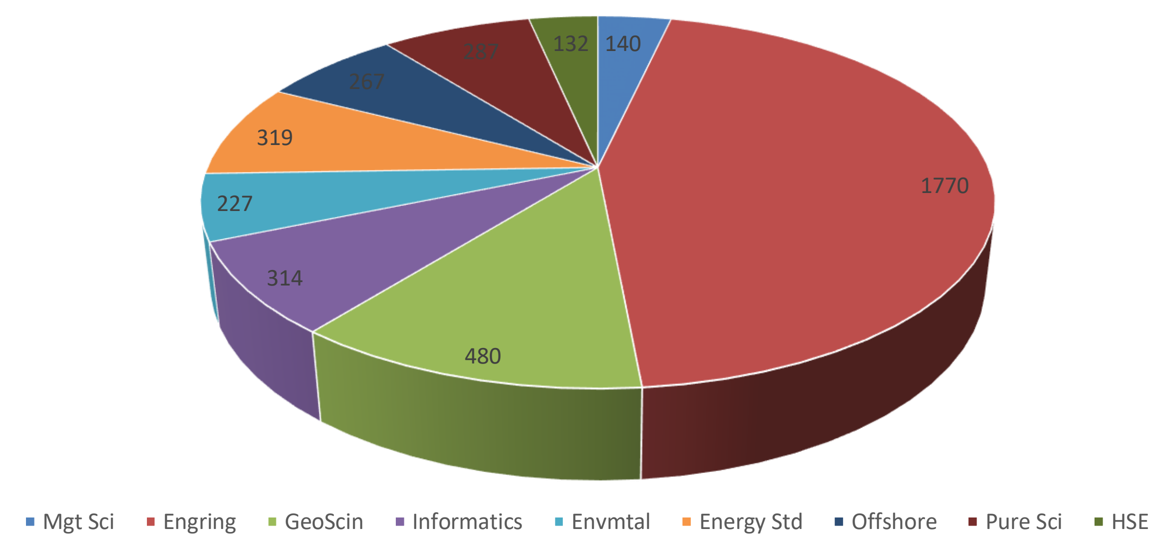

Fig.3.2: Distribution of trained professional, M.Sc Prog.

