Small Research Grant Project

Technical Skills Mapping for Accelerated Technology-Based Socioeconomic Development in the Niger Delta

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Foundation for Partnership Initiatives in the Niger Delta (PIND)
2nd Floor Prime Plaza,
187 Ademola Adetokunbo Crescent,
Wuse II, Abuja, Nigeria

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Acronyms

AMT	Advanced Manufacturing Technology
BPD	Barrels per day
CSP	Cross-sector partnership
DNA	Deoxyribonucleic Acid
FGD	Focus group discussion
ICT	Information and communications technology
IIP	In-depth interview protocol
KBE	Knowledge-based economy
LGAs	Local government areas
MSMEs	Micro, medium and small-sized entrepreneurs
NACETEM	National Centre for Technology Management
NDDC	Niger Delta Development Commission
NDR	Niger Delta region
NGOs	Non governmental organisations
PIND	Partnership Initiatives in the Niger Delta
PPP	Public-private-partnership
PSO	Private sector organisation
SBTC	Skill-biased technological change
SMEIs	Small and medium-sized entrepreneurs and industrialists
SMEs	Small and medium-sized entrepreneurs
SPSS	Statistical packages for social sciences
SRGP	Small research grants programme
STI	Science, technology and innovation
TVC	Technology venture capital fund
TVET	Technical/vocational education and training
UK	United Kingdom
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
WEF	World Economic Forum

Disclaimer

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Project Team

With the award of the research grant on the 30th September, 2011, this research project was undertaken by the following persons.

Names	Title	Role	Contact
Mendie Micah	Mr.	PIND Small Research Grants Program Manager	micah@pindfoundation.org
INI Ekanem Effiong	Mr.	Coordinator	litralcom@yahoo.com
EJIM-EZE Emmanuel Emeka	Mr.	Member	emmanuel.ejimeze@nacetem.org ejim_kings@yahoo.com
OGUNGBEMI Akinleye Afolabi	Mr.	Member	akinleye.ogungbemi@nacetem.org
OGUNDELE Olorotimi Jacob	Mr.	Member	jacob.ogundele.@nacetem.org
OKRIGWE Festa Ndutimi	Mr.	Member	festaokrigwe@yahoo.com
BUBOU Gordon Monday	Mr.	Team Leader	gordon.bubou@nacetem.org gbubou@gmail.com

1. Executive Summary

This study was intended to map technical skills requirements for technologically driven development programme for the Niger Delta region (NDR).

NDR is host to Nigeria's abundant oil and gas industry which generates about 90% of the country Gross Domestic Product. The economic growth for the nation coming from the NDR seem not have commiserate economic development of the region. Consequently, the region passed through turbulent years of agitations by militant youths. The restiveness took the form of wanton destruction of lives and property targeted at the oil industry. The spate of violence in the region was fuelled by the prevalent poverty and utter neglect of government and oil majors that are hosted in NDR. In an attempt to abate the danger posed to the nation by the militancy and agitations, the government of late President Yar'Adua initiated an Amnesty Programme. As various development partners try to tackle the developmental challenges of the NDR, the dearth of reliable data to plan and implement such initiatives became imminent.

This study used a mixed methodology approach, which included extensive desk review of secondary literature, survey; In-depth Interview protocol (IIP); and Focus Group Discussions (FGDs). The studied area of the NDR is covered by the following states of Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo and Rivers. Bayelsa, Delta and Rivers were the three states selected for the study, based on their peculiarities in the NDR, their huge crude oil and gas deposits, large scale exploration and exploitation, and their similar experiences in youth restiveness. Three sets of questionnaires were designed as research instruments for administration to graduates respondents, non-graduates with technical skills, and organisations either providing training or some form of support or even both. Contacts were made with various trade associations of artisans and craftsmen with different technical skills from the three selected states to get involved in FGDs. The FGDs involved about 408 discussants grouped into 10 clusters of their technical skills. The IIP protocol had five key informants spread across different strata of the development community. The informants were made up of key experts/technocrats, former and present serving High government personnel and opinion leaders from the NDR, working or have worked in the region.

Statistical data from the study revealed that, 83.9% of the non-graduate respondents have acquired technical skills and 78.6% of them are self-employed, with 11.1% working with NGOs, and the remaining 6.8% and 3.4% practicing in both the private and public sectors respectively. Those non graduate respondents without skills and willing to acquire technical skills preferred to acquire skills in Metal Work/Welding/Fabrication; some others prefer Electrical works and Painting while rest prefer the other technical skills. Even 80.8% of the graduates sampled in the study are willing to acquire additional skills if given the opportunity.

