NIGERIAN FIRMS AND DIGITAL TRANSFORMATION: INCUBATIONS, UNIPODING AND PROSPECTS.

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ABSTRACT

As Africa's major oil exporter and factor driven stage country, Nigeria has made some progress in socioeconomic terms in recent years. However, large pockets of Nigeria's population still live in poverty without adequate access to basic services. Currently, Nigeria is capturing just as small fraction of its potential for digital development as a viable policy response. While the country has the requisite development oriented strategies, policies and regulations in place; there is still gap in terms of implementation monitoring and evaluation. Therefore, accelerating digital transformation of Nigerian firms requires critical enablers to ensure that policy framework is kept up to date and has suitable long term anchors. In other word, while the capacity to innovate and strengthen regulatory frameworks for digital business in crucial in attracting digital investments; these frameworks will be less effective without strong digital infrastructure and digitally skilled labor force. Consequently, this paper argued that Nigerian government and development partners should continue to support all enterprise firms in their pursuit of digital transformation – led growth and development so that new discoveries can work for us all. Specifically, the adoption of UNIPOD and Technology Incubation Centres as dynamic institutions (of innovation and creativity) to facilitate digital transformation processes of all Nigerian enterprises is highly recommended.

KEY WORDS: Digitalization, Nigeria, Firms, Enterprise, Incubation, UNIPOD, Economy, Technology, Polices, Industries, Digital, Innovation, Creativity, Growth, Development, Artificial Intelligence, Strategy, Readiness, Networks, Competitiveness, Pillars, Infrastructures, Skills Platforms, Services, Financial, transformation, centres.

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1.0. **INTRODUCTION**

Notably, many African countries (such as Nigeria) have low levels of industrialization which has resulted in a death of large business. Structurally, most of these enterprises are predominantly Nano, micro informal, low value added and needs driven business. Yet, they contribute to improved livelihoods, given the extent of development of some African economies as well as rising employment levels. Consequently, if these Nano, Micro, small and medium sized enterprises (NMSME) were to be more opportunity driven, more innovation focused and higher growth; they would have a significant impact on these economics. Subsequently, some of these lower businesses could scale to become large growth business or large scale enterprises with high impact and opportunity driven capacities (UNCTAD, 2018; Nwaobi, 2019).

In other words, there is an opportunity to nurture business ventures that exhibit strong value addition and higher productivity through access to technology and innovation. Specifically, digital innovation can be regarded as the ongoing process of developing and implementing new technologies into existing systems to solve problems and increase efficiency, affordability, reliability and sustainability. Notably, some of these innovation tools include access to high speed internet and smart mobile devices, internet of things, remote sensing, big data, cloud storage, artificial intelligence, block chain and 3D printing. Thus, applying these tools can lead to considerable economic, environmental and societal benefits as well as supporting rising living standards (Banga, 2019). However, in recognizing digital innovations potential in creating jobs, addressing poverty, reducing inequality as well as contributing to sustainable development goals; the African Union (2020) developed a comprehensive digital transformation strategy for

African. While offering a pragmatic framework, this strategy identifies challenges in scale up, education and infrastructural lack as pitfalls that can impact digitalization. Yet, the continuous innovation process that is intrinsic to new digital technology related advancements creates new scenarios and highlights the need for established and prospective entrepreneurs to obtain and maintain valuable competence related to these new technologies. Perhaps, the ever-charging nature of the emerging technological context her created significant uncertainty around the enterprising process as identified.

(i) Digital technologies may make existing ones obsolete and thereby reducing the period in which firms can exploit them to gain a competitive advantage.

(ii) Digital technologies may drive some players to disrupt the existing context, changing in an unforeseen manner as well as creating new competitive spaces for addressing user's needs.

However, new digital technologies have unique characteristics that are crucial to the improvement of enterprising processes and their outcomes (such as involvement of a broader set of stakeholders). In other words, widespread digital platforms may help the various actors in the new technological context become more embedded in an effective network of relationships that proves useful to access the needed competences for creating effective innovations and leveraging new technologies. And depending on how they are structured, incubators could be critical enablers for supporting Nano, Micro, small medium and large enterprises in gaining access to technology and innovation so as to achieve higher levels of innovativeness, productivity and competitiveness.

Unfortunately, Nigeria is currently facing a deficit in energy infrastructure (such as power generating plants); transmission and distribution infrastructure; and transportation infrastructure (such as roads, rails and seaports).

Furthermore, there are regulatory gaps such as conflicting government policies, ineffective enforcement of rules and regulations as well as multiple taxation (FGN, 2021) Critically this condition has increases cost of doing business and discourages domestic output expansion. Again, it has implications for the overall economic growth and development as well as the continued survival of Nano, Micro, small, medium and large enterprises in Nigeria. Therefore, private sector players need a viable business environment to drive concentric economic diversification as well as partnering with the public sector in delivering key infrastructures to enhance business transformations. In other words, how can Nigeria leverage on science, technology and innovation to improve efficiencies and overall competitiveness?

Again, given the catalytic role of technology in the blue/green) and digital economies as well as the potential of Nano, Micro, small, medium and large scale enterprises in these sectors; how can we encourage entrepreneurs in Nigeria to establish business firms that solve challenges (and reap opportunities). Presented by these economies via transformation processes?

Thus, the rest of this research paper is structured as follows.

SECTION TWO discusses the Nigerian economic and business environment while SECTION THREE examines the firms and enterprise operations in Nigeria. The digital transformation and incubation processes in Nigeria are presented SECTION FOUR whereas firm's digitalization and incubative challenges are discussed in SECTION FIVE, SECTION SIX highlight policy options and prospect while SECTION SEVEN concludes the paper.

2.0. NIGERIA ECONOMIC AND BUSINESS ENVIRONMENT

Spatially, Nigeria is located in West African on the Gulf of Guinea and shares borders with Cameroon (in the East), Chad (in the North East), Niger (in the North) and Benin (in the West). It has an area of 923,968 square kilometers (inclusive of 13,000 Sq. Km of water). Basically, Nigeria's primary natural resources consist of natural gas, petroleum, tin, iron ore, coal limestone, niobium, lead and zinc. Her climate is arid in the north, tropical in the center and equatorial in the South. However variations are governed by the interaction of moist South West monsoon and dry North East winds.

Structurally, in the 1950s, Nigerian economy grew at acceptable single digit rate given the strength of its agricultural sector. However, government policies were not supportive while the agricultural sector was heavily taxed through monopolistic marketing boards. At the start of the 1960s, the basis of the economy was a well-diversified agricultural sector as well as oil exports that were rapidly growing. Unfortunately, the economic situation deteriorated in the early 1960s despite the growing oil exports. In fact, between 1961 and 1964, half of the external reserves accumulated in the previous decade were drawn down (World Bank, 1996). Yet, the most significant event affecting the economy and poverty in the 1970s and early 1980s was the management of the oil boom and bust. However, the positive oil shocks of 1973 and 1979 increased the term of trade between 1972 and 1981.But the oil revenue began to fall after with a final collapse in 1985. Consequently, economic activity, real per capital income, expenditure and consumption dropped drastically.

Again, the government's inability to manage the country's exposure to oil price volatility (as well as huge waste of resources and multiple inefficiencies in resources allocation that characterized the

period made the observed impacts worse. Notably, these unfavorable economic conditions triggered the introduction of structural adjustment program (SAP) in 1986. In other words, the collapse of oil prices forced government to adopt a comprehensive package of economic reform as a response to a deep seated economic crisis. Indeed, as a comprehensive reform package, SAP combined exchange rate and trade policy reforms (aimed at revitalizing the non-oil economy) with stabilization policies (designed to restore equilibrium to the balance of payments while making prices more stable) as well as access to debt relief from the Paris and London Club creditors. Although oil revenues remained low and government debts accumulated after 1985; agriculture and domestic manufacturing began to grow again (gives improvements of the economy led to higher incomes, higher household expenditures and real gain for the country. However, the gradual loss of macroeconomic control after 1990 eroded many of the positive changes that took place in the preceding years. Specifically, between 1991 and 1995, real GDP per capital and private consumption per capital fell down significantly.

Politically, Nigeria became a Federal Republic with a presidential system in 1999. Here the constitution provided for a separation of powers among the three branches of government (Federal, State and Local Government). And the general elections held marked the end of fifteen years of military rule as well as the beginning of civilian rule based on multiparty democracy. Notably, in this policy era was a longer term economic development program known as united Nations-Millennium Development Goals (UN-MDG) for Nigeria under the program covering the period of fifteen years (2000 – 2015), Nigeria was expected to commit to achieving a wide range of ambitious objectives involving poverty reduction, education, gender equality, health, environment and international development

cooperation. However, as an indigenous policy initiative, Nigeria attempted to implement as economic reform program known as National Economic Empowerment Development Strategy (NEEDS: 2003-2007). Similarly, a related initiative on the state level was the state Economic Empowerment Development Strategy (SEEDS). Basically, the purpose of NEEDs (SEEDs) was to raise the country's standard of living through a variety of reforms such as macroeconomic stability, deregulation, liberalization, privatization, transparency and accountability.

However, subsequently developments revealed that previous or past economic policies left the Nigeria Economy ill-prepared for the sudden collapse of crude-oil prices and production. In other words, the structure of the economy remained highly import dependent, consumption driven and undiversified. Even the high growth recorded during the years 2011-2015, were mainly driven by higher oil prices and largely non-inclusive. Thus, during this era, majority of Nigerians remain under the burden of poverty, inequality and unemployment. Again, general economic performances were seriously undermined by deplorable infrastructure, corruption and mismanagement of public finances.

Therefore, decades of consumption and high oil price driven growth led to an economy with a positive but jobless growth trajectory. Consequently, after more than a decade of economic growth the sharp and continuous decline in crude oil prices (Since mid – 2014) along with a failure to diversity the sources of revenue and foreign exchange in the economy; led to a recession in the second quarter of 2016 (FGN, 2018). Notably, the challenges in the oil sector (including sabotage of oil export terminals in Nigeria Delta) negatively impacted government revenue and export earnings as well as the fiscal capacity to prevent the economy from contracting.

Furthermore, the capacity of government spending was equally constrained by lack of fiscal buffers to absorb the manifested shock as well as leakages of public resources due to corruption and inefficient public spending process. As a policy response, the strategic implementation plan for the 2016 budget of change was developed as a short term intervention measure.

However, the Economic Recovery and Growth Plan (medium term plan for 2017 – 2020) stood on the strategic implementation plan and was developed for the purposes of restoring economic growth while leveraging the ingenuity and resilience of the Nigerian people. Apart from levy raising the need to leverage science, technology and innovation to build knowledge based economy; it was also consistent with the aspirations of the sustainable development goals (2015 – 2030) given that the initiatives addressed the three dimensions of economic, social and environmental sustainability. Unfortunately, during the year 2020 the world economic and business order was unavoidably disrupted by the outbreak of the novel Corona Virus (Covid-19) which started in the last quarter of 2019 at china. Thus, the policy measures enforced by the various governments significantly shut down global economic activities as businesses rolled back, household demands weakened as well as deteriorated public finance. Specifically, in Nigeria, the lockdown measure (coupled with unfavorable developments in the international crude oil market) distorted adversely across all sectors and therefore culminated in a recession (CBN, 2020) statistically, the economy contracted by 1.92 percent in 2020 as compared to a growth of 2.27 percent in 2019. Clearly, the construction in growth reflected the adverse impact of the Covid-19 pandemic that resulted in the global and domestic supply shocks as witnessed.

Furthermore, it was worsened by weak demand arising from the weaker consumer purchasing power. Yet, the economy maintained some resilience (give the devastating impact of the pandemic) by way of reversing the contraction experienced in the second and third quarters of the year, by the fourth quarter with significant growth rate. Basically, the economy resilience was hinged on the diligent implementation of the Nigeria Economic sustainability plan as well as other intervention measures by the Federal Government. Notably, the government implemented policies and programmes aimed at stimulating sustainable economic growth as well as building globally competitive industrial sectors to take advantage of the African continental free trade agreement. The government also lavished the national MSME survival fund and guaranteed off-take stimulus scheme to support Micro, small and medium enterprises across the country. However, the industrial sector deteriorated in 2020 due to the observed Covid-19 pandemic and the consequent fall in economic activities which negatively affected the manufacturing sector (resulting in supply chain disruptions as well as sharp rise in input prices). As a policy response, the 2020 finance Act was enacted with five strategic objectives.

(i) Promoting fiscal equity by mitigating instance of regressive taxation.

(ii) Reforming domestic tax laws to align with global best practices.

(iii) Introducing tax incentives for investments in infrastructure and capital markets.

(iv) Supporting micro, small and medium-sized business in line with the ease of doing business reforms as well as.

(v) Raising revenue for government

Statutorily, the Act contained provisions of increased VAT rate from 5.0 percent to 7.5 percent as appropriate (CBN, 2020).

Consequently, the country's GDP growth has bounced back from the Covid-19 pandemic (recovering to 3.6% in 2021 and 3.3% in 2022) after the 1.8% contraction recorded in 2020. However, it is expected to reach 3.2% in 2024. The projected growth trajectory could be due to high inflation and sluggish growth in the global economy (Which declined from 3.5% in 2022 to 3.2% in 2023 (AFDB, 2024).

Notably, growth was driven by services and agriculture on the supply side as well as by consumption and investment on the demand side. Again, inflation rose from 18.8% in 2022 to 24.5% in 2023 due to rising fuel costs and depreciating naira. Specifically, exchange rate depreciated by 95/6% in 2023 (resulting from the naira floating as at June, 2023). Although economic growth is projected to increase to 3.2% in 2024 and 3.4% in 2025 (given improved security, higher oil production and stronger consumer demand); inflation is expected to continue to rise (driven by higher food prices and continued depreciation of naira). Furthermore, Nigeria's current debt burden (of about us & 130 billion) is being serviced by approximately 95 percent of revenues perhaps, debt payment now exceeds recurrent and capital expenditure. Statistically, the Nigerian debt management office has reported that Nigeria's public debt stock rose from N97.34 trillion in December 2023 to N121.67 trillion in March 2024. Clearly, the Nigeria's debt levels are now unsustainable and have wide ranging effects on poverty rates and level as currently observed. Indeed, the double tragedy of fuel subsidy removal and free float of naira has made life extremely rough and tough in Nigeria. Perhaps, Nigerians are hungry and justifiably angry to act given the prevailing economic conditions. However, the government needs to be proactive to arrest the dangerous slide of the economy. In other words, Nigeria needs help now.

BUSINESS ENVIRONMENT IN NIGERIA

Essentially, the Global competitiveness Report (GCR) assesses the ability of countries to provide high levels of prosperity to their citizens. In other words, it assesses how productively a country uses available resources to enhance business growth and citizen's welfare. Specifically, Global competitiveness index (GC1) measures the set of institutions, polices and factors that set the sustainable current and medium term levels of economic prosperity. Basically, GC1 is made up of about 110 variables that are organized into twelve pillars (representing areas considered as important determinants of competitiveness). Again given inter - country differences, GC1 separates countries into three specific stages; factor driven, efficiency driven and innovation-driven (Implying growing degree of complexity in the various individual economy operations). Structurally, the twelve pillars of competitiveness include institutions; Appropriate infrastructure; stable macroeconomic framework; Good health and primary education; Higher Education and training; Efficient goods markets; efficient labor markets; Developed financial markets; Ability to harness exiting technology; market size (domestic and international); Adoption of sophisticated production processes as well as innovation.

Empirically, Nigeria scored 48.33 points out of 100 on the 2019 Global Competitiveness Report (WEF, 2019). Notably, competitiveness index in Nigeria averaged 13.81 points from 2007 until 2019 (reaching on all time high of 48.33 point). However, the country had a record low of 3.37 points in 2011; 3.40 points in 2010; 3.37 points in 2009; 3.80 points in 2008 and 3.70 points in 2007 (World Bank 2024).

Similarly, the Doing Business Report (DBR) provides objective measures of business regulations and their enforcement across several economies and related cities at the sub national and regional levels. Basically, DBR looks at domestic, small and medium-size companies and measures the regulations applying to them through their life cycle. Essentially, it captures several important dimensions of the regulatory environment as it applies to local firms. Specifically, it provides quantitative indicators on regulation for starting a business; dealing with construction permits, getting electricity; registering property; getting credit; protecting minority investors; paying taxes; trading across borders; enforcing contracts as well as resolving insolvency. Apart from measuring features of employing workers; DBR encourages economies to complete towards more efficient regulation as well as offering measurable benchmarks for reform. TABLE 2.1 shows the various business environment reforms in Nigeria as applicable (World Bank 2020). However, the impact of the various policy measures on business environment varies among the various states in Nigeria. Even through, micro, small and medium enterprises make up greater percentage of all registered business in Nigeria; they still face multiple challenges that hinder their contribution to inclusive growth. Thus, as a structured policy response to the observed business environment; the Presidential Enabling Business Environment Council (PEBEC) was established by the Federal Government of Nigeria to oversee Nigeria's Business Environment intervention.