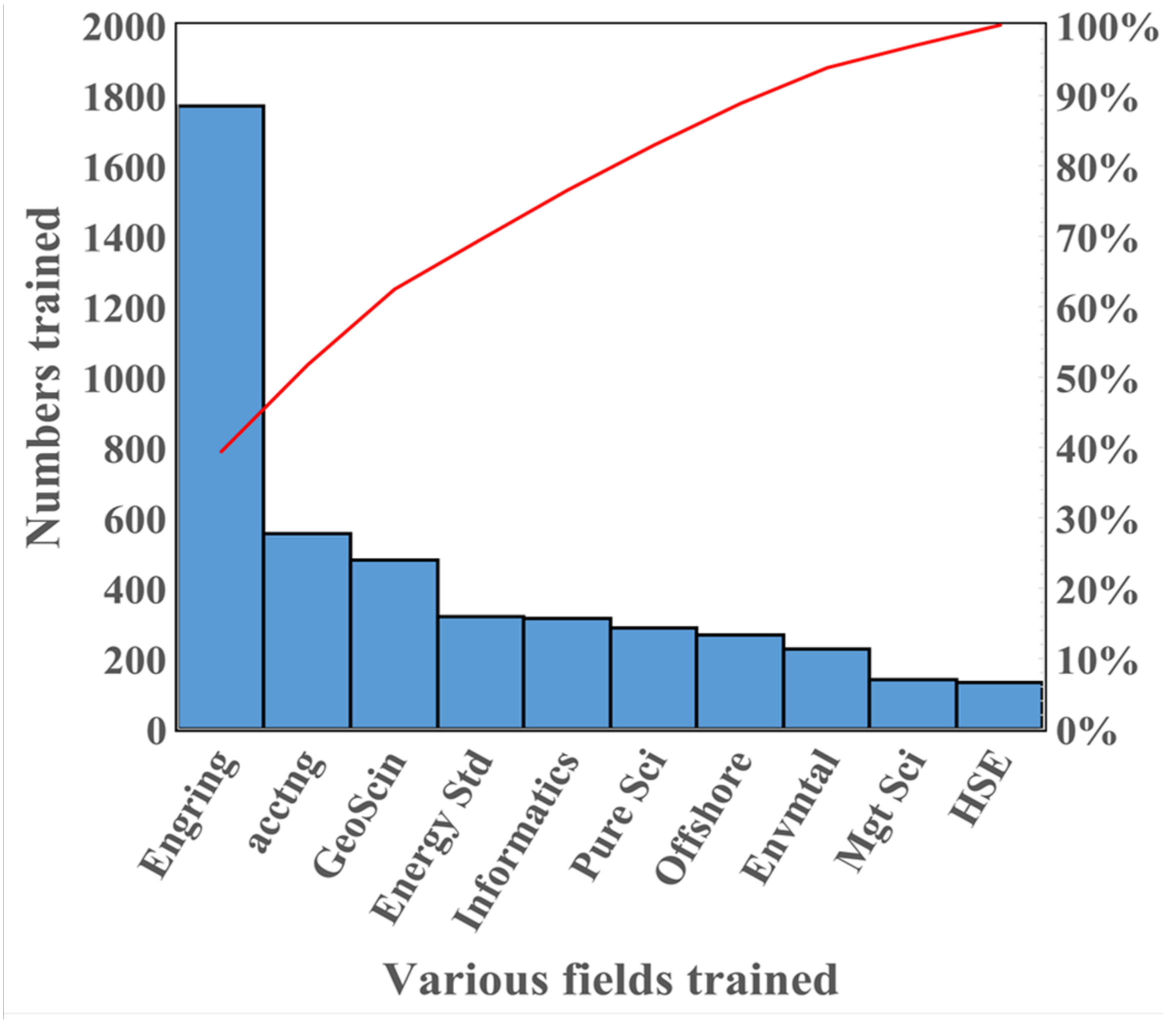

Fig. 3.3: Capacity Gaps in Percentage from the M.Sc Programme.

Fig. 3.4 represents the simplified statistical model, which is stochastic and defines the actual value (657), the earned value (1770) and the projected value (2225) for the engineering family of scholars using the M.Sc programme base data. The plot predicts the optimum manpower needs, all things being equal. The orange line shows the gradual progression from the estimated skills gap audit reports, benchmarking on the highest (engineering) and the lowest (Health and Safety) figures. For the manpower need to be at 100%, it is projected that in 2021, all professions identified in this study should have at least 600 scholars trained and documented. In the distribution, accounting scholars grow a little above 550 followed by the geosciences with about 500 while Health and Safety is about 135 respectively. The gaps indicated that there are needs for more human capital development in the various fields sampled for this analysis. The dynamics of the industry requires the growing need for human capital, and that is the core mandate of the PTDF.

Figure 4.5 is a correlational plot of the SGA and SDS with 46.5% of the total human capacity development of the Fund., Interestingly, the research component has seven (7) patents registered that could re-produce spinoff for the Fund. This is relatively comparable to the skills-gap audit report, which estimated 56.59% to vocational training programme and 39.14% to the intellectual intervention programme. The skills-gap audit did not account for research and development indices in the computation of the intellectual intervention neither were the undergraduate scholarship programme included in the overall estimate. These two components added to the estimate under the current research increased the intellectual intervention percentage to 52.3% and reduce the vocational intervention percentage to 46.5% as shown in the Pie-chart above.

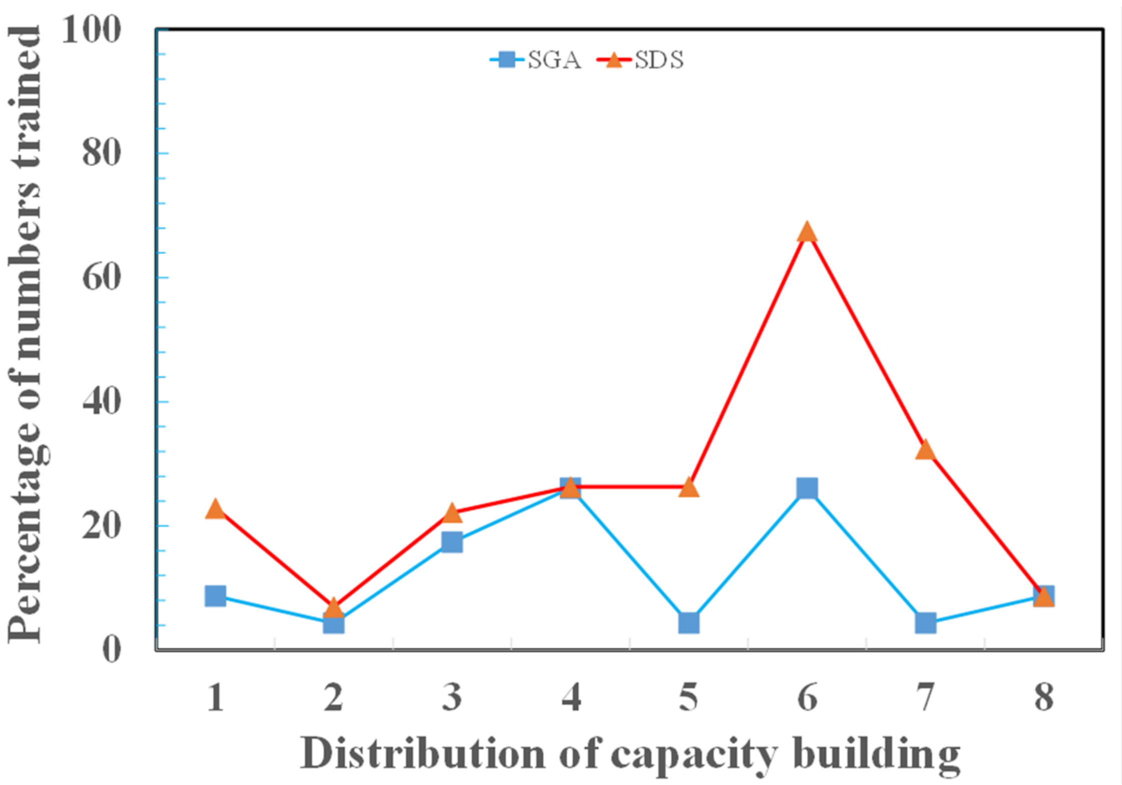

Fig. 3.4: Correlational plots of SGA and SDS on OSS, M Sc programme.

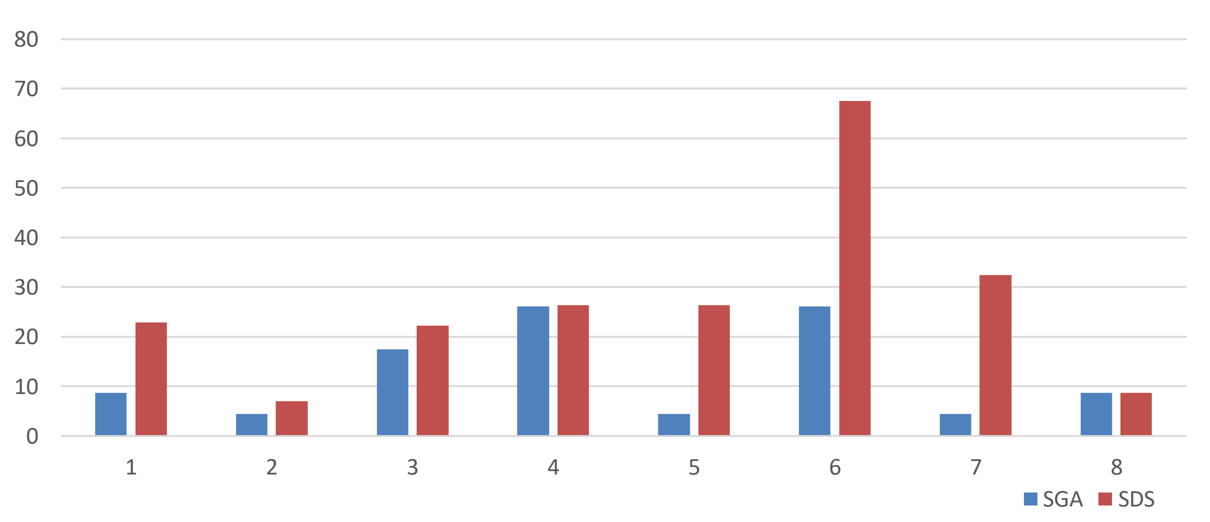

Fig. 3.5: Comparative Distribution between SGA and SDS.