Specifically, PEBEC was tasked with the dual mandated of removing bureaucratic and legislative constraints to doing business as well as improving the perception of the ease of doing business in Nigeria with a view to reducing the time, cost and procedure in starting a business with increase efficiency. Notably, PEBEC in collaboration

with ministries, Departments and Agencies (MDAs) have worked on their dual mandate (with the passing of the Business Facilitation Act) by given legislative backing to the critical ease of doing business reforms as at February, 2023.

Consequently, PEBEC releases the Business Facilitation Act (BFA) compliance Report annually; which offers insights into critical metrics for measuring effective and transparent service delivery by the various MDAs in Nigeria. Therefore, based on statistical data collection and rigorous data analysis, the 2023 BFA compliance Report ranks the Nigerian MDAs in order of their compliance to providing service in an efficient, timely and customer-friendly manner. Essentially, the reports spot lights the urgent need for MDAs to strengthen their effort on high quality service delivery so as to rapidly improve the productivity and competitiveness of Nigeria's business environment.

Clearly, table 2.2 shows the business compliance ranking scores of the concerned ministries, departments and agencies in Nigeria (FGN, 2023). Here, the BFA efficiency ranking relates to the capacity of an MDA to provide its services in a timely, cost-effective and customer friendly manner. Basically, the ranking measures MDAs on their adherence to service level agreements; costs and procedures; government directive

TABLE 2.1 NIGERIA: BUSINESS ENVIRONMENT OPERATIONAL STATUS

S/N	POLICY MEASURES	A 2020	B 2019	C 2018	D 2017	E 2016	F 2013	G 2010	H 2009	I 2008
1.	Starting Business	Business was made easier by reducing the time needed to register a company and improving online	By reducing the time needed to register a company at corporate affairs commission as well as introducing online platform to pay stamp	By allowing electronic stamping of registration of documents, faster starting of business was made possible	By improving online government portal; starting of business was made easier.		–		–	By introducing an online system for company name search as well as increasing efficiency at the company registry; starting a business was made easier in the country.

		platform reforms also made starting business easier by no longer requiring onsite inspections for business premises inspecti	duty; starting a business was made easier.							

		on								
2.	Dealing with Construction permits	Construction permit was made less costly by eliminating the infrastructure development charge for warehouse use	–	By streamlining the process to obtain construction on permits. And increased transparency; it was now easy to obtain construction on permits.						By setting in official time limit for issuing permits; dealing with construction permits was made easier in the country.
3.	Getting	This	By	–	–	–	–	–	–	–

	Electricity	was made easier by allowing certified engineers to conduct inspections for new connections	requiring that the distribution companies obtain the right of way on behalf of the customers as well as turning on the electricity once the meter is installed; getting electricity	–	–	–	–	–	–	–
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			was made easier in the country	– – – – – – – – – –	– – – – – – – – – –	– – – – – – – – – –	– – – – – – – – – –	– – – – – – – – – –	– – – – – – – – – –	– – – – – – – – – –
4.	Registering property	By implementing geographic information	By no longer publishing online the fee schedule	By removing the sworn affidavit for certified	– – –	By reducing fees for prope	– – –	– – –	– – –	– – –

		tion system, the country witnessed improved land administration system	as well as the list of documents necessary to register a property some states made property registration less transparent.	copies of the land ownership records as well as introducing specific and independent complaint mechanism, the country made property easier.	– – – – – – – – – – –	rty transactions; transferring property was made easier in the country.	– – – – – – – – – – –	– – – – – – – – – – –	– – – – – – – – – – –	– – – – – – – – – – –
5.	TRADING ACROSS BORDERS	By upgrading its electro	By implementing joint inspection	– – – –	– – – –	– – – –	– – – –	– – – –	By upgrading facilitie	– – – –

		nic system as well as launching e-payment of fee, the country reduced the time to export and import.	s NICIS2 electronic system and around the clock operations the country reduced the time needed to export and import	– – – – – – – – – – – – – – – – –	– – – – – – – – – – – – – – – – –	– – – – – – – – – – – – – – – – –	– – – – – – – – – – – – – – – – –	– – – – – – – – – – – – – – – – –	s at ports terminals; exporting and importing was speeded up.	– – – – – – – – – – – – – – – – –
6.	Enforcing contracts	By introducing a pretrial conference as	By issuing new rules of civil procedure for small	– – – – – –	– – – – – –	– – – – – –	– – – – – –	– – – – – –	– – – – – –	– – – – – –

		part of the case management techniques used in court; the country experienced easier contract enforcement.	claims courts which limits adjournments to unforeseen and exceptional circumstances; enforcing of contracts was made easier in some state such as	– – – – – – – – – – – – – – – – – – – –	– – – – – – – – – – – – – – – – – – – –	– – – – – – – – – – – – – – – – – – – –	– – – – – – – – – – – – – – – – – – – –	– – – – – – – – – – – – – – – – – – – –	– – – – – – – – – – – – – – – – – – – –	– – – – – – – – – – – – – – – – – – – –

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7.	Getting Credit	–	–	By guaranteeing borrowers the legal right to inspect their credit data from the credit bureau as well as starting to provide credit scores to banks, financial institutions; the country	–	–	By distributing credit information from retail companies; Nigeria improved access to credit information.	Through central bank guidelines defining regulatory requirement, Nigeria improved its credits information system.	–	–

		– – – – –	– – – – –	improved access to credit information.	– – – – –	– – – – –			– – – – – – – –	– – – – – – – –
8.	**PAYING TAXES**	– – – – – – – – – – –	– – – – – – – – – – –	By introducing new channel for payment of taxes and mandating tax payers to file tax returns at the nearest FIRS	– – – – – – – – – – –	– – – – – – – – – – –	Introduction of a new compulsory labor contribution paid by the employer was made	– – – – – – – – – – –	– – – – – – – – –	– – – – – – – – –

				office; the country made taxes payment easier.	– – – – – –	– – – – – –	possible	– – – –	– – – – – – – – –	– – – – – – – – –
9.	Protecting minority investors	– – – – – – – – – – – –	– – – – – – – – – – – –	– – – – – – – – – – – –	– – – – – – – – – – – –	By requiring that relates s party transactions be subject to	– – – – – – – – – – – –	– – – – – – – – – – – –	– – – – – – – – – – – –	– – – – – – – – – – – –

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and default approval. Notably, the MDAs that exhibit exceptional performance are those that recorded consistent efficiency reporting performance; higher degrees of adherence to service guideline as well as improved customer experience.

However, when MDAs publish their standardized procedures, timelines and service fees; it empowers citizen to demand efficient service and ensures access to comprehensive information on services, fees, timeline, requirements as well as customer service contact details. Consequently, the Nigerian Business Facilitation Act imposes obligations on MDAs to execute the following actions.

(A) Providing a comprehensive inventory of all charges, terms an prerequisites necessary for acquiring permits, licenses and approvals (within its facilities and official website)

(B) Assigning the duty of consistently revising and validation such information to the respective heads of various MDAs.

Empirically, Table 2.2 illustrates MDAs' performance in meeting the set BFA transparency criteria for the operational year (2023). Critically, the overall performance of MDAs is evaluated based on the efficiency and transparency scale with assigned weighting. Comparatively, the MDAs that achieved higher scores indicated higher compliance levels to their service level agreement and default approval.

Furthermore, as strategic policy direction, the Report Gov. NG platform hosts larger number of ministries, departments and agencies (all of which have been on boarded on the platform).

Formally, these MDAs are bounded by a service level agreement which requires that all lodged complaints must be resolved within seventy-two hours. In this regard, PEPEC conducted training sessions for the representatives of those diverse MDAs for the sake of improving their skills in complaint management and administration.

Indeed, it is notable that the high performing MDAs demonstrated acceptable performance in both efficiency and transparency through diligent adherence to their service level agreements during the reporting year (2023). Yet, the overall performance of MDAs indicates the need for massive improvement in the key BFA compliance metrics. But with only ten MDAs scoring above 50% and a weighted average score of 34.87%, across the thirty nine MDAs, strategic measures to enhance sector –specific metrics will certainly need to be prioritized.

TABLE 2.2 NIGERIA: BUSINESS COMPLIANCE RANKING OF MDAS

S/N	MINISTRIES, DEPARTMENTS AND AGENCIES	EFFICIENCY SCORES (%)	TRANSPARENCY SCORES (%)	GENERAL PERFORMANCE SCORES (%)
1.	STANDARDS ORGANIZATION OF NIGERIA	66.42	71.33	69.05
2.	NIGERIAN CONTENT DEVELOPMENT AND MONITORING BOARD	64.02	80.54	70.77
3.	NIGERIA ELECTRICITY REGULATORY COMMISSION	61.98	58.83	61.65
4.	NIGERIA AGRICULTURAL QUARANTINE SERVICE	56.55	49.00	55.45
5.	NIGERIA EXPORT IMPORT BANK	55.96	79.46	63.51
6.	FEDERAL COMPETITION AND CONSUMER PROTECTION COMMISSION	55.55	84.38	65.08
7.	CORPORATE AFFAIRS COMMISSION	53.36	89.88	65.12
8.	SECURITIES AND EXCHANGE COMMISSION	40.67	67.00	53.10
9.	CENTRAL BANK OF NIGERIA	40.63	55.29	46.31
10.	NIGERIA ELECTRICITY MANAGEMENT SERVICES AGENCY	40.26	78.33	53.09

11.	FEDERAL MINISTRY OF INTERIOR	39.74	67.13	48.58
12.	NIGERIA IMMIGRATION SERVICE	35.67	59.00	43.13
13.	NATIONAL AGENCY FOR FOOD AND DRUG ADMINISTRATION AND CONTROL	35.05	67.63	45.39
14.	FEDERAL INLAND REVENUE SERVICE	34.14	87.17	50.49
15.	NIGERIAN SHIPPERS COUNCIL	30.69	38.50	33.58
16.	NIGERIAN PORTS AUTHORITY	28.55	42.68	32.85
17.	FEDERAL AIRPORTS AUTHORITY OF NIGERIA	18.83	49.46	28.66
18.	NIGERIA INVESTMENT PROMOTION COMMISSION	14.83	55.63	27.24
19.	NATIONAL OFFICE OF TECHNOLOGY ACQUISITION AND PROMOTION	37.70	52.96	25.47
20.	SERVICOM	13.27	48.96	24.16
21.	NIGERIAN MARITIME ADMINISTRATION AND SAFETY AGENCY	09.47	86.58	
22.	BUREAU FOR PUBLIC PROCUREMENT	09.02	64.33	25.61
23.	NATIONAL PENSION COMMISSION	07.95	48.75	19.59
24.	FEDERAL MINISTRY OF INDUSTRY, TRADE AND INVESTMENT (COMMERCIAL LOAN DEPARTMENT)	07.27	34.38	15.40
25.	NIGERIA EXPORT PROCESSING ZONES AUTHORITY	06.50	70.96	25.84

26.	NATIONAL SUGAR DEVELOPMENT COUNCIL	06.09	58.54	21.83
27.	FEDERAL ROAD SAFETY CORPS	05.91	91.79	31.67
28.	NIGERIA AIRSPACE MANAGEMENT AGENCY	05.91	50.03	19.16
29.	NIGERIA EXPORT PROMOTION COUNCIL	04.40	90.42	30.59
30.	NIGERIA CIVIL AVIATION AUTHORITY	04.16	39.58	14.79
31.	NATIONAL BROADCASTING COMMISSION	01.89	71.13	24.63
32.	OIL AND GAS FREE ZONES AUTHORITY	00.00	73.33	22.05
33.	NATIONAL DRUG LAW ENFORCEMENT AGENCY	00.00	64.21	19.26
34.	BANK OF INDUSTRY	00.00	71.17	21.35
35.	NATIONAL COLLATERAL AGENCY	00.00	57.79	17.34
36.	SPECIAL CONTROL UNIT AGAINST MONEY LAUNDERING	00.00	23.46	07.04
37.	NIGERIA CUSTOM SERVICES	00.00	61.75	18.53
38.	JOINT TAX BOARD	00.00	70.83	21.25
39.	NIGERIA POLICE FORCE	00.00	31.88	09.56
40.				

3.0. NIGERIA: FIRMS AND ENTERPRISE OPERATIONS

Indeed, the growth, productivity and competitiveness of the economies of developing countries (such as Nigeria) are widely undisputable. Notably, they are essential for delivering more inclusive growth given their employment and income generation potentials. Also, these enterprises can make diverse contributions to social and economic wellbeing of citizens of Nigeria. Historically, the evolution of business enterprises in Nigeria can be traced to the colonial rule. During this era (with the commercial policy of treating colonies as estates to be developed for metropolitan trade) local industries were neglected and often discouraged in favor of import promotion subsequently, during the early post-independence era, national governments promoted import substitution policies aimed at encouraging local production as well as consumption of goods and services which would have been imported. Comparatively, industrial output grew under this policy era. However, the 1980's ushered in the golden era of business enterprises in Nigeria, especially in terms of facilitating their credit access operationally, in this era, support institutions such as NIDB and NBCI provided development oriented funding for the subsector. Similarly, NERFUND, Bank of Agriculture, etc., provided development – oriented funding for the sector. Thus, with abundant and cheap US dollars; foreign exchanges denominated loans were easily accessible for procurement of machinery and raw materials.

Subsequently the polices of succeeding structural adjustment programme (SAP) led to currency devaluation with higher exchange rates as well as low pricing of raw materials in the export market. Since then several programmes (such as those addressing employment creation, poverty reduction, women empowerment and youth development) made business enterprises as a primary focus

of their activities. Chronologically, some of the known measures include.

1) Mandatory credit guidelines in respect of MSMES (1970)
2) Small scale industries credit guarantee scheme (1971)
3) Agriculture credit guarantee scheme (1973)
4) Nigeria Agriculture and Co-operative Bank (1973)
5) Rural Banking Scheme (1977)
6) World Bank Assisted SME 1 (1985)
7) Second Tier Security Market (1985)
8) Peoples Bank of Nigeria (1989)
9) World Bank Assisted SME (1990)
10) National Economic Reconstruction Fund (1992)
11) Small and Medium Scale Enterprises Loan Scheme (1997)
12) African Development Bank (Export Stimulation Loan Scheme) (1998)
13) Bank of Industry (2001)
14) Nigeria Agricultural Cooperative and Rural Development Bank (2002)
15) Small and medium enterprises development Agency of Nigeria (2003)
16) Micro Finance Bank Establishments (MFB)
17) Small and Medium Enterprises Credit Guarantee Scheme for MSMEs (2010)
18) Central Bank Anchor Borrowers Programmer (2015)
19) Conditional Grant Scheme (2017)
20) SMEDAN one local government one product programme (2017)
21) Government Enterprise Empowerment Programme: Market Moni/Farmer Moni/Tradermoni Scheme (2018)
22) Corporate Affairs Commission: Incentivizing Business Registration Compliance (2019)

23) Industrial Development Centres Conversion to industrial parks and clusters (2019)

24) National Collateral Registry Under Financial System Strategy (2020)

25) Bank of Agriculture Establishment (BOI)

26) Rural Financial Institution Building Programme (RUFIN)

27) Enhancing Financial Innovation and Access (EFinA)

28) Facilitating and guaranteeing external finance through World Bank, African Development Bank, International Finance Corporation and other willing international institutions.

29) Numerous Training Schemes designed to build enterprise capacities and competencies by several government MDAs, Entrepreneurship Development Institutions (EDIs) as well as entrepreneurship studies introduction into the tertiary institutions curriculums.

30) ETC.

Conventionally, business enterprises are differently defined using parameters such as asset base or size, turnover, paid-up capital, employment or staff strength, technology and location. Clearly, these variables interact with each other in complex ways which must be taken into account in order to understand the nature, characteristics, performance, problems as well as challenges of business enterprises in Nigeria. Thus, following FGN (2021) and NBS (2017), we present the business enterprises classification in Nigeria as modified and shown in table 3.1 below. Surely, the identified set levels of table 3.1 represent the realities of the Nigerian economy while the wide class interval (with regards to turnover) gives flexible room for growth as well as capturing possible varying levels of turnover between manufacturing and service providing enterprises. However, where there exists a conflict in classification between employment and turnover

TABLE 3.1 NIGERIA: CLASSIFICATION OF BUSINESS ENTERPRISES

S/N	SIZE (CATEGORY)	EMPLOYMENT	ASSET (TURNOVER)
1.	Nano Enterprises (NAE)	1 – 2	< 3 (₦ Million)
2.	Micro Enterprises (MIE)	3 – 9	3-25 (₦ Million)
3.	Small Enterprises (SME)	10 – 49	25 -100 (₦ Million)
4.	Medium Enterprises (MEE)	50 – 199	100 – 1000 (₦ Million)
5.	Large enterprises (LAE)	200 +	1000 + (₦ Million)

criteria; the employment based classification will take precedence. In fact, employment based classification trends to provide a relatively more stable definition given that inflationary trends could distort the turnover definition as appropriate. As compared to large enterprises (LAE); Nano, Micro, Small and medium enterprises (NMSME) cover greater range of economic activity in Nigeria. Table (3.2) and (3.3) lists the various sectors and such sectors of the Nigerian economy. Operationally, NMSME are characterized by the following factors:

(I) Small size, which is an advantage when it comes to specialization and filing niche markets with products.