4.0: CONCLUSIONS AND RECOMMENDATIONS

4.1: CONCLUSIONS

From the simplified statistical models developed, and the secondary data analyzed, there are strong indicators that the Petroleum Technology Development Fund's consistent capacity development intervention programmes have significantly impacted the Oil and Gas industry in Nigeria through: Producing tremendous pools of infrastructural, intellectual, and human capital developments needed for impactful operations in the oil and gas industry; More infrastructural and skills-based interventions structured on research and innovations for the energy industry in the era of the Petroleum Industry Act and global energy transition; Developing computational variables in equations 2.1 – 2.11 that could be used as strong indicators in PTDF opportunities to strategically pursue aggressive collaborations with relevant stakeholders to foster sustainable local content policy in Nigeria; Enhance the culture of public private partnership in the implementation of capacity development initiatives from the various streams of intervention programmes, for sustainable local content policy in Nigeria; Leverage on comprehensive skills-gap audit in future capacity development strategy, with emphasis on key indicators in the determinant matrix such as infrastructure, research, technology, and innovation components for a long-term development plan.

4.2: RECOMMENDATIONS

Flowing from the systematic data analysis carried out, it is recommended that: The petroleum Technology Development Fund should be empowered through the policy of government to sustain the various capacity development programmes through expanded frontiers in the extant law as a FUND. Petroleum Technology Development Fund should adopt strong public -private -partnership policy in mainstreaming the next phases of capacity development programmes for visible revenue generation and sustainable development. There is need for strong advocacy on policy shift and amendment to the core mandate of the Fund to accommodate investment-divestment strategy through commercialization of developed technologies and innovations of the various intervention programmes. Petroleum technology Development Fund should engage in strategic manpower aggregation of the past and present beneficiaries of the various intervention programmes and develop strong database for sustainable local content partnership trade-off for alternative revenue generation. Petroleum Technology Development Fund should sustain regular evaluation of the various capacity development programmes by leveraging on comprehensive industry-based skills gap audit that would input comprehensive success determinant indicators on need assessment of the oil and gas industry. The Petroleum Technology Development Fund should deepen the participation in renewable energy development to accommodate the global energy transition and sustainable local content development in that sector.

REFERENCES

Aliyu Gusau (2022): Capacity Building Mandate, Functions and Achievements: A presentation at the Ministry of Petroleum Resources, Block D, NNPC Towers, Abuja, March 2022.

Ozim, I. O (2010): Analysis of the Nigerian Oil and Gas industry Content Act 2010. Aelex Newsletter, Lagos, 1- 6.

James U. Monday (2018): Local Content Policy, Human Capital Development and Sustainable Business Performance in the Nigerian Oil and Gas Industry. Journal of Management and Sustainability, Vol.5 No.1.

Ozigbo, N.C (2018): Technological Capacity Building in the Nigeria's oil and gas industry. Proceedings of the 19th Annual International Information Management Association, San Diego, CA, 13 – 15 October, 51 - 63.

Nwosu, H.U; Nwachukwu, I.U; Ogaji, S.T and Robert, S.O (2006): Local harnessing in the crude oil and natural gas in Nigeria. Applied Energy 83, 1274 – 1287.

Shumway, H.R (1988): Applied Statistics: Time Series Analysis. Practice Hall, Eaglewood, Cliffs, New Jersey, P.46.

Kunekebari, T. Ngaage (2007): Essentials of Descriptive Statistics for Business Decisions. Horizon Concept publishers, Ikwerre Road, Port Harcourt. Pp. 58 – 62.

Uwem, U; Mary, U and Olusola, O (2020): Local Content Development in the oil and gas industry in Nigeria: Problems and Prospects. Retrieved from Global Journal of Politics and Law Research: https:// www. Eajournals.org/wp-content/upload/oil- and -gas-industry-Nigeria–1.pdf.

ScienceDirect, (2009): Available online@ www.ScienceDirect/sustainable local content policy/researchgate.net/publication. Accessed April 10th 2022.