(II) Dependence on few employees which implies that as limited staff is required to complete all necessary tasks (inclusive of innovation, production, marketing, sales and accounting for the entire business).

(III) Simplicity which allows NMSME to be very flexible as well as making necessary changes quickly without much requirements (Such as addressing board members or shareholders for approval).

(IV) Limited focus on product and services which allows them to establish strong relationship with their business partners.

Statistically, NBS (2017) estimated the total number of micro, small and medium enterprise (in Nigeria) to be about 41.54 million. Yet, each of these categories of business enterprises has its own peculiar or differentiated characteristics. Specifically, the micro enterprises in Nigeria are dominated by those who engage in wholesale and retail trade, agriculture, manufacturing, accommodation and food services, transport and storage, construction as well as other services. Notable, some students in educational institutions engage (inclusive of their studies) in one form of business or another; ranging from photography services, hair/barbing services, shoe making/mending, fashion

designing, entertainment services, computer/phone repair services as well as trading in varieties of (on-demand) products. Typically, micro enterprise is operated by sole proprietor (Manager) aided mainly by unpaid family workers as well as the occasional paid employee and apprentice. Here, output size or volume is usually very small while there is much scope for upgrading technology and skills set for existing enterprises as well as for the rise of new technology based enterprises critically, funding is mainly from, private resources (such as personal savings) with rarely little help from family and friends.

However, government often interacts very little with individual micro enterprises, except through the occasional cooperative or other relevant groups as officially recognized. Again, bank loan are rarely sought and very rarely obtained by micro enterprises. Therefore, dealing with them will certainly require sensitivity and empathy as appropriate and socially.

Similarly, small enterprises (usually employing between 10 and 49 persons) cover much of the same spectrum of enterprises types but are concentrated) in the more modern and sophisticated end. Notably most of them are sole proprietorships while a significant number are incorporated businesses. As compared with micro enterprises; small enterprises has a large reservoirs of educated manpower, technical skills and relatively better access to the banks. Indeed, the small enterprise has the highest potential for growth through nurturing, capacity building and support. Operationally, they are well represented in organizations as well as by professional and trade associations. However, medium enterprises are the bedrock of Nigerian enterprises usually employing between 50 and 100 persons. Concentrated in a few sectors (such as manufacturing,

TABLE 3.2 NIGERIA: SECTORAL CLASSIFICATION OF ENTERPRISES (FIRMS)

S/N	SECTORS	SUB-SECTORS	SUB-SUBSECTORS
5B	AGRICULTURE	**SA1:** CROP PRODUCTION **SA2:** LIVESTOCK **SA3:** FORESTRY **SA4:** FISHING	
5B	INDUSTRY	**5B1:** MINI 6 AND QUARRYING	**SSB11**: Crude Petroleum and Natural Gas **SSB12:** Coal Mining **SSB13:** Metal ores **SSB14:** Quarrying and Her Minerals
		SB2: Manufacturing	**SSB21:** Oil Refining **SSB22:** Cement **SSB23:** Food, Beverage and Tobacco **SSB24:** Textile, Apparel and foot wear **SSB25:** Wood and Wood products **SSB26:** Pulp, Paper and products **SSB27:** Chemical and Pharmaceutical Products **SSB28**: Non-Metallic Products **SSB29:** Plastic and Rubber products

			SSB30**:** Electrical and Electronics **SSB31:** Basic metal, Iron and Steel **SSB32:** Motor Vehicles Assembly **SSB33:** Other Manufacturing
		SB3: ELECTRICITY, GAS, STEAM, AIR-CONDITIONER	
		SB4:WATER SUPPLY, SEWAGE WASTE MANAGEMENT	
		SB5: CONSTRUCTION	
	SERVICES	**SC1:** TRADE	
		SC2:ACCOMMODATION AND FOOD SERVICES	
		SC3:TRANSFORMATION AND STORAGE	**SSC31:** ROAD TRANSPORT **SSC32:** RAIL TRANSPORT AND PIPELINE **SSC33:** WATER TRANSPORT **SSC34:** AIR TRANSPORT **SSC35:**TRANSPORT SERVICES **SSC36:**POST AND COURIER SERVICES
		SC4: INFORMATION AND COMMUNICATION	**SSC41:**TELECOMMUNICATION AND INFORMATION SERVICES

			SSC42: PUBLISHING **SSC43:**MOTION PICTURES, SOUND RECORDING AND MUSIC PRODUCTION **SSC44:** BROADCASTING
		SC5: ARTS, ENTERTAINMENT AND RECREATION	
		SC6:FINANCIAL AND INSURANCE	**SSC61:**FINANCIAL INSTITUTIONS **SSC62:** INSURANCE
		SC7:REAL ESTATE	
		SC8:PROFESSIONAL SCIENTIFIC AND TECHNICAL SERVICES	
		SC9: ADMINISTRATIVE AND SUPPORT SERVICES.	
		SC10: Public administration	
		SC11: Education	
		SC12: Human health and social services	
		SC13: Other services	

TABLE 3.3 NIGERIAN MANUFACTURING INDUSTRIES: DISAGGREGATED SUBSECTORS

S/N	SUBSECTORS
SSM1	MEAT AND DAIRY PRODUCTS
SSM2	VEGETABLE AND GRAIN MILL
SSM3	BAKERY PRODUCT
SSM4	SUGAR COCOA CONFECTIONERY
SSM5	MISCELLANEOUS FOOD PREPARATION
SSM6	BEER AND STOUT
SSM7	SOFT DRINKS
SSM8	TEXTILES
SSM9	KNITTING CARPET AND RUG
SSM10	LEATHER PRODUCTS
SSM11	LEATHER FOOTWEAR
SSM12	SAW MILLING
SSM13	WOOD AND CORK PRODUCTS
SSM14	PAPER MANUFACTURE AND PRODUCTS
SSM15	PRINTING PUBLISHING
SSM16	BASIC INDUSTRIAL CHEMICAL
SSM17	PAINTS

SSM18	DRUGS AND MEDICINE
SSM19	SOAP AND PERFUMES
SSM20	OTHER CHEMICAL AND PETROLEUM PRODUCTS
SSM21	TYRES AND TUBES
SSM22	PLASTIC PRODUCTS
SSM23	GLASS AND GLASS PRODUCTS
SSM24	CEMENT AND CEMENT PRODUCTS
SSM25	BASIC METAL INDUSTRIES
SSM26	STRUCTURAL METAL PRODUCTS
SSM27	FABRICATED METAL PRODUCTS
SSM28	RADIO, TV AND COMMUNICATION EQUIPMENT
SSM29	MOTOR VEHICLE ASSEMBLY
SSM30	ROOFING SHEETS
SSM31	WINE SPIRITS AND DISTILLERS

transportation, information and communication technology, agriculture and agro allied as well as oil and gas) are usually well organized and connected. In fact, they often have good access to government and financial system. Although few in number and restricted in scope; they represent critical aspect of the Nigeria's private enterprises system.

As regards large enterprise operations, Nigeria's manufacturing sectors is among the largest in Africa with great potentials (Usually employing above 100 persons). Indeed, several development plans recognized the potential of the manufacturing sector as a major source of economic growth as well as important driver of concentric economic diversification and structural change. Specifically, between 2017 and 2020; the country launched a series of initiatives to alleviate manufacturing industry bottlenecks so as to promote large scale industrialization (including the review of Nigeria Industrial Revolution Plan). Similarly, over the last few years, several projects aimed at enhancing value chain resilience through market linkage programmes were launched. Furthermore, there has been increased funding of the export expansion grant fund to stimulate demand for locally manufactured goods so as to ensure that the export oriented businesses remain stimulated and competitive. Essentially, the manufacturing industry provides numerous opportunities for growth and investment as well as market access and export opportunities offered by the African continental free trade association single market. However, Nigeria's large and youthful population as well as natural resource endowment provides great potential in local markets for light manufacturing, pharmaceuticals, oil refining and petrochemicals. Notably, structures were established to encourage the development of modular refiners to increase local refining capacity. Specifically, opportunities for establishing modular refineries were created as part of Nigeria's strategy to reposition its oil and gas sector under the refineries and local production capacity initiative. Here, the initiative was aimed at supporting the development of the third party financed Greenfield and modular refineries that are located within refinery clusters for effective operations and minimal environmental foot print. Basically, the preferred modular refinery model involves a private sector led partnership with equity participation from the state government or its agencies, registered local cooperative societies as well as regional refinery stakeholder's integration. Furthermore, the backward and forward linkages of the sector with the pharmaceutical and agricultural sectors to enhance growth and job creation remain critical.

Notably, Nigeria is endowed with diverse mineral resources such as gold, iron, lead, zinc, rare metals, coal and gemstones that can be harnessed for her growth and development. Specifically, significant opportunities exist in the sector as many commodities (such as gold, copper, nickel, lithium and lead) will most likely remain in high demand by the battery and electronics industry. However, in response to the sector's poor performance, the country launched as new

mining road map (in 2016) known as the Road Map for the Growth and Development of the Nigerian Mining Industry. Essentially, it aspires to build a world-class minerals and mining ecosystem designed to serve a targeted domestic and export market. Yet, Nigeria's industrialization objectives cannot be realized without reliable and affordable energy access. Thus, Nigeria's current energy mix is driven mostly by natural gas and hydropower despite abundance of renewable energy sources (such as solar and wind energy) in other words, the country is yet to maximize these energy sources to their full potential. Consequently, large scale enterprise firms can accelerate the growth of these sectors given enabling business environment.

INFORMAL (NANO) ENTERPRISES: These are informal market structures such as stalls, minimarts, hairdressers, plumbers, and food sellers as well as many others in varying market enterprises. In fact, unlike their formal counterparts, these informal sectors comprise businesses which can be described as untaxed of unregistered. In other words, they can be regarded as underground, cash in hand or shadow economy which signifies how hidden they are from formal systems as well as regulatory bodies. Operationally, informal or Nano workers can include street vendors, pretty goods and service traders, subsistence farmers, seasonal workers, domestic workers as well as industrial out workers. Notably, retails and general trade are the leading category in the country's informal business enterprises. Other business sectors include food and drinks, fashion and beauty as well as agriculture essentially businesses in the informal economy sector contributes to about ninety percent of employment in Nigeria. Perhaps, while unemployment is the leading motivation for starting Nano business among men; insufficient income from more formal employment is the higher motivation among women (Moniepoint, 2024). Structurally, the business enterprises earn money for daily living expenses and feeding.

Yet, unlike the formal business enterprises (micro small and medium) the informal economy businesses (Nano) often face bleak odds while access to credit remains crucial. However, loans often help with restocking, expansion as well as keeping business a float in unfavorable times. Even when these informal business enterprises get access to loan; their primary sources include friends, family loan platforms and traditional banks. Again, most of these business enterprises do not pay taxes as required by law. Yet, for these informal enterprises, taxation comes in the form of market levies usually paid by them. In fact, for many of these Nano businesses, these levies are paid to local councils and bodies which determine how much and payment frequency. Unfortunately businesses that do not pay their levies may risk losing their goods as well as having their businesses closed by local councils. However, the payable amount varies given location and size.

Indeed, savings are critical part of business in the informal market. Here, these savings are usually tied to regular responsibilities that cannot be met with immediate cash flow. Specifically, cooperative and group contributions from the

bulk of how these Nano enterprises choose to save. Recently, their best option is digital banks as compared to traditional banks. Perhaps, their choice could be as a result of lower entry barrier and potentially higher returns. Again, various digital payment collection method exist for business owners in the Nano Enterprises but card payment are popular way of receiving in person payments. In other words, digital payment methods (Such as cards and transfers) accounted for the bulk of various payment schedules and transactions. However, for those businesses that needed to use cash for purchasing transactions; cash acceptance remains critical.

OPERATIONAL CHALLENGES OF NIGERIAN FIRMS: Generally, business enterprises in Nigeria have not achieved their full potential because of several critically inhibiting factors. Clearly, poor infrastructure (such as inadequate supply energy and limited transportation option) remains the primary barriers to business enterprises in Nigeria. Furthermore, some key macro-economic factors are negatively impacting Nigeria's firms and business enterprises. These include high interest and inflation rates; volatile exchange rates; multiple taxation and levies; inadequate loan facilities as well as public and private partnerships restraining access to capital; inability to provide traditional collateral for loans and hence limiting financing opportunities, other critical challenges include unfair competition with dumped products substitutes; weak access to inputs and products markets; weak institutional framework for generating and disseminating critical business information; low and option of ICT, e-commerce and e-payment options; financial illiteracy and management; strong family ties and disregard for business formalities. Similarly, other critical challenges include low operating capabilities (Capacities) and huge skills gaps in terms of management, technology, knowledge and work attitudes; low research and development investments with innovative results as well as weak linkages to local and international supply chains.

However, the development of business enterprises in Nigeria bas involved as wide network of institutions, organizations, agencies, and associations over time. Table 3.4 shows the various segments of these organizational enterprise enablers, actors, regulators, partners and stakeholders in Nigeria.

TABLE 3.4 NIGERIA ENTERPRISE STAKEHOLDERS NETWORK

S/N	REGULATORS/ENABLERS	S/N	ACTORS/PARTNERS
1.	NATIONAL PLANNING COMMISSION	1.	NEW PARTNERSHIP FOR AFRICAN DEVELOPMENT
2.	NATIONAL BUREAU OF STATISTICS	2.	AFRICAN BUSINESS ROUNDTABLE
3.	NATIONAL POVERTY ERADICATION PROGRAMME	3.	NIGERIAN ECONOMIC SUMMIT GROUP
4.	SMALL AND MEDIUM ENTERPRISES DEVELOPMENT AGENCY	4.	NATIONAL ASSOCIATION OF WOMEN IN BUSINESS
5.	CORPORATE AFFAIRS COMMISSION	5.	NATIONAL ASSOCIATION OF SMALL AND MEDIUM ENT.
6.	NIGERIAN EXPORT PROMOTION COUNCIL	6.	NATIONAL ASSOCIATION OF CHAMBERS OF COMMERCE INDUSTRY MINES AND AGRICULTURE
7.	NIGERIAN EXPORT PROCESSING ZONES AUTHORITY	7.	NATIONAL ASSOCIATION OF SMALL SCALE INDUSTRIALISTS
8.	COMMODITY ASSOCIATIONS	8.	ASSOCIATION OF MICRO ENTREPRENEURS OF NIGERIA
9.	STANDARD ORGANIZATION OF NIGERIA	9.	SMALL BUSINESS OWNERS ASSOCIATION OF NIGERIA
10.	SMALL AND MEDIUM INDUSTRIES DEPARTMENT	10.	MANUFACTURERS ASSOCIATION OF NIGERIA
11.	BANK OF INDUSTRY	11.	NATIONAL ASSOCIATION OF NIGERIAN TRADERS

12.	INDUSTRIAL TRAINING FUND	12.	NIGERIAN ASSOCIATION OF WOMEN ENTREPRENURES
13.	NATIONAL AUTOMOTIVE DESIGN AND DEVELOPMENT COUNCIL	13.	PRODUCT MARKET ASSOCIATIONS
14.	DEPARTMENT OF RURAL DEVELOPMENT	14.	TRADE UNION CONGRESS
15.	COOPERATIVE COLLEGES	15.	CIVIL SOCIETY ORGANIZATIONS
16.	DEPARTMENT OF COOPERATIVES	16.	WORKERS COOPERATIVE UNIONS
17.	BANK OF AGRICULTURE	17.	EDUCATIONAL INSTITUTIONS
18.	FEDERAL INSTITUTE OF INDUSTRIAL RESEARCH	18.	GERMAN AGENCY FOR INTERNATIONAL AGENCY
19.	NATIONAL OFFICE OF TECHNOLOGY ACQUISITION AND PROMOTION	19.	JAPAN INTERNATIONAL COOPERATION AGENCY
20.	RAW MATERIALS RESEARCH AND DEVELOPMENT COUNCIL	20.	UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION.
21.	NATIONAL AGENCY FOR SCIENCE AND ENGINEERING INFRASTRUCTURE	21.	UNITED NATIONS DEVELOPMENT PROGRAMME
22.	PROJECT DEVELOPMENT AGENCY	22.	WORLD BANK
23.	ENERGY COMMISSION OF NIGERIA	23.	AFRICAN DEVELOPMENT BANK
24.	NATIONAL BIOTECHNOLOGY DEVELOPMENT AGENCY	24.	INTERNATIONAL FINANCE COOPERATION
25.	NATIONAL CENTRE FOR TECHNOLOGY	25.	DEPARTMENT FOR INTERNATIONAL

	MANAGEMENT		DEVELOPMENT
26.	NATIONAL INFORMATION TECHNOLOGY DEVELOPMENT AGENCY	26.	UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
27.	NATIONAL BOARD FOR TECHNOLOGY INCUBATION	27.	EUROPEAN UNION
28.	NIGERIA CONTENT DEVELOPMENT MONITORING BOARD	28.	CANADIAN INTERNATIONAL DEVELOPMENT AGENCY
29.	BUDGET OFFICE OF THE FEDERATION	29.	INTERNATIONAL FUND FOR AGRICULTURAL DEVELOPMENT
30.	FEDERAL INLAND REVENUE SERVICE	30.	PRIVATE ENTREPRENEURSHIP DEVELOPMENT CENTRE
31.	CENTRAL BANK OF NIGERIA	31.	PAN AFRICAN UNIVERSITY ENTERPRISES DEVELOPMENT CENTRE
32.	NIGERIA EXPORT IMPORT BANK	32.	GROWING BUSINESS FOUNDATION
33.	NATIONAL DIRECTORATE OF EMPLOYMENT	33.	FATE FOUNDATION
34.	ENTREPRENEURSHIP DEVELOPMENT PROGRAMME	34.	NATIONAL ASSOCIATION OF MICRO FINANCE BANKS
35.	DEPARTMENT OF WOMEN AFFAIRS	35.	VENTURE CAPITAL ASSOCIATION
36.	NATIONAL CENTRE FOR WOMEN DEVELOPMENT	36.	ASSOCIATION OF BUSINESS DEVELOPMENT SERVICE PROVIDERS

37.	NATIONAL YOUTH SERVICE CORPS	37.	ECONOMIC COMMUNITY OF WEST AFRICAN STATES
38.	CITIZENSHIP AND LEADERSHIP TRAINING CENTRE	38.	DIASPORA ENGAGEMENT NETWORKS
39.	NATIONAL AGENCY FOR FOOD AND DRUG ADMINISTRATION	39.	NIGERIA SOCIETY OF ENGINEERS
40.	DEPARTMENT OF PUBLIC HEALTH	40.	ETC
41.	STATE GOVERNMENT MDAS		
42.	LOCAL GOVERNMENT COUNCILS		
43.	INFRASTRUCTURE BANK		
44.	DEVELOPMENT BANK		
45.	NATIONAL BOARD OF TECHNICAL EDUCATION		
46.	NIGERIA STOCK EXCHANGE		
47.	ETC		
48.			

4.0. NIGERIA: DIGITAL TRANSFORMATION AND UNIPOD INCUBATIONS

Basically, science, technology and innovation are integrated concepts that underpin the development of products, processes and systems that ensure human progress and wellbeing. Here, technology is the application of scientific knowledge to solve a broad range of problems while innovation refers to the diffusion of technologies into specific market segments and parts of society to create sustained value. However, technological change is constant but digital technologies are enabling radically new ways to deliver value to enterprises as well as altering competitive landscapes and changing the underlying economics of firms. Therefore, digital transformation is the adoption of digital technology to transform services or businesses by way of replacing non-digital or manual processes with digital processes (or replacing older digital technology with newer digital technology). In other words, digital transformation is the cultural, organizational and operational change of a business enterprise (firms) through smart integration of digital technologies, processes and competencies across all levels and functions in a staged (strategic) way. Essentially, digital solutions may enable new types of innovation and creativity (rather than enhancing and supporting traditional methods). Indeed, digital transformation is not monolithic. Rather, in the integrated and connected sense, it can touch upon the transformation of the following areas:-

(A) **ENTERPRISES ACTIVITIES AND FUNCTIONS** which includes marketing, operations, human resources, administration, customer services, etc.

(B) **ENTERPRISE MODELS** which involves how business function (from the go-to market approach and value proposition to the ways it seeks to make money and effectively transforms its core business) as well as tapping into novel revenue sources and approaches (even if dropping the traditional core business after sometimes).

(C) **ENTERPRISES PROCESSES** which involves one or more connected operations, activities and sets to achieve a specific business goal by enabling business process management,

business process optimization and business process automation.

(D) **BUSINESS ECO SYSTEMS** which involves the networks of partners and stakeholders as well as contextual factors affecting business enterprises such as regulatory (economic) priorities and evolutions. Here new ecosystems are built between companies with various backgrounds upon the fabric of digital transformation and information which makes data and actionable intelligence to become innovation assets.

(E) **FIRM ASSET MANAGEMENT**, which implies that both customers and information need to be treated as real assets in all perspectives since customer experiences is a leading goal and information is the lifeblood of business, technological evolutions as well as of any human relationship.

(F) **ORGANIZATIONAL CULTURE** involving a clear customer centric (agile and hyper aware) goal which can be achieved by acquiring core competencies across the board in areas such as digital maturity, leadership, knowledge worker silos that enables to be more future proof.

(G) **ECOSYSTEM AND PARTNERSHIP MODELS**, which involves arise of cooperative, collaborative, co-creating and entirely new business ecosystem approaches that leads to new business models and revenue sources.

(H) **CUSTOMER, WORKER AND PARTNERS APPROACHES** which implies that the changing behavior expectations and stakeholder's needs are crucial. Clearly, these should be expressed in many change subprojects whereby customer-centricity, user experience, worker empowerment, new work place models, changing channel partners dynamics can appear as appropriate.

In the context of the Nigerian economy, the National Digital economy policy and strategy (2020 – 2030) has been developed to reposition the Nigerian economy so as to take advantage of many opportunities that digital technologies provide (FGN, 2020). Basically, the document is based on eight pillars as follows:

Development regulation, Digital literacy and skills, solid infrastructure, service infrastructure, digital services development and promotion, soft infrastructure, digital society and emerging technologies as well as indigenous content development and adoption. Essentially, the policy document aims to provide a plan for using digital technology as a platform for stimulating growth in all sectors of the Nigerian economy.

Notably, block chain technology (as a critical tool of the digital transformation) has the potential to revolutionize many business enterprises (such as finance, health care, transportation and supply chain management). Here, transactions can be made more transparent, trustworthily and efficient, which can result in considerable cost savings and better user experiences. Again, the policy serves as catalyst for innovation and economic growth as well as enabling the development of new business models, products and services that can lead to job creation. Thus, by creating a supportive environment for block chain technology; governments can attract investment; promote research and development as well as fostering entrepreneurship. Similarly, there are other national policies and regulatory policies that are currently being implemented to enhance enterprise growth in Nigeria. these include National Digital Innovation and Entrepreneurship policy, National policy on Digital identity for internally displaced persons; Nigeria startup Act, National Dig-once policy; National policy for the promotion of indigenous content in the telecommunications sector; SIM Card Registration Plan, National Policy on VSAT installation core skills for Nigerians, National Policy on SIM Card Registration; Revised National Digital Identity Policy for SIM Card Registration; National Policy on fifth Generation (5G) Networks for Nigeria's Digital Economy; National Policy on Virtual Engagements; National Policy on Device Management System; National Policy for the Establishment and Management of the National Center for Artificial Intelligence and Robotics; National Policy on the Nigerian Government Second – level domains; Nigeria Data Protection Act as well as National Policy on Communication Satellite.

However, as an expected outcome and impact, the block chain Policy shall provide funding for block chain research and development; which would lead to the creation of new applications, products and services in the digital economy. Again, the policy promotes experimentation with new block chain technologies (Such

as smart contracts, decentralized applications and interoperability solutions).

In fact, this experimentation would lead to more innovative and practical use cases for block chain. And by promoting public-private partnerships, the policy shall encourage collaboration between different stakeholders (including start-ups, established companies and government agencies). Operationally, this collaboration shall lead to more innovative and practical block chain solutions as desired. Furthermore, by facilitating the creation of supportive legal and regulatory frameworks that encourage innovation; the policy would provide clarity and certainty for companies developing block chain solutions as well as attracting more investment to the productive sectors. Indeed, the Nigeria block chain policy is anticipated to lead to the provision of incentives for entrepreneurship in the block chain ecosystem (such as tax breaks, grants and incubator programs). This would therefore encourage the development of new start-ups as well as helping to foster a culture of innovation among the Nigerian enterprises or firms.

INCUBATION PROGRAMMES: Essentially, Technology incubation programme (TIP) can be regarded as an institutional vehicle for commercialization of the output of research and development processes. As a popular economic development tool, TIP is a veritable mechanism that can fast truck local and regional economic growth. In other words, it's an integrated support programme usually provided by governments, academic and private sector (either individually or in partnership) with the intension of creating, assisting or nurturing budding entrepreneurs in the development of new technology based firms (such as startups and fledge lings). In fact, TIP seeks to effectively link technology, talent, capital and know how so as to leverage entrepreneurial skills to accelerate the development of new companies (firms) considered to originated from intellectual properties. Again, it can develop value orientation by creating an enabling environment that encourages personal initiative, creativity, innovation, risk taking and entrepreneurship. Operationally, the TIP commenced in Nigeria with the registration of the National technology Business incubation foundation in 1993 (as a company limited by guarantee) subsequently, the Federal Government of Nigeria took over the ownership and operations of the company under National technology business incubation foundation decree in 1995.

However, to make for effective coordination, supervision and management; the National Board for Technology incubation (NBTI) was established in 2005. Critically, the aim of the board is to establish and manage the operations of Technology Incubation Centres (and parks) so as to ensure the commercialization of research and development results from the establishments and related innovation efforts. Thus, the objectives of NBTI can be stated as follows:-

I. Provision of support facilities to encourage individual initiatives, creativity, innovations and risk taking

II. Provision of support services such as working space, offices, access to finance and exposures to critical business opportunities.

III. Promotion of growth of privates sector through the creation of competitive small and medium enterprises as engine of growth and industrialization.

IV. Sourcing of entrepreneurs and investors for the commercialization of chosen technologies

V. Sourcing and developing commencing viable indigenous and foreign technologies as well as.

VI. Linking Government (Policy makers), Academic (Knowledge providers) and industries (Absorbers of value added technology outputs) in a triple helix framework for sustainable socio-economic development.

Practically, the scope of NBTI is to nurture the development and commercialization of the following technologies as classified below.

(A) **INDIGENOUS TECHNOLOGIES** which includes manufacturing of simple equipment and machineries; upgrading of traditional technologies; utilization of local raw materials for empowerment as well as waste recycling.

(B) **MEDIUM TECHNOLOGIES** which includes manufacturing of electrical and electronic components for circuits and control; chemical process and production of reagents; industrial fluids

and food processing as well as manufacturing of equipment and tools

(C) **HIGH TECHNOLOGIES** which include products related to mining, environmental climate change; renewable energy; building materials and machines development; biotechnology process and products, as well as high tech application to other technologies.

(D) **EMERGING TECHNOLOGIES** which includes advanced materials, Nano technologies, laser technologies, smart systems, robotics, artificial intelligence big data analysis, cloud computing, augmented reality as well as other related technologies.

And for the sake of public operations, NBTI incorporates the following technology incubation scheme as follows: PRE-INCUBATION SCHEME (IDEATION/ CAPACITY BUILDING /PRODUCTION TRIALS); INCUBATION SCHEME (RESIDENT/ NON-RESIDENT/ VIRTUAL); COMMUNITY INCUBATION SCHEME; POST INCUBATION SCHEME as well as DIRECT COMMUNALIZATION SCHEME. Essentially, Technology Incubation Centres (TIC) will benefit government by enhancing the creation of entrepreneurial culture within the community. On the other hand, it will benefit the business enterprises by facilitating access to resources such as information, technology, mentors, loans and seed capital. Similarly, it will benefit industrial firms by promoting knowledge acquisition and global competitiveness of products. And for the research community, it will foster environment for integrations between government, industry and academic. It will also create an enabling environment for a corporate or private in vesture to participate in a knowledge driven (innovation driven) post incubation scheme.

For operational efficiency, the federal government should undertake the following responsibilities: Policy guideline for the execution of TIC, Provision of technology focus; undertaking feasibility studies for the establishment of TIC; provision of facilities such as workshop equipment, laboratory facilities, library facilities, digital technologies, management of TIC; Funding of the overhead (running costs of TIC; facilitating access to funds sources; Training Provision to techno premiership and TIC staff; Establishing institutional and research linkages with other related institutions; provision of industrial parks and estates for the sake of relocations; promotion of center products

as well as provision for industrial safety. On the other hand, the state government (as a host) should undertake the following responsibilities: Provision of adequate and suitable landscaped with potential for future expansion; provision of building for offices for incubation unit and other facilities; provision of access road to TIC location; provision of digital technology infrastructures (in partnership with Federal Government); provision of industrial parks (Estates) for future relocation; promotion of centre products as well as continued support and NBTI cooperation. However, private sectors can also establish technology incubation centers by satisfying the statutory requirements as appropriate.

UNIPOD NETWORKS: This is a dynamic institution dedicated to fostering innovation and creativity as well as engaging in research and development activities. In other words, UNIPOD is a living (breathing) hub of innovation, creativity and transformative thinking where community of dreamers, thinkers and doers united by a common passion with the pursuit of ground breaking ideas as well as relentless drive to turn them into reality. Basically, UNIPOD envision a world where innovation knows no bound. That is, it believes in the power of ideas to reshape the future; to solve complex challenges as well as to inspire positive change. Clearly, UNIPOD is the catalyst that propels these ideas forward by turning them into tangible solutions that can impact the global world and African enterprises in particular. However, UNIPOD has the capacity to empower creators, visionaries and innovators from all sectors. Operationally, UNIPOD stands on strong pillars with each contributing to the objective of nurturing innovation and entrepreneurship. These include:

I. **INNOVATION ECOSYSTEM** that fosters creativity, experimentation and cross-disciplinary collaboration which provides necessary infrastructure, mentorship and resources for individuals or enterprises to develop practical ideas.

II. **RESEARCH EXCELLENCE** which is promoted by facilitating access to funding. Laboratories and research networks

III. **ENTREPRENEURIAL SUPPORT** which is provided to entrepreneurs (from ideation to market entry) by assisting in business development, mentorship and access to investment opportunities. As a resource hub, it offers a range of services

such as contractual fabrication, product development consultancy, diagnostics and repairs

IV. **INNOVATION POD** which is an environment containing open innovation area and initiatives devoted to assisting creators, researchers as well as firm owners in developing and commercializing present and future technologies. In other words, it brings together commercial partners and multidisciplinary talents to collaborate on the development of innovative solutions.

Structurally, the membership of UNIPOD shall comprises of professional enterprises, corporate membership, start-up enterprise, student membership program innovated supporter, community innovators Graduate membership as well as faculty membership. These membership categories are detailed as follows:-

(A) **PROFESSIONAL MEMBERSHIP** is those categories of enterprises that are actively engaged in a specific businesses or firms and holds relevant qualifications, certifications or relevant experience. Such firms may include micro, small and medium enterprises. Essentially, they will have access to collaboration space, computer design laboratory as well as audiovisual and creative arts laboratory. They will also have access to intellectual property library, priority booking for fabrication services, and technical support to expert's innovation as well as interest access and weekly access at UNIPOD.

(B) **CORPORATE MEMBERSHIP** is those categories open to public and private institutions such as universities, research institutes, government agencies and large firms. Essentially, they will have access to collaborative space, computer design lab, audiovisual and digital creative arts laboratory. They shall also access intellectual property library as well as priority booking for fabrication services including technical support to expert's innovation development.

(C) **START-UP MEMBERSHIP** are those categories open to start ups (and nanos) by offering support and resources tailored to their unique needs and challenges. Essentially, they will have access to collaborative space, computer design lab, audiovisual as well as digital creative arts laboratories. Furthermore, they

will access expert's technical support to innovation development as well as token based internet access. As a critical benefit, they will enhance their professional skills and knowledge through access to exclusive workshops, seminars and training programs at UNIPOD. They can also participate in cross-disciplinary projects and innovative ventures in conjunction with fellow professionals at UNIPOD networks.

(D) **STUDENT MEMBERSHIP** is those categories open to students of all levels (from primary schools to universities). Essentially, they will have access to collaborative space, computer design lab, audiovisual and digital creative arts laboratories. Furthermore, they can access intellectual property library, expert's technical support to innovation development as well as token based internet access. As critical benefit, they will access wealth of educational resources such as research materials and industry insights as well as opportunities for skill development. Participants can also gain priority access to UNIPOD internship programs by offering hands on experience as well as choice to work on real world projects.

Again, they will access mentorship opportunities (as a mentor and mentee) by connecting with experienced professionals and emerging talents.

(E) **SPECIAL MEMBERSHIP** is those categories of individuals coming to the UNIPOD through specific program or initiative projects that are not managed by UNIPOD. As a program innovation supporter, they will have access to the collaborative space, compute design lab, audiovisual lab, digital creative lab, intellectual property library as well as internet access. Furthermore, they will access priority technical support to innovation development experts as well as business development support experts. As critical benefit, they will gain prominent visibility and recognition as key supporter of UNIPOD's innovative strategies. In exchange the partnership will be acknowledged in the programme, events and marketing materials. Again members can connect with a diverse network of fellow partners, affiliates, sponsors and other UNIPOD members while fostering relationship that can lead to new business opportunities and collaborations.

(F) **COMMUNITY MEMBERSHIP** are those categories of members that will have access to collaborative space, computer design lab, audio virtual lab, digital creative arts lab as well as intellectual property library. Again, they will access expert's technical support to innovation development.

As critical benefit, they shall access mentorship opportunities (as a mentor and mentee) by connecting with experienced professionals and emerging talent in specific fields. In fact, they can access exclusive collaboration opportunities with UNIPOD dynamic community such as projects participation, research and co-creation activities.

(G) **FACULTY MEMBERSHIP** is those categories tailored for staff members working in universities, colleges and other education institutions. Here, it encompasses diverse range of roles such as academic faculty, administrative staff and support personnel. Essentially, they will have access to the collaborative space, computer design lab, audio visual lab, digital creative arts lab as well as intellectual property library. Again, they can access expert's technical support to innovation development as well as token base internet access. As critical benefit, they will collaborate with UNIPOD on cutting edge research projects as well as tapping into the expertise of academic and research community. In fact, they can gain access to a talent pool of students and professionals for recruitment and internship opportunities. In other words, they can participate in cross disciplinary projects and innovative activities within UNIPOD network.

Practically, UNIPOD offers a wide range of services such as CONTRACT FABRICATION, PRODUCT DEVELOPMENT, CONSULTANCY as well as DIAGNOSTICS TESTING and REPAIRS. Essentially, these services are explained as follows:

(1) Indeed, for those who have great ideas but lack resources or facilities to operationalize them; CONTRACT FABRICATION SERVICE will help to turn concepts into tangible products.

(2) Whether a community innovator or external visionary, PRODUCT DEVELOPMENT SERVICE will provide the resources, mentorship and infrastructure to bring innovative products to life or market.

(3) UNIPOD offers solicited and unsolicited CONSULTANCY SERVICES by providing guidance and solutions in innovation, technology, product development and entrepreneurship.

(4) Whether needing assistance in diagnosing issues, testing prototypes or repairing faculty devices, UNIPOD team will cater to both internal and external projects.

Structurally and operationally, UNIPOD spaces typically consist of the following: IDEATION, PITCH ROOM, COMPUTER DESIGN LAB, MAKER, BUSINESS NURSERY, TECHNOLOGY TRANSFER UNIT as well as LIBRARY SERVICES. As the very essence of innovation, IDEATION SPACE is not just a physical room but ideal place to bring your projects to life with resources that range from cutting edge technology to traditional barnstorming aids. As a dedicated space, the pitch room is crafty designed to empower innovators, entrepreneurs as well as visionaries to deliver their concepts with a blend of professionalism, precision and captivating impact. Technically, the pitch room should be equipped with seamless video conferencing capabilities that can enable participants to engage with a global audience virtually as appropriate. In fact, in the realm of innovation and entrepreneurship; a compelling pitch can serve as the pivotal point of securing vital funding as well as gaining the support of stakeholders or attracting potential partners. Again, whether as an aspiring entrepreneur (with a ground breaking startup) or a researcher (harboring ground breaking ideas) or an innovator (with a vision that can re-shape the world); pitch room facility greatly empowers. COMPUTER DESIGN LABORATORY is a dynamic space where innovation and technology converge to shape the future of computing. In other words, it is a place where latest ideas, advanced software and cutting edge hardware blend together as well as providing fertile ground for creative minds. Apart from accessing latest computers, workstations and servers; high performance computer equipped with advanced processors and memory (Designed for data intensive and complex computational

tasks) exists. Essentially, they are ideal for participant's researchers and innovators working on simulations data analysis and artificial intelligence. This lab also offers access to wide array of specialized software tools such as computer aided design (CAD), 3D modeling software and advanced simulation programs. Essentially, these software tools shall empower participants to turn your design concepts into digital reality. And for those seeking to turn digital designs into physical prototypes; the lab is usually equipped with multiple collaborative workstations, 3D printers, CNC (Computer Numerical Control) machines and other prototypes tools. Surely, as an innovation incubator, it is a place that provides access to emerging technologies by ensuring that participants are in the forefront of digital landscape in the areas of artificial intelligence virtual reality as well as internet of things development. Specifically, within the computer design lab, MAKER SPACE represents the epicenter of creativity and innovation (where ideas take tangible form via digital fabrication). Essentially, this specialized section of the lab is equipped with CNC machines which are the driving force behind transforming digital designs into physical reality. Here, participants can harness the power of CNC machines to empower them to create prototypes as well as manufacturing of wide range of valuable items. Clearly, CNC machines are the precision crafters of digital age. In other words, participants can use computerized control systems to precisely cut, mill or engrave materials with incredible accuracy. Operationally, whether working with wood, metal, plastic or composites, CNC machines offer a versatile and high precision means of fabrication. Notably, in the specialized lab (LAB X) participants, researchers and prospective entrepreneurs will have access to advanced instruments, microscopes, spectrometers as well as analytical tools for conducting experiments, analysis and cutting edge research for development.

Essentially, BUSINESS NURSERY is the thriving ecosystem where entrepreneurial Dreams are nurtured; ideas are cultivated whereas innovative start-ups are born. As a specialized incubator space, it is designed to provide aspiring entrepreneurs and emerging business with the support, resources and guidance needed to navigate the challenges of the business enterprises. Critically, the business nursery platform shall provide a supportive environment for business incubation as well as fostering the growth of startups through access to essential resources. In other words, the platform offers real world opportunities for learning via practical experiences.

In fact, from creating business plans and developing marketing strategies to understanding financial management; participants acquire essential skills to navigate challenges and triumphs of entrepreneurship. Furthermore, collaboration between academia and industry is the bedrock of the technology transfer unit. Here, by establishing partnerships and collaborations with external organizations, the technology transfer unit pares the way for industry experts and academic researchers to work together as well as harnessing their respective strengths to drive innovation and addressing real world challenges. As pivotal roles in fostering entrepreneurship and supporting startups; the unit shall provide aspiring entrepreneurs with the resources, mentorship and guidance needed to transform their innovative ideas into sustainable businesses.

These ideas include access to funding opportunities, business development support and vibrant entrepreneurial ecosystem. Operationally, the unit shall play pivotal role in shaping the future by bridging the gap between academia and industry as well as ensuring that innovative discoveries are not confined to the laboratory but used in transforming the world. Undisputedly, the LIBRARY SERVICES UNIT is a treasure trove of knowledge and innovation. As a dedicated facility, participants can access wide range of intellectual property resources such as patents, research papers, copy right materials and innovation databases. Indeed, by providing valuable insights, the unit helps the participant to stay updated with the latest information. Specifically, as a library facility, the High –Performance computing (HPC) Laboratory should be equipped with advanced high performance computers that provide researchers and innovators with the computing power needed for data intensive tasks, simulations and complex calculations. Essentially, this HPC Lab is the final destination for high speed and high capacity computing needed to push the boundaries of emerging projects as being investigated. Unfortunately, since education is incomplete without practical exposure, INTERNSHIP PROGRAM is tailored to industry integration.

Basically, it is a seamless blend of academic knowledge and industry practice. Here, participants have the chance to work with experienced professionals and hence gain insights into latest trends and techniques.

In fact, it is a transformative experience that equips participants with the skills, knowledge and confidence needed to excel in the chosen sector.

Again, as a journey of self-discovering and professional growth, participants will learn to adapt, innovate and grow in the enrolling world of enterprise. However, as required by the UNIPOD TOUR (via witnessing the process and engaging with creators) participants gain deeper understanding of how innovation works as well as its potential to shape the future.

Consequently, for the sake of the Nigeria enterprises development, United Nation Development Programme (UNDP) recently performed the official ground breaking ceremony of the Lagos UNIPOD, Lagos State of Nigeria. Notably, the Artificial Intelligence (AF) themed facility is expected to serve as a hub for the hatchery of creativity and innovation among potential participants and entrepreneurs in Nigeria.

5.0. NIGERIA: FIRMS DIGITALIZATION AND INCUBATIONAL CHALLENGES

Perhaps, Nigeria has made significant policy and institutional changes that point towards a recognition of the centrality of the digital economy performances. Notably, the country has taken the journey from command and control first generation regulation (Decrees 75 of 1992) to a market liberalization process that commenced in the year 2000. Although mobile competition was introduced in 2001, the fixed line operator known as Nigerian Telecommunications Limited (NITEL) as well as Mobile Telecommunications Limited (MTEL) that handles mobile telephony; were eventually privatized in 2014. Consequently, as at 2020, Nigeria was among the group of countries with regulation that enables investment and access. Notably, this regulation era is marked by indicators such as the introduction of unified licensing regime in recognition of convergence; enabling environment for investment, innovation and access as well as dear competition and

consumer protection regime. However, Nigeria can now be classified as fourth generation regulation country (ITU, 2024). In fact, this regulatory identity denotes integrated regulation lead by socio-economic goals and objectives as highlighted in the recent national development plan (FGN, 2021).

Yet, as one of the largest economies in Africa as well as with a fairly complex institutional framework for ICT (information and communication technologies), IT (information technologies) and DT (Digital technologies); Nigeria's journey to Digital transformation regulation provides important lesson for regulators and policy makers in the country. Clearly, table 5.1 shows the bench mark performances in the assessment of Nigeria's digital transformation readiness (ITU, 2024). Thus, given its large, young and entrepreneurial population, digital entrepreneurship has the potential to become an engine of economic transformation. In other words, digital technologies are forecast to be a new major driver of productivity in Nigeria. However, for emerging enterprises to successfully perform digital works; they must possess adequate digital skills.

Indeed, several aspects of digital ecosystem are important in understanding Nigeria's level of digital development and enterprises challenges. These include broadband and its availability, affordability and quality as well as Nigeria's competitiveness via the country's performance in terms of cyber security, digital financial services, e-commerce e-governance, digital entrepreneurship, mobile money, cloud services as well as other related technological areas.

Specifically, Global innovation index (GII) takes the pulse of global innovation trends against the background of an economic

environment fraught with uncertainty. However, GII has previously provided a stance and whether stagnation and low productivity growth have come to stay; or whether we are about entering new era (where innovation sports like DIGITAL AGE as the DEEP SCIENCE INNOVATION waves generates economic lift). In fact, as recently identified, two promising innovation waves are making their presence felt across economies and societies:

(i) Digital innovation wave built on Artificial Intelligence (AI), supper computing and Automation.

(ii) Deep science innovation wave based on biotechnologies and Nanotechnologies.

TABLE 5.1 NIGERIA DIGITAL TRANSFORMATION READINESS PERFORMANCE FRAMEWORKS

S/N	BENCHMARK	SCORES
1.	National Digital Policy Agenda	69
2.	Regulatory Capacity	91
3.	Good Governance	55
4.	Collaborative Governance	81
5.	Stake holder engagement	60%
6.	Legal instruments for ICT/ telecom markets	76%
7.	Legal instruments for digital markets	-
8.	Markets rules	82%
9.	Regional and international cooperation	60%

However, as measuring tools, GII is a key instrument that empowers stakeholders across public and private sectors by allowing them to gauge the impact of their policies and strategies as well as enabling informed decision making to drive and enhance

shared progress. Consequently, the global innovation tracker addresses the following crucial questions:

(i) What is the global state of innovation?

(ii) Is innovation slowing down or accelerating?

(iii) How is innovation navigating through the global turbulence caused by elevated inflation, rising interest rates and geopolitical conflict?

As a national response to the above questions, tables 5.2 presents Nigerian performance among the surveyed 132 economics (WIPO, 2023). Specifically, the country poorly ranked 98 (Output) and 116 (Input) as a lower middle income nation in sub-Saharan Africa region with estimated population (218.5 Millions) while the GDP (PPP) was 1,275.3 ($Billions). Clearly, table 5.3 shows the disaggregated compositions of the reported comparative GII indicators.

However, similar to other African economies, there are serious security threats to Nigeria's enterprise digital transformation process; basically due to online and financial fraud as well as the country's current struggle with terrorism and armed conflict. However, the security and integrity of digital telecommunication networks, data and systems remain a key consideration.

TABLE 5.2 NIGERIA: COMPARATIVE GII PERFORMANCE INDICATORS (2023)

S/N	VARIABLES (PARAMETERS)	VALUES (SCORES)	RANK
A	INSTITUTIONS	32.90	115/132
A1	INSTITUTIONS ENVIRONMENT	13.00	129/132
A2	REGULATORY ENVIRONMENT	58.10	79/132
A3	BUSINESS ENVIRONMENT	27.60	106/132
B	HUMAN CAPITAL AND RESEARCH	27.80	80/132
B1	EDUCATION	78.01	-
B2	TERTIARY EDUCATION	05.30	120/132
B3	RESEARCH AND DEVELOPMENT	00.00	119/132
C	INFRASTRUCTURE	18.70	123/132
C1	INFORMATION AND COMMUNICATION TECHNOLOGIES	35.70	115/132
C2	GENERAL INFRASTRUCTURE	11.10	120/132
C3	ECOLOGICAL SUSTAINABILITY	09.40	129/132
D	MARKET SOPHISTICATION	12.40	127/132
D1	CREDIT	04.50	125/132
D2	INVESTMENT	09.00	57/132
D3	TRADE, DIVERSIFICATION AND MARKET SCALE	23.70	122/132
E	BUSINESS SOPHISTICATION	240.50	82/132

E1	KNOWLEDGE WORKERS	37.00	55/132
E2	INNOVATION LINKAGES	11.50	111/132
E3	KNOWLEDGE ABSORPTION	24.90	104/132
F	KNOWLEDGE AND TECHNOLOGY OUTPUTS	09.90	124/132
F1	KNOWLEDGE CREATION	07.40	97/132
F2	KNOWLEDGE IMPACT	17.10	115/132
F3	KNOWLEDGE DIFFUSION	05.30	125/132
G	Creative outputs	17.30	54/132
G1	Intangible assets	26.00	76/132
G2	Creative goods and services	01.20	115/132
G3	Online creativity	15.90	91/132

TABLE 5.3 NIGERIA: COMPOSITIONS OF COMPARATIVE G11

S/N	VARIABLES (PARAMETERS)	S/N	COMPOSITIONS
A1	INSTITUTIONAL ENVIRONMENT	A11	OPERATION STABILITY FOR BUSINESS
			GOVERNMENT EFFECTIVENESS
		A12	
A2	REGULATORY ENVIRONMENTAL	A21	REGULATORY QUALITY
		A22	RULES OF LAW
		A23	COST OF REDUNDANCY DISMISSAL.
A3	BUSINESS ENVIRONMENT	A31	POLICES FOR DOING BUSINESS
		A32	ENTREPRENEURSHIP POLICES AND CULTURE
B1	EDUCATION	B11	EXPENDITURE ON EDUCATION (% GDP)
		B12	GOVERNMENT FUNDING/PUPIL, SECONDARY (% GDP)
		B13	SCHOOL LIFE EXPECTANCY (YEARS)
		B14	PISA SCALES IN READING: MATHS AND SCIENCE
		B15	PUPIL TEACHER RATIO: SECONDARY
B2	TERTIARY EDUCATION	B21	TERTIARY ENVIRONMENT (% GROSS)
		B22	GRADUATES IN SCIENCE AND ENGINEERING
		B23	TERTIARY IN BOUND MOBILITY
B3	RESEARCH AND DEVELOPMENT	B31	RESEARCHERS. GROSS EXPENDITURE ON RESEARCH AND DEVELOPMENT

		B32 B32 B34	(% GDP). GLOBAL CORPORATE RESEARCH AND DEVELOPMENT INVESTORS. QS UNIVERSITY RANKING.
C1	INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT)	C11 C12 C13 C14	ICT ACCESS ICT USE GOVERNMENT ONLINE SERVICE E-PARTICIPATION
C2	GENERAL INFRASTRUCTURE	C21 C22 C23	ELECTRICITY OUTPUT (GWH) LOGISTICS PERFORMANCE GROSS CAPITAL FORMATION (% GDP).
C3	ECOLOGICAL SUSTAINABILITY	C31 C32 C33	GDP/UNIT OF ENERGY USE ENVIRONMENTAL PERFORMANCE 150 14001 ENVIRONMENTAL STANDARD.
D1	CREDIT	D11 D12 D13	FINANCE FOR STARTUPS AND SCALE UPS. DOMESTIC CREDIT TO PRIVATE SECTOR (% GDP). LOANS FROM MICROFINANCE INSTITUTIONS.
D2	INVESTMENT	D21 D22 D23 D24	MARKET CAPITALIZATION (% GDP) VENTURE CAPITAL INVESTORS VENTURE CAPITAL RECIPIENTS VENTURE CAPITAL RECEIVED (% GDP)
D3	TRADE, DIVERSIFICATION AND MARKET SCALE	D31 D32 D33	APPLIED TARIFF RATE (WEIGHTED AVERAGE) DOMESTIC INDUSTRY DIVERSIFICATION DOMESTIC MARKET SCALE
E1	KNOWLEDGE WORKERS	E11 E12	KNOWLEDGE-INTENSIVE EMPLOYMENT FIRMS OFFERING FORMAL TRAINING

		E13	GROSS EXPENDITURE ON RESEARCH AND DEVELOPMENT PERFORMANCE BY BUSINESS (% GDP).
		E14	GROSS EXPENDITURE ON RESEARCH AND DEVELOPMENT FINANCED BY BUSINESS (%GDP).
		E15	FEMALES EMPLOYED WITH ADVANCED DEGREES.
E2	INNOVATION LINKAGES	E21	UNIVERSITY INDUSTRY RESEARCH AND DEVELOPMENT COLLABORATION.
		E22	SATE OF CLUSTER DEVELOPMENT.
		E23	GROSS EXPENDITURE ON RESEARCH AND DEVELOPMENT FINANCED BY ABROAD (%GDP).
		E24	JOINT VENTURE/STRATEGIC ALLIANCE DEALS (%GDP).
		E25	PATENT FAMILIES.
E3	KNOWLEDGE ABSORPTION	E31	INTELLECTUAL PROPERTY PAYMENTS (%TOTAL TRADE).
		E32	HIGH TECH IMPORTS (% TOTAL TRADE)
		E33	ICT SERVICES IMPORTS (% TOTAL TRADE)
		E34	FOREIGN DIRECT INVESTMENT NET INFLOWS (%GDP)
		E35	RESEARCH TALENT (% IN BUSINESS)
F1	KNOWLEDGE CREATION	F11	PATENTS BY ORIGIN.
		F12	PATENT COOPERATION TREATY BY ORIGIN.
		F13	UTILITY MODELS BY ORIGIN
		F14	SCIENTIFIC AND TECHNICAL ARTICLES
		F15	CITABLE DOCUMENTS (H.INDEX).
F2	KNOWLEDGE IMPACT	F21	LABOR PRODUCTIVITY GROWTH (NEGATIVE FOR NIGERIA)

		F22	UNICORN VALUATION (%GDP)
		F23	SOFTWARE SPENDING (% GDP)
		F24	HIGH-TECH MANUFACTURING
F3	KNOWLEDGE DIFFUSION	F31	INTELLECTUAL PROPERTY RECEIPTS (% TOTAL TRADE).
		F32	PRODUCTION AND EXPORT COMPLEXITY.
		F33	HIGH-TECH EXPORTS (% TOTAL TRADE)
		F34	ICT SERVICES EXPORT (% TOTAL TRADE)
		F35	150 9001 QUALITY.
G1	INTANGIBLE ASSETS	G11	INTANGIBLE ASSET INTENSITY
		G12	TRADE MARKS BY ORIGIN
		G13	GLOBAL BRAND VALUE
		G14	INDUSTRIAL DESIGNS BY ORIGIN.
G2	CREATIVE GOODS AND SERVICES	621	CULTURAL AND CREATIVE SERVICES EXPORTS.
		622	NATIONAL FEATURE FILMS.
		623	ENTERTAINMENT AND MEDIA MARKET.
		624	CREATIVE GOODS EXPORTS (% TOTAL TRADE).
G3	ONLINE CREATIVITY	631	GENERIC TOP LEVEL DOMAINS
		G32	COUNTRY CODES
		G33	GITHUB COMMIT
		G34	MOBILE APP CREATION

In other words, the country cyberspace is faced with dangers posed by criminals constantly striving to perpetuate various forms of cyber-attacks and crimes (such as fraud, identity and intellectual property) theft as well as electoral interference and critical infrastructure destruction specifically, the country is also witnessing the following cyber threats:

(A) An increasing use of the internet for propagation of seditious messages, fake business news and hate speech.

(B) Cyber domain hosting an increasing pool of illicit actors such as foreign and domestic groups, stated and non-state elements, and lone wolves;

(C) As well as attention of terrorists and other subversive elements that constantly strive to exploit cyberspace for indoctrination or propaganda so as to undermine the government and causing apprehension towards the people.

Indeed, the dynamic nature of cyber threats and the constantly evolving tactics of perpetrators of cybercrime pose serious risks to business commercial and financial activities which are usually reliant on cyberspace. Unfortunately, these cyber threats constitute hazards to regular users of cyberspace that cut across government establishments, private sector and other economic actors in Nigeria. Again these threats have the potential to compromise critical networks and systems in the way that leads to essential services disruption. Notably, these disruptions are perpetrated by individuals or groups using arrays of malicious activities (motivated by financial gains, anti-government or terrorist related activities); thereby challenging the confidentiality, integrity or availability of data in the Nigeria Cyberspace. Specifically, the main targets of cyber-attacks in the cyberspace of Nigeria include cloud-based system, mobile devices, internet of things, data centres as well as corporate establishment networks. Recently, the Nigeria interbank settlement system has reported that mobile fraud cases have risen continuously. Again, the expansion of cyber-physical systems (such as transportation technologies, air traffic control systems, smart devices and hydropower grids) is another dimension of cyber challenge that the country needs to resolve for the sake firms/enterprise digitalization needs (FGN, 2021C). However, the major cyber threats of critical concern are identified as follows:-

(I) **CYBERCRIME CHALLENGE** involves those common forms of cybercrime that feature in the Nigeria cyber domain. These include Phishing, Business Email Compromise, Ransom Wave, Malwares, credentials theft, intellectual property rights violation, online scam, etc. Yet other emerging cyber threats include machine learning poisoning, deep fakes, cloud hijacking, artificial intelligence fuzzing, crypto currency hacking, data breaches as well as other related virtual attacks.

(II) **CYBER TERRORISM CHALLENGE** which involves the increasing likelihood for cyber terrorists to use cyberspace to inflict violence through targeting of critical assets such as financial systems, military networks, transportation infrastructure, telecommunications system, government services, etc. Again, these terrorists often use the spreading of fake news and hate speech in the social media so as to enhance their operations (of recruitment and propaganda) so as to undermine government and instill fear on the business community.

(III) **ONLINE EXPLOITATION CHALLENGE** which involves online sexual harassment, cyber stalking, internet–induced kidnapping, rape, blackmailing and cyber bullying, etc. Regrettably, several Nigerians are increasingly falling victim to predominant cyber threats such as online defamation, public shaming, identity theft and related matters.

(IV) **ELECTORAL SYSTEMS INTERFERENCE CHALLENGE** which involve direct physical attack on elections critical infrastructure or the conduct of cyber operations or systems disruption as well as undue influences on electorates of public or business functions.

(V) **CRITICAL CYBER THREATS CHALLENGE** which involves predominant and emerging security threats emanating from cyber space such as fragmentation of technology, advanced persistent threats, cyber conflict as well as cyber threats triggered by climate change and unmanned aerial vehicles. Notably, these could be perpetrated by nation states or non-state actors with the objective of compromising national critical services as well as undermining the economy and national security. In fact, this foreign actor (actors) could make the national infrastructure susceptible to eves, dropping, military or industrial espionage as well as other malicious activities.

(VI) **VULNERABILITIES CHALLENGES** which implies that short falls in human resources, capacity development and accessibility to digital technologies are factors limiting efficient cyber security development in Nigeria. In other words, human resources capacity, research and development as well as cyber security awareness are still relatively law across government, private sector and general public. Unfortunately, this shortfall or negligence has been responsible for diminished or poor cyber security consciousness at the organizational, business and individual levels. In fact, Nigeria businesses face numerous cyber-attacks across all sectors weekly while some reports believe that Nigeria faced the second-highest number of cyber-attacks in African much recently. Here, targets include information technology and telecommunication services with hackers aiming to steal the personal information of individual and companies served by the affected firms. Yet, other attacks focus on android devices stealing, banking credentials and financial information.

As operational response to the above challenges, the Nigeria computer and emergency response team (ng CERT) has released several advisories to alert Nigerians about these attack methods and vulnerabilities clearly, these cyber-attacks are unwelcome attempts to steal, expose, alter, disable or destroy information by gaining unauthorized access to computer systems. Therefore, the cybercrime costs include data damage and destruction, stolen money, lost productivity, intellectual property theft, personal and financial data theft, embezzlement, fraud, post-attack disruption, restoration cost as well as other unforeseen costs. In other words, the hacking habit can grow into a multi-dimensional act of applying magic-bullet tactics to harm the rightful owners (enterprises) as well as causing immense damages and hardships to them. Again, hackers are now leveraging new technologies such as artificial intelligence to perpetrate crimes which can cause serious financial losses. Even though Nigeria cybercrimes. Act (2015) offers an effective, unified and comprehensive (legal, regulatory and institutional) frameworks for the prohibition, prevention, detection, prosecution and punishment of

cybercrimes and punishment of Cybercrimes in Nigeria; there is need for more actionable measures in this era of digital transformation.

TECHNOLOGY INCUBATIVE CHALLENGES: Critically, continuous underfunding has been the bane of the National Board for Technology Incubation (NBTI) in Nigeria. Consequently, this implies inability to adequately support and nurture growth of private sector through Nano, micro, small and medium enterprises in Nigeria; inability to promote new infrastructural facility or to maintain and expand existing Technology incubation centers as well as inability to adequately promote and support the commercialization of research findings into viable ventures. Other implications of underfunding include adverse effect on the development of human capacity as well as inadequate capacity of initiating foreign technology acquisition or pilot plant promotion. Again, the development of business enterprises in the country (via technology incubation programmes) has been slotted down as a result of lack of synergy in scientific and technological research. In other words, the entrepreneurial drive and research capabilities (as a major target of NBTI) cannot evolve an innovation spirit that can attract the interest of international donors (partners) such as UNIDO, UNDP and World Bank. In fact, the over reliance on the Nigeria government for funding (Provision of modern tooling machines and testing equipments) constitutes a major weakness as currently observed. However, due to the absence of operational strategic plan, there may be misplaced priorities in the allocation and resources use as appropriate. Furthermore, most Nigerian states lack the critical infrastructure necessary for technology incubation programmes. These include insufficient internet penetration, unreliable electricity supply and inadequate transportation networks. Operationally, these deficits make it challenging to deploy and maintain digital technologies by technology incubation centres. Again, some regulatory frameworks in Nigeria are out dated and not conducive to the rapid adoption of emerging technologies. In other words, inconsistent policies, lack of clear guidelines as well as bureaucratic hurdles can stifle innovation and slow down the implementation of digital transformation solutions of business enterprises by incubation centres. Again, fragmented markets and small or micro size

of many enterprises can limited the scalability of digital technologies and transformation processes. In fact, regional or sub-regional integration and more unified markets are necessary to create sufficient demand that justifies the investments needed for the technological transformations.

AI PREPAREDNESS CHALLENGES: Indeed, there is a significant gap in digital literacy and technological skills across the states of Nigeria. Notably, Nigerian educational systems are not adequately equipped to provide the training needed for the workforce to engage with emerging technologies such as artificial intelligence ecosystem networks effectively. Unfortunately the observed skill gaps limit the ability of individuals and enterprises to adopt and leverage digital technologies. Again, high levels of poverty and limited access to financing may impede the ability of Nigerian firms to invest in digital technologies such as artificial intelligence networks. Similarly, political instability, corruption and weak governance are potential obstacles that can undermine efforts to create conductive environment for the adoption of artificial intelligence as tools for digital transformation of business enterprises in Nigeria. Consequently, digital transformation processes should align with AI preparedness gap as follows:-

(I) Foundational A1 Preparedness which are the digital infrastructure and human capital that enable workers and firms to adopt artificial intelligence.

(II) Second Generation Preparedness which is the digital innovation capacity as well as legal and ethical frameworks to govern and foster Artificial intelligence advances.

Therefore, improvement in regulatory frameworks (which are critical for broadening societal trust in AI tools) followed by innovation integration are the A1 preparedness dimensions more strongly correlated with the size of the digital sector in large economies. However, regulatory frameworks need to mitigate cyber security risks as well but which will increase with widespread use of AI and may adversely affect firms performances. Then, where foundational preparedness is weak (as seen in developing economies such as Nigeria) investment in digital infrastructure

and human capital should be prioritized to reap early gains from the artificial intelligence ecosystems while paving the way for second generation preparedness. In other words, while the capacity to innovated and strengthen regulatory frameworks for digital businesses is crucial in attracting digital investments in low income countries (such as Nigeria); these frameworks will be less effective without strong AI infrastructure and digitally skilled labor force (Cazzaniga, et al. 2024; Jamilov, et al, 2023; Carriere and Haksar, 2019). Thus, with appropriate investment, artificial intelligence networks has the potential to improve the delivery of fundamental services such as education and health care as well as performing complex tasks in areas where skilled labor is scarce. However, considering the costs associated with such critical investments and the limited space in the Nigerian economy; perhaps, it would be prudent to focus spending on high-return (digital) transformation projects. However, the exact implications of AI-Ecosystem for the economy are challenging to predict given levels of uncertainty as regards productivity gains and job displacements. Clearly, Table 5.4 shows the various indications of the various AI preparedness dimensions (Cassaniga, et al 2024; FGN, 2024; Nwaobi, 2024; Nwaobi, 2019).

As shown in the table 5.4 above, although each component of the preparedness index (AIPI) is important individually; preparedness for AI included structural or digital transformation will likely rely on the collective performance in all indicator areas.

Notably, the digital infrastructure component (as a crucial determinant of information and communication technology adoption) can lay the foundation for the diffusion and localized applications of AI transformative technologies.

TABLE 5.4 A1 PREPAREDNESS INDEX: COMPOSITIONS OF INDICATORS

S/N	INDEX	DIMENSIONS	VARIABLES	INDICATORS
AI	FOUNDATIONAL A1 PREPAREDNESS	(1)DIGITAL INFRASTRUCTURE	A)ACCESSIBLE AFFORDABLE AND SECURED INTERNET ACCESS	I)ESTIMATED INTERNET USERS PER 100 INHABITANTS II) NUMBER OF MAIN FIXED TELEPHONE LINES FOR 100 INHABITANT. III) NUMBER OF MOBILE SUBSCRIBERS FOR 100 INHABITANTS. IV) NUMBER OF FIXED BROADBAND SUBSCRIPTIONS PER 100 INHABITANTS. V) NUMBER OF WARLESS BROADBAND SUBSCRIPTIONS PER 100 INHABITANTS. VI) COST OF INTERNET ACCESS (PERCENT OF MONTHLY GNI PER CAPITAL. VII) SECURE INTERNET SERVERS PER 1 MILLION PEOPLE
			B) MATURE E-COMMERCE INFRASTRUCTURE	I)PRIVATE SECTOR'S ECOMMERCE BUSINESS ENVIRONMENT II)POSTAL RELIABILITY INDEX III)USE OF MOBILE PHONE FOR ONLINE TRANSACTIONS IV)PUBLIC SECTOR'S ONLINE SERVICES INFRASTRUCTURE
		HUMAN CAPITAL AND LABOUR MARKET POLICIES	C) EDUCATION AND DIGITAL SKILLS	I) HUMAN CAPITAL INDEX=MEAN YEARS OF SCHOOLING, EXPECTED YEARS OF SCHOOLING, GROSS ENROLLMENT RATIO AS WELL AS ADULT LITERACY. II)PUBLIC EDUCATION EXPENDITURE (% GDP). III)SKILL SET OF GRADUATES (EQUALITY OF EDUCATION) (V)DIGITAL SKILLS AMONG ACTIVE POPULATION (COMPUTER SKILLS, BASIC CODING, ETC.) (VI)NUMBER OF STEM (SCIENCE, TECHNOLOGY,

				ENGINEERING AND MATHEMATIC,) GRADUATES. VI) NUMBER OF FEMALE STEM GRADUATES.
			D)LABOUR MARKET FLEXIBILITY AND POLICIES	I)FLEXIBILITY OF WAGE DETERMINATION (CENTRALIZED VS INDIVIDUAL FIRM LEVEL. II)PAY AND PRODUCTIVITY (EXTENT TO WHICH WAGES ARE MARKET DETERMINED). III)INTERNAL LABOUR MARKET MOBILITY. V)ACTIVE LABOUR MARKET POLICIES (SKILLS MARCHING AND RETAINING). VI) SOCIAL PROTECTION (POPULATION COVERED BY SOCIAL PROTECTION SCHEMES).
AII	SECOND-GENERATION A1 PREPAREDNESS	3) INNOVATION AND ECONOMIC INTEGRATION	E)INNOVATION	I)RESEARCH AND DEVELOPMENT (RXD) SPENDING PER UNIT GDP II)FORNTIER TECHNOLOGY READINESS (AI REACTED RXD ACTIVITY; NUMBER OF SUENTIFIC PUBLICATIONS; NUMBER OF PATENTS ON FRONTIER TECHNOLOGIES) III)DOMESTIC CREDIT TO PRIVATE SECTOR (%GDP)
			F)ECONOMIC INTEGRATION	I)MEAN TARIFF RATE II)NON-TARIFF BARRIERS III)FREE MOVEMENT OF CAPITAL AND PEOPLE (AVERAGE OF THREE INDICATORS OF FINANCIAL OPENNESS, CAPITAL CONTROLS, FOREIGNERS FREEDOM OF VISIT).
		4) REGULATION AND ETHICS	G)STRONG LEGAL FRAME WORKS AND ENFORCEMENT MECHANISMS	I) LEGAL FRAMEWORK'S ADAPTABILITY TO DIGITAL BUSINESS MODELS. II) GOVERNMENT EFFECTIVENESS, VOICE AND ACCOUNTABILITY.

However, such infrastructure would be of limited use in the absent of skilled workforce capable of leveraging digital platforms for innovative workplace applications (**Nkpletti et-al 2020**).

Consequently, the human capital and labor market policies element (which corporate the presence of social safety nets) assesses the prevalence and inclusive distribution of digital skills within the labor force as well as the presence of policies that facilitate labor reallocation while safe guarding those harmed by AI – induced transitions or transformations (Bartley et al. 2007; Autor, et al. 2003; Boom, et al 2015).

Again, coupled with strong infrastructure, a digitally skilled labor is vital for innovation and economic integration which fosters domestic technological development through a vibrant research and development ecosystem as well as promoting international trade which attracts foreign investment and new technologies, such as artificial intelligence tools. Similarly, the regulation and ethics dimension evaluates the extent to which the exiting legal frameworks are adaptable to evolving or emerging digital business models as well as the presence of strong governance for effective enforcement.

Computationally, AIPI is the sum of the four key dimensions; digital infrastructure, human capital, technological innovation and legal frameworks. Although these four dimensions are likely relevant for smooth AI adoption; each dimension (in turn) is computed by normalizing and averaging a rich set of sub-indicators. Here, the aggregated result shows the level of preparedness as follows (Cazzaniga, eta al 2024);

ADVANCED ECONOMIES (ADVEC) = 0.68

EMERGING MARKET ECONOMIES (EME) = 0.46

LOW INCOME COUNTRIES (LIC) = 0.32

Thus, similar to the oxford in sights (2023) report, several developing economies such as Nigeria are not yet prepared for the AI induced digital transformations. For the sake of operational clarity, table 5.5 shows that universe of AI ecosystems.

NETWORK READINESS CHALLENGES: Essentially, in network societies such as Nigeria, truth is a basic foundation to our use of media, communication tools and related digital information systems. However, as innovations driving our network societies became more widespread; the

trustworthiness of technology under pinning the new age has been taken for granted. In other words, the changing ways in which we acquire information, communicate, use services and engage with technology present challenges for everyone (especially those that are digitally inexperienced or unconnected and least trusting in technology). Yet, various factors have fed prevailing negative scenarios over fake news on social media as well as the undermining of privacy in harvesting data generated by living in the data age. In other words, all economic agents are stoking greater concerns over how and by all are stoking greater concerns over how and by whom data is being collected, stored, shared and processed for different purposes. Consequently, Network readiness index (NRI) represents a pivotal metric for assessing digital trends and understanding the evolution of online trust in this networked or digital era. Basically, NRI seeks to identify and analyze major trends; identify and the driving forces behind developments in media, information and communication technologies and their societal implications as well as offer actionable recommendations for policy practices. In other words, it aims to assist policy and decision makers as well as industry and academia in establishing measures that amplify positive effects of technology on society and economy as well as promoting positive relationship between enterprises and digital technologies. Clearly, table 5.6 illustrates the factors shaping trust in the digital era as shown below (Dutton, 2023).

However, digital transformation necessitates a constant review of data that powers the network readiness index (NRI). Thus, a sum of 58 indicators spanning across twelve sub-pillars are structured as follows:

(A) **TECHNOLOGY PILLAR** aims to evaluate the technological infrastructure crucial for a country's engagement in the global economy. This technology pillar objective are addressed through the following sub-pillars:
A1= ACCESS; A2= CONTENT; A3=FUTURE TECHNOLOGIES

(B) **GOVERNANCES PILLAR** Emphasizes the creation and reachability of structures that invigorate the networked economy across a triad of dimensions. This governance pillar objectives are addressed through the following sub-pillars:
B1=TRUST; B2= REGULATION; B3=INCLUSION

TABLE 5.5 ARTIFICIAL INTELLIGENCE UNIVERSE: ECOSYSTEM NETWORKS

S/N	ARTIFICIAL INTELLIGENCE (AI)	MACHINE LEARNING (ML)	NEURAL NETWORKS (NN)	DEEP LEARNING (DL)	GENERATIVE AI (GA)
1.	AI2) NATURAL LANGUAGE PROCESSING	MLI) UNSUPERVISED LEARNING	NNI)MULTILAYER PERCEPTION	DLI)TRANSFER LEARNING	GA1)TRANSFORMER ARCHITECTURE
2.	AI2)COMPUTER VISION	ML2)SEMI–SUPERVISED LEARNING	NN2)BACK PROPAGATION	DL2) GENERATIVE ADVERSARIAL NETWORKS	GA2)NAURAL LANGUAGE UNDERSTANDING
3.	AI3) EXPERT SYSTEMS	ML3) REINFORCEMENT LEARNING	NN3) ACTIVATION FUNCTIONS	DL3) DEEP RELIEF NETWORKS	GA3) SUMMARIZATION
4.	AI4) ROBOTICS	ML4) CLASSIFICATION	NN4) PERCEPTIONS	DL4) DEEP NEURAL NETWORKS	GA4) LANGUAGE MODELING
5.	AI5)AUTOMATED REASONING	ML5) REGRESSION	NN5) CONVOLUTIONAL NEUTRAL NETWORKS	DL5) DEEP CONVOLUTIONAL NEURAL NETWORKS	GA5) SELF ATTENTION MECHANISM
6.	AI6)FUZZY	ML6 CLUSTERING	NN6) LONG SHORT	DL6) DEEP	GA6) GENERATION

	LOGIC		TERM MEMORY	REINFORCEMENT LEARNING	
7.	AI7) PLANNING AND SCHEDULING	ML7) DIMENSIONALITY REDUCTION	NN7) GENERATIVE ADVERSARIAL NETWORKS	DL7) CAPSULE NETWORKS	GA7) DIALOGUE SYSTEMS
8.	AI8) KNOWLEDGE REPRESENTATIO N	ML8) DECISION TREES	NN8) DROPOUT		
9.	AI9)SPEECH RECOGNITION	ML9) SUPPORT VECTOR MACHINES	NN9) SELF ORGANIZING MAPS		
10.	A20) A1 ETHICS	ML10) ENSEMBLE LEARNING	NN10)RECURRENT NEURAL NETWORK		
11.	A21) COGNITIVE COMPUTING	ML11) FEATURE ENGINEERING			

TABLE 5.6 D IGITAL ERA: FA CTORS S4HAPING TRUST

S/N	ACCESS TO	RESHAPING	TRUST IN
1.	**INFORMATION**	What you watch, read, see, hear, ultimately what you know.	Sources of information you access online such as podcast news or discussion on social media
2.	**PEOPLE**	Who you meet, who you know, who you keep in touch with, whom you communicate with	Individuals, influencers experts, neighbors you communicate with
3.	**SERVICES**	How and from whom you obtain services	Different services providers; business enterprises; firms
4.	**TECHNOLOGY**	Producing, using and consuming equipment, devices, hardware software to access ICTs	Knowledge of how to safely use the internet, artificial intelligence, online resources as a producer, consumer or citizen, enterprise

(C) **PEOPLE PILLAR** mirrors the proficiency, inclusivity and adeptness of the populace and entities of a nation in harnessing technological assets. This pillar assesses the application of digital technologies across three facets:

C1= INDIVIDUALS; C2= BUSINESSES; C3=GOVERNMENTS

(D) **IMPACT PILLAR** indicates that a nation's readiness in the networked economy translates into holistic growth and societal enhancement. This pillar tries to gauge the diverse ramifications of engagement in the networked economy across three sub-pillars.

D1=ECONOMY; D2=LIFE QUALITY; D3=SDG CHANGE

Epically, the network readiness index (NRI) of 2023 ranks a total of 134 economies of the world. Table 5.7 shows the detailed report on the Nigerian readiness towards digital transformation as a developing (Lower-Middle-Income) nation scoring 35.73 as well as ranking 106 out of 134 (Soumitra, 2024). Clearly, the challenges are enormous towards the digital transformation agenda of Nigeria enterprises. Thus, the time for action is now.

TABLE 5.7 NIGERIA NETWORK READINESS INDEX PERFORMANCE

S/N	PILLAR INDICATORS	SUB-PILLAR INDICATORS	VARIABLE INDICATORS	SCORE	RANK
1.	Technology Pillar	-	- - -	34.42	88/134
	-	A)Access Sub-Pillar	- - -	55.57	89/134
	-	-	AI) Mobile Tariff	44.76	96/134
	-	-	AII)Handset Prices	45.92	69/134
	-	-	AIII)Internet Subscriptions	20.16	89/134
	-	-	AIV)3GMOBILE Network Access	95.22	111/134
	-	-	AV) International Internet Bandwidth	71.81	63/134
			AVI) Schools Internet Access	-	-
	-	B) Content Sub-Pillar	- - -	22.29	69/134
	-	-	BI) GITHUB Commits	03.90	83/134
	-	-	BII) Internet Domain Registration	00.49	108/134
	-	-	BIII) Mobile Apps Development	60.84	82/134
	-	-	BIV) A1 Scientific Publications	23.91	18/134

	-	C) Future Tech Sub-Pillar	- - -	25.44	99/134
	-	-	CI) Adoption of Emerging Technologies	43.17	75/134
	-	-	CII) Investment In Emerging Technologies	22.75	115/134
	-	-	CIII) Robot Density	-	-
	-	-	CIV) Computer Software Spending	10.29	88/134
2.	Peoples pillar	-	- - -	33.89	96/134
	-	D) Individual Sub-Pillar	- - -	20.71	120/134
	-	-	D1) Intra-Mobile Broad Band Internet Traffic	07.52	72/134
	-	-	DII) Education System Based ICT Skills	30.21	87/134
	-	-	DIII) Virtual Social Networks usage	11.34	114/134
	-	-	DIV) Tertiary Enrollment	06.33	108/134
	-	-	DV) Adult Literacy Rate	48.14	97/134
	-	-	DVI) AI Talent Concentration	-	-

		E) Businesses Sub-Pillar	- - -	52.97	44/134
	-	-	EI) Firms with website	14.79	105/134
	-	-	EII) Business Enterprise Financed GERD	-	-
	-	-	EIII) Knowledge Intensive Employment	55.66	34/134
	-	-	EIV) Telecommunications Services Investments	86.47	19/134
		-	EV) Business Enterprises Performed GERD	-	-
-	-	F) Government Sub-Pillar	- - -	28.00	95/134
-	-	-	F1) GOVERNMENT ONLINE SERVICES	47.50	93/134
	-	-	FII) PUBLICATION AND OPEN DATA USE	19.12	73/134
	-	-	FIII) GOVERNMENT INVESTMENT PROMO-INTECH	17.38	110/134
	-	-	FIV) GOVERNMENT HIGHER EDUCATION R&D		
			EXPENDITURE.	-	-
3.	Governance Pillar	-	- - -	37.40	114/134
		(G)Trust Sub-pillar	- - -	35.41	82/134
			GI) Secure Internet Servers	34.23	107/134
			GII) Cyber Security	84.49	55/134
			GIII) Online Access to Financial Accounts	19.70	80/134

			GIV) Internet Shopping	03.23	117/134
	-	(H) Regulation Sub-Pillar	HI) regulatory Quality	28.53	123/134
	-		HII) ICT Regulatory Environment	87.06	45/134
	-		HIII)Emerging Technology Regulation	18.70	105/134
	-		HIV)Ecommerce Legislation	66.67	87/134
			HV) Law Content Privacy Protection	52.16	90/134
4.	-	I)Inclusion Sub-Pillar	- - -	26.17	131/134
	-	-	II) E-Participation	29.07	104/134
	-	-	III) Digital Payments Use (Socio-Economic GAP)	33.24	124/134
	-	-	IIII)Local Online Content Availability	27.40	117/134
	-	-	IIV)Internet Use (Gender GAP)	-	-
	-	-	IV) Digital Payments GAP Use (Rural GAP)	14.97	122/134
	Impact Pillar	-	- - -	37.20	116/134
	-	(J) Economy Sub-Pillar	- - -	22.51	85/134
	-	-			

	-	-	JI) High/Medium Tech Manufacturing	-	-
	-	-	JII)High/Tech Exports	11.52	67/134
	-	-	JIII) PCT Patent Applications	0.13	96/134
	-	-	JIV)Domestic Market Size	68.32	26/134
			JV) GIG Economy Prevalence	29.65	92/134
			JVI) ICT Services Export	01.92	116/134
	-	(K) Life Quality Sub-pillar	- -	50.53	109/134
	-	-	KI)Happiness	39.56	102/134
	-	-	KII) Freedom to make life choices	58.45	99/134
	-	-	FIII) Income inequality	70.10	51/134
	-	-	FIV) Healthy life expectancy at birth	34.10	125/134
	-	L) SDG Contributions Pillar	- -	38.56	131/134
	-	-	LI) Good health and well being	26.65	121/134
	-	-	LII) Quality Education	-	-
	-	-	LIII) Gender Economic Opportunity	52.21	115/134
	-	-	LIV) Affordable Clean Energy	52.10	113/134
	-	-	LV) Sustainable Cities /Communities	23.29	131/134

6.0. NIGERIA: POLICY OPTIONS AND PROSPECTS

Surely, in setting the pace for digital transformation, digital policies and strategies are very critical. Notably, Nigeria's medium term development plan is set out in the national development plan (2021– 2025) with the vision to unlock the economic potential in all sectors for a sustainable, holistic and inclusive National development. Clearly, the mission of the plan is to promote rapid multi-sector growth and development of Nigerian economy.

Specifically, it aims to establish a strong foundation for a diversified economy with robust micro, small and medium-sized enterprises growth and more resilient business environment as well as investing in critical physical, financial, digital and innovation infrastructures (FGN, 2021).

Similarly, the National Digital Economy Policy and Strategy (2020-2030) has been developed to reposition the Nigerian Economy in order to take advantage of the many opportunities that digital technologies provide (FGN, 2020). Basically, the vision is to transform Nigeria into a leading digital economy providing quality life and digital economies for all citizens, enterprises and stakeholders. However, several cross sector policies that relates to specific sectors have been developed either by the lead sector specific agency or by National Information Technology Development Agency or by Central Bank of Nigeria.

Essentially, a key element of the new generation digital regulation is consultation and collaboration with stakeholders (beyond the public sector stakeholders). In other words, engagements and interactions with private sector, academia, consumer and end-user associations, Development agencies as well as non-governmental organizations shall perform an important role. In fact, private and financial sector players' involvement is key to investment while academia can perform specific role in developing digital skills and promotion innovation. As the other end of the spectrum, consumers and endures are at the core of people – centered digital economy operationally, the involvement of these stakeholders is critical as digital transformation is highly dependent on the alignment and common vision between the government and different stakeholder across digital ecosystems.

Specifically, policy and regulatory framework design for enterprises (firms) digital transformations is of critical importance since they

can trigger digital multiplier effect by providing predictability as well as direction to stakeholder with divergent interest.
Again, market development with a locally relevant developmental impact should be at the lead of Nigeria's digital transformation strategy. However, a long-term policy framework can help to create certainty for policy makers, regulators and market players. Operationally, this framework needs to be complemented by a keen focus on associated implementation plans as well as legal and regulatory instruments for support it. Furthermore, the responsibility of digital transformation should be properly shared so as to avoid the issues of responsibility overlaps and ineffective coordination. Notably, where there are overlaps, gaps or lack of clarity; then there is need to clarify uncertainty as well as taking steps to reduce forum shopping while addressing in effective policy implementation. Yet, whole of government collaboration and cooperation should be encouraged whereas institutions and other stakeholders could be considered as potential partners.

Indeed, a total ecosystem approach should be taken to drive digital transformation of Nigerian business enterprises. In other words, there should be high level policies to facilitate digital skills as well as encouraging broadband usage and uptake in Nigeria.
While various instruments and institutions are in place to combat cybercrime and enhance cyber security and capabilities; efforts of different stakeholders need better coordination and communication. Yet, many challenges erode online trust and prevent the digital society from operating at its full potential.
Therefore, the development of unified legal and regulatory framework to protect society and promote a safe and secure digital environment should be foremost at any national efforts in cyber security operations. Critically, legal and regulatory frameworks include the establishment of cyber security baselines and compliance mechanisms for a set of national stakeholders as well as procedures to ensure consistency with international obligations. Again, effective mechanisms and institutional structures at the national level are necessary to deal with cyber risks and incidents reliably. Specifically, Computer Incident Response Teams (CITS) or Computer Emergency Response Teams (CERT) will enable the country to response to incidents using centralized contact point; promote quick and systematic action as well as empowering

countries to learn from experiences and build cyber security resilience.

Critically, national CIRTs should address issues on the national level while sector specific CIRTs should address the cyber security needs of the several specific sectors as appropriate. Furthermore, organizational measures should ensure that cyber security is sustained at the highest level of the executive as well as assigning relevant roles and responsibilities to various national entities making them accountable for the national cyber security posture.

However, the prioritization of cyber security as part of critical infrastructure and resilience should be reflected in budgetary commitments and cyber security strategies. Yet, having a national cyber security strategy is a positive step for cyber security posture; but regular updates and revision are also critically needed. Again, security the cyber domain through cyber security capacity building activities can contribute to reducing issues such as digital divide and cyber risks. Here, cyber security capacity also reinforces developing collective capabilities as well as facilitating international cooperation and partnerships to respond to cyber related challenges of the digital security. In other words, capacity development tools and measures can contribute to managing cyber related risks, protecting citizens, infrastructure, and businesses as well as building stronger cyber communities.

Furthermore, cyber security awareness rising is essential in keeping business enterprises and organizations alert. Thus, with the current shift to digital services, governments need to ensure that all users are aware of the risks being faced while carrying out digital activities. In fact, fostering cyber security at a national level needs to be accompanied by the promotion of a cyber-security culture encouraging an attitude shift among business leaders (away from cyber security as an information technology related problem; to a more holistic outlook that values the role of cyber security in improving overall business efficiently and performance). Specifically, Nigeria can promote cyber security adoption in the private sector through incentive mechanisms such as tax incentive based on cyber security parameters, tax holidays or cyber security standards (as part contracts). As a transitional issue (due to increasing interconnection and correlated infrastructures) cyber security risks are increasingly borderless and hence collaboration remains an essential tool for resolving cyber security challenges. In other words, bilateral and multilateral agreements are crucial in

codifying norms and behaviors as well as enhancing international cooperation.
And beyond formal cooperation between Nigeria and other countries; participating in international activities can provide opportunities to understand good practices as well as new approaches to tackle cyber security threats. Similarly, public-private partnerships are critical to cyber-security efforts such as in sharing actionable intelligence; exchanging good practice as well as communicating research and development needs and priorities.

UNIPOD AND INCUBATIVE POLITIES: Essentially, the capacity and competence of existing incubators in Nigeria should be enhanced by way of concentrating efforts on providing incubators with adequate financial resources to ensure their sustainability as well as effective support of Nano, micro, small and medium-sized enterprises. In this regard, government policies in which science and technology are prioritized as well as innovation strategies that foster innovation and encourage digital entrepreneurship (with transformation) should be developed and implanted. Again, seeking and establishing robust external networks could provide these enterprises with access to the relevant linkages to support market participation endeavors. Perhaps, rather than establishing new technology incubators, priority should be given to expanding and strengthening existing ones by increasing their financial capabilities for operational expenditure as well as projects founding. Consequently, the incubators (and policy makers) need to develop new business models (driven by digital transformation strategies) that ensure consistent revenue and incubators sustainability.
Again, strategic alignment and linkages with appropriate international organizations (such as EINECA, UNDP, AFDB, World Bank, AUC, ECOWAS, GIZ and Industry Associations) can ensure incubator sustainability by providing access to financial support and information networks that can build capacity among the leadership and management of technology incubator centers in Nigeria. Notably, collaboration and knowledge sharing among incubators can ensure financial sustainability by eliminating the supplication of costs and maximizing limited resources. Basically, this may include sharing pooled technical resources or designated faculties and technical resources at UNIPOD Centres (as regionally established).

Surely, mainstreaming entrepreneurship awareness and education as well as providing free tools, resources and digital platforms might ensure inclusive. In other words, given the incubators positing regarding knowledge transfer networks; they are crucial for industrialization as well as the establishment of new generation of businesses (geared towards fourth industrial revolution) in Nigeria. Therefore, given the importance of technology transfer and new knowledge generation for industrialization; there is need to build capacity in the management of intellectual property rights.

Operationally, incubators need to be equipped with experts in the green, blue and digital economies. Here, the private and public sectors can drive initiatives across the various economies and incentivize technology incubators to participate and make significant contributions to building the prototype economies. Specifically, the green economy is focused on transitioning to a low-carbon economy (requiring policy instruments that provide incentives for innovation). Consequently, UNIPODS and INCUBATORS should provide safe, collaborative and exciting space for people to explore ideas, design, build and adjust their product or services in these emerging sectors of global and national importance.

Critically, Nigerian policy makers must update their police and keep them up-to-date with the direction of entrepreneurship development in the Africa region and globally so as to prevent any disconnect between development polices and incubators as well as the development of Nano, micro, small, medium and large enterprises in Nigeria.

Specially, the adoption of robust monitoring and evaluation system will provide National Board for Technology Incubation (NBTI) with the expertise and capabilities to monitor and evaluate the extent of success of the projects and programme across the numerous Technology Incubation Centres (TIC) in Nigeria. In other words, the proposed system should aim to have a standardized monitoring and evaluation process which comes with the best international standard as well as in conformity with the national monitoring and evaluation framework.

Emerging Tech (Network) Policies: Indeed, organizations and enterprises will make better choices when they understand the factors shaping the future and hence the needs to bring policy commitment to the transformative science into clear focus. In other words, the need to bring insight and clarity to breakthrough technology that has the ability to change societies, economies, and

enterprises for the better. In fact, emerging technologies have the potential to reshape industries, economies and societal structures while presenting both opportunities and challenges for the various types and sizes of enterprises in Nigeria. Table 6.1 shows the topology of the emerging technologies that has great potential for (digital) transformation and growth for Nigerian Business enterprises and firms. Notably, while artificial intelligence has been used in research for many years, advances in deep learning, generative AI and foundation models are revolutionizing the scientific discovery process (WEF, 2024).

Essentially, AI will enable Nigerian enterprise research to make unprecedented connections and advancements in understanding diseases, proposing new materials as well as enhancing knowledge of the human body and mind. Again, by protecting personal privacy and providing new opportunities for global data sharing and collaboration; synthetic data is set to transform how information is handled with powerful applications in health related matters.

TABLE 6.1 TOPOLOGY OF EMERGING TECHNOLOGIES (TECH)

S/N	ETECH GROUPINGS	ETECH TYPES
1.	ETECH CONFIGURABLE INTELLIGENT SURFACES	A) INTELLIGENT SENSING NETWORKS B) INTELLIGENT MACHINE LEARNING C) HIGH ALTITUDE COMMUTATION SYSTEMS D) ELASTOCALORIC SYSTEMS E) PATIENT DATA ANALYSIS INTELLIGENCE F) ADVANCED DATA ANALYSIS AND INTELLIGENCE G) PROTEIN SYNTHETIC BIOLOGY H) NEUROTECHNOLOGY I) CLINICAL ARTIFICIAL INTELLIGENCE SYSTEM J) INTELLIGENT SENSORY COMMUNICATION K) QUANTUM INFORMATION SCIENCE L) SUSTAINABLE AVIATION AND FUELS M) GG-INTEGRATED DEVICES N) WATER ELECTROLYSIS FOR GREEN HYDROGEN PRODUCTION.
2.	AI FOR SCIENTIFIC RECOVERY	
3.	PRIVACY ENHANCING TECHNOLOGIES	
4.	IMMERSIVE TECHNOLOGY FOR THE BUILT WORLD	
5.	INTEGRATED SENSING AND COMMUNICATIONS	
6.	HIGH ALTITUDE PLATFORM STATIONS	
7.	CARBON-CAPTURING MICROBES	
8.	ELASTOCALORIES	
9.	GENOMICS FOR TRANSPLANTS	
10.	ALTERNATIVE LIVESTOCK FEED	

As innovative devices, reconfigurable intelligent surfaces turn ordinary walls and surfaces into intelligent components for wireless communication as well as enhancing energy efficiency in wireless networks. Essentially, they hold promises to numerous applications in smart factories and vehicular networks. Operationally, the advent of GG networks will facilitate simultaneous data collection (sensing) and transmission (communication). Critically, this will enable environmental monitoring systems that will help smart agriculture, environmental conservation and urban planning. By offering higher efficiency and lower energy use; elastocalorics release and absorb heat under mechanical stress which presents a sustainable alternative to current technologies. Similarly, engineered organisms con convert emissions into valuable products like befouls which provides a promising approach to mitigating climate change by Nigerian economy. This, act is known as carbon-capturing microbes.

Furthermore, high altitude platform stations can deliver connectivity, coverage and performance enhancements that neither satellites nor terrestrial towers can match in area with difficult terrains (such as mountains, jungles or deserts). For the sake of building next-generation networks with digital awareness, integrated sensing and communications makes wireless networks environment aware by enabling capabilities like localization, environment mapping and infrastructure monitoring. Practically, in engineering organisms to convert emissions into valuable products, Nigeria firms and enterprises could (after implementation) generate new products for the market instead of paying higher dollar amounts per ton of carbon dioxide emissions to offset their emissions. In the same way, by transitioning to alternative livestock feeds could promote more environmentally sustainable practices in animal agriculture. In the case of Genomics for transplants, the ability to understand and precisely edit the genome couple with novel immunes suppressive drug regimes has enabled the gene-editing organs for transplantation enhancements (though with ethical considerations). Indeed, the above technological innovations present transformative opportunities for Nigerian enterprise.

DIGITALIZATION POLICIES: While digital economic development can be critical, the process is neither linear nor a panacea. Thus, high-speed internet for broadband has the potential to accelerate Nigeria's socio-economic and enterprise development. In other words, since broadband is a key enabler to harmless the digital economy transformation; then the need to develop broadband and infrastructure in Nigeria remains high. That is, digital economy development should be a key priority for the

government of Nigeria as appropriate. Specifically, the country should accompany regulatory efforts to encourage infrastructure sharing and open access to critical infrastructure so as to allow faster deployment and greater rural push in the middle and last line connectivity. In other words, the government should support the reform and operationalization of the universal service provision fund to accelerate infrastructure development in underserved areas. Again, use innovative solutions to mobilize substantial private sector investment and expedite development of broadband infrastructure in underserved areas. Furthermore, the regulatory agencies should optimize spectrum by promoting greater transparency on spectrum allocation processes so as to encourage private investment. The government should also strengthen coordination between the various regulatory agencies that govern digital policy, regulation and implementation (with the goal of streamlining the institutional and regulatory framework). Critically, this can be achieved by considering merging some agencies/regulators/parastatals such as Nigeria Communications Commission (NCC) Nigeria Broadband Commission (NBC) and Nigeria Information Technology Development Agency (NITDA). The country should also promote affordability of broadband-enabled devices and widen opportunities for business enterprise as well as expanding communal broadband access to connect the unconnected. As regards digital platforms, the policy makers should reform the incentive structures in place that support the proliferation of multiple government applications that provide limited value for money. In other words, there is need to upgrade the skills of public sector employees to delivered on the government technological agenda of digital transformation of Nigerian firms. Again, without further delay, the Nigerian Inter Bank Settlement System (NIBSS) and National Identity Management Commission (NIMC) should complete the integration between the NIN system and BVN database so as to enhance efficient digital financial services. In fact, NIBSS and Central Bank of Nigerian (CBN) should strengthen enforcement of service standards to reduce the incidence of transaction failures in Nigeria digital ecosystem.

Similarly, Central Bank of Nigeria should encourage development of infrastructure for steam lined processing of foreign currently transactions and international payments. However, they should also ensure that its Digital financial services supervisory capacity is commensurable with the growth of the market. Furthermore, once the government makes the critical decision to digitalize all government payments; the Central Bank should use its regulatory powers to facilitate digitizing government payments at state and local levels. Consequently, financial institution

(CBN), government agencies (Civil Society) and development partners should collaborate on fostering financial literacy and capability as well as advancing digital skills in the economy. Indeed, give its large and entrepreneurial population, digital entrepreneurship has the potential to become on engine of economic transformation in Nigeria and thereby set the country on new growth trajectory. However, the use of digital technologies by Nigerian firms remains limited. Therefore, the country's legal and regulatory framework must be assessed and structured to create the business enabling environment that can support the evaluation of digital economy. Basically, the enactment of the digital economy bill will be an important step to improve the business environment for Nigerian enterprises as well as providing greater clarity for investment funds. In facts, once enacted, it is also important to develop relevant regulations to support the new bill (Act) so as to ensure effective implementation. Similarly, there should be review of legislation impacting digital enterprises so as to ensure the regulatory environment is operationally conducive (rather than impediment) to the growth of digital enterprises in Nigeria. It is also essential for the country to ensure consistency and coordination across the government levels (agencies) in support of digital enterprises.

Again, the government should update the legal framework for private equity investment as well as allowing for the introduction of innovative financing mechanisms. Perhaps, this includes revising current laws and regulations relevant to access private equity finance (such as venture capital incentives). Here, the government should ensure that they are effectively incentives as well as removing impediments to investment with property calibrated consumer and investor protection rules as appropriate. As a critical reform measure, the policy makers should date on the Nigerian enterprise and technology enabled firms so as to conduct a technology adoption survey with the intention to systematically assess the firm level barriers to adoption of digital technologies. Essentially, this assessment should provide a basis for need-based development of government policies and programs as well as evidence for consultations with ecosystem stakeholders. Clearly, the research outcome (information) will be a public good that allows Nigerian enterprises (firms) to better understand needs and constraints with potential solutions. In fact, it can also inform the design of programs of innovation hubs and other ecosystem enables.

Furthermore, the government should specially support the adoption of digital technologies in strategic industries. In other words, based on the results of the technology adoption survey and in collaboration with the private sectors, the country should launch targeted programs for digital technology adoption in industries that can have a transformational impact on productivity and livelihoods as well as expanded digital markets. Critically, the policy makers should foster collaboration between ecosystem players such as the small and medium enterprises, innovation hubs, academic, large enterprises, innovation hubs, academia, large enterprises and government. However, successful implementation of these initiatives will depend on the ownership and participation of the Nigerian private sector.

Indeed, digital technologies are forecast to be a major driver of productivity and therefore, in order for workers to successfully perform digital work; they must develop digital skills. Notably, digital skills exist on a continue (ranging in level from basic to intermediate to advanced). Despite the challenges and bottlenecks related to digital skills in Nigeria, there are clear strengths and opportunities that indicate the country can achieve much greater digital inclusion in the future. Consequently, the country should leverage the smart Nigerian Digital Economy project and use it to improve government coordination for the sake of digital transformation of business enterprises in Nigeria.

7.0. **CONCLUSION**

Indeed, technological advancements have resulted in a variety of innovations which have been evidence over the past decade by the evolution and growth of digital technologies. Consequently, digital enterprises can be regarded as the creation of new ventures and transformation of existing businesses through digital technologies. Essentially, these include new and mature firms that have digital technologies at the core of their business model. In other words, these enterprises can develop or transform the digital technology to deliver new improved products or services to their customers. On the other hand, we have the digitally enabled businesses which utilize digital technologies to improve business operations, sharpen

business intelligence as well as engaging with customers and stakeholders through new (digital) channels. Therefore, given its large and young entrepreneurial population, digital enterprising has the potential to become an engine of economic transformation in Nigeria as well as setting the country on new growth trajectory. However, improved digital connectivity can only achieve the desired transformational impact on economic opportunity and inclusive growth if combined with improvements in digital skills and literacy; the coverage of digital identity schemes; access to digital payments and financial services; as well as digital support to new and existing businesses. Thus, with such capabilities, the country can harness digital data and new technologies; generate new content link individuals with markets and government services as well as rolling out new and sustainable business models. Again, rather than implementing multiple and fragmented interventions; a coordinated and high level cross-boundary approach that maximizes complementarities is needed to build an inclusive digital economy. Ultimately, this would spur the development of high-impact applications for critical sectors while mitigating exclusion fraud and cyber risks. Therefore, as the country sets out to implement the strategic measure and unlock national potentials for ensuring progressive use of the national's cyberspace; all stakeholders have the mandate to make conscious effort to balance the security, social and economic imperatives of cyberspace with the cyber security needs of the government, industry, academia and development partners.

Notably, trust is the glue that binds our interconnected world and without trust, the fabric of our global society would unravel; causing not only uncertainty and inefficiency in our daily interactions but breaking many of the connections that empower our digital interactions. Therefore, as a critical backbone that upholds the

integrity and functionality of our digital age' access exposure and skills development are crucial to building trust. In other words, appropriate data governance is required in Nigeria. However, use of digital technologies by Nigerian (traditional) enterprises remains limited. Unfortunately, the cost cow complexity of doing business in Nigeria is significant impediment for the digital transformation of the various business enterprises. Similarly, some policies for stimulating investment for digital transformation are perhaps outdated or ineffective. Therefore, there is critical need to reform the policy environment to encourage digital transformation processes. Specifically, the Nigeria Digital Economy an E-Governance bill (2024) should rigorously be debated and enacted for the sake of successful digital transition programmes of the country. Similarly the National Artificial Intelligence strategies (2024) draft should be developed so as to harness the full potentials of AI in the digital transformation of the Nigerian firms and enterprises.

Finally, the adoption and utilization of UNIPOD and Technology Incubation Centers as dynamic institution dedicated to fostering innovation creativity and development activities for Nigerian enterprises should be encouraged. Operationally, as transformation incubators, they are places that will provide access to emerging technologies while ensuring that Nigerian enterprises (firms) are in forefront of digital landscape in the areas of artificial intelligence, virtual reality, internet of things development and other enabling digital applications.

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