58.3% of skilled respondents were dissatisfied with their jobs/practice. 62.6% of the respondents attributed their dissatisfaction to low pay/wage and that their jobs were not related to their acquired skills, while 62.1% and 53.5% attributed reasons for their dissatisfaction to lack of facilities, workspace and conducive environment respectively. 16.7% of the non-graduate respondents stated that they have gained institutional support through skill training programmes, while 4.5% stated that they have received technical and market information but less than 3% agreed to have gained other institutional supports in the form of grants/Starter pack, loans, subsidies, Tax rebate, Technology Incubation and Trade union and Association support. About 71% of the non-graduate respondents rated Work space and Access road as basic infrastructure with a high importance while about 60% of them felt that power supply and Telecommunication/internet as needful. 16.3% of them attached importance to water supply.

Historically, technology, technology changes and technological progress have played important role in development of human kind. S&T play a key role in the creation of opportunities that serve as sources of livelihood, reducing poverty, the improvement of competitiveness and key sectors of national economies. Oil exploration and exploitation with the resultant environmental degradation, coupled with the environmental challenges of the Delta landscape of the NDR will need science and technology capabilities to sustain the region. It was no surprise that both graduates and non-graduates of the region crave to have technical skills to fill the opportunities in the oil industry located in their locality.

The IIP revealed that a multilateral approach would be the ideal to tackle the challenges of the region. This has far reaching policy implications for the NDR. NDR is largely a rural setting with the absence of the basic amenities, this calls for technical knowledge on how to utilize the natural resources in those areas to enhance living conditions and more so create sources of livelihood. There is a strong need to build basic social and technological infrastructure to support the informal sector (especially technological-biased small and medium-sized entrepreneurs and industrialists (SMEIs). There have been developmental programmes over the years to enhance the living conditions of the region. The point is that the best developmental strategy should be put in place to move NDR forward. This study concluded by proffering short, medium and long term technology led developmental strategies for the NDR. Government and developmental agencies should revitalise existing technology incubation centres and create new ones as short term measures. This will nurture young technological entrepreneurs creating jobs and sources of livelihood. Then there should be industrial clusters to host existing SMEs involved in technology-based enterprises and attract new ones. There is the need to develop Science parks in Universities in the Region to help create new technology spin-offs. On a long term basis, there should be capacity building in science and technology through the building of technical schools, skills and vocational centres in major towns of the Local Government Areas (LGAs) in the NDR.

Conclusively, this study underscores the importance of S&T for development, the policies that can maximize the benefits of S&T at the region level, and the strategic approaches that development partners can adopt to help accelerate the growth of scientific and technically skilled work force in the NDR. It proposes specific ways for intervention agencies to integrate the isolated activities they currently undertake to improve the lots of the people of the regions, making future actions more targeted and effective.

2. Introduction

Perceived or real neglect of the oil rich Niger Delta region (NDR) by government, and unresolved issues between the local communities and the petroleum industry plague the NDR to the extent that the region became prone to restiveness. Thus, the NDR witnessed an unprecedented level of violent agitations from armed militant youths who were demanding for a fair share of the region's rich petroleum resources. Such violent agitations took the form wanton destruction of life and property, mostly targeted at the oil industry and it lasted for a couple of years until the government of Late President Yar'Adua introduced an Amnesty programme in 2009.

The oil industry is primarily located in the Niger Delta, as nearly all oil and gas deposits found are concentrated there. It consists of the six south states, (Akwa Ibom, Bayelsa, Cross River, Delta, Edo and Rivers), two from the South-East (Abia and Imo) and Ondo State from the South-West geopolitical regions of Nigeria [see Figure 1.1]. The industry covers about 112,110 square kilometres surface (12% of Nigeria's total surface area) and goes well into the off-shore of the country's territorial waters in the Gulf of Guinea. The region is believed to have the world's third largest wetlands and also home to a very rich biodiversity Niger Delta Development Commission (NDDC) (2006). On the average daily basis, the NDR produce between 2 – 3 million BPD of crude oil if uninterrupted by militant activities, has approximately 5,284 drilled oil wells, approximately 257 oil flow stations, and over 7000km length of oil and gas pipelines criss-crossing the region (NDDC, 2006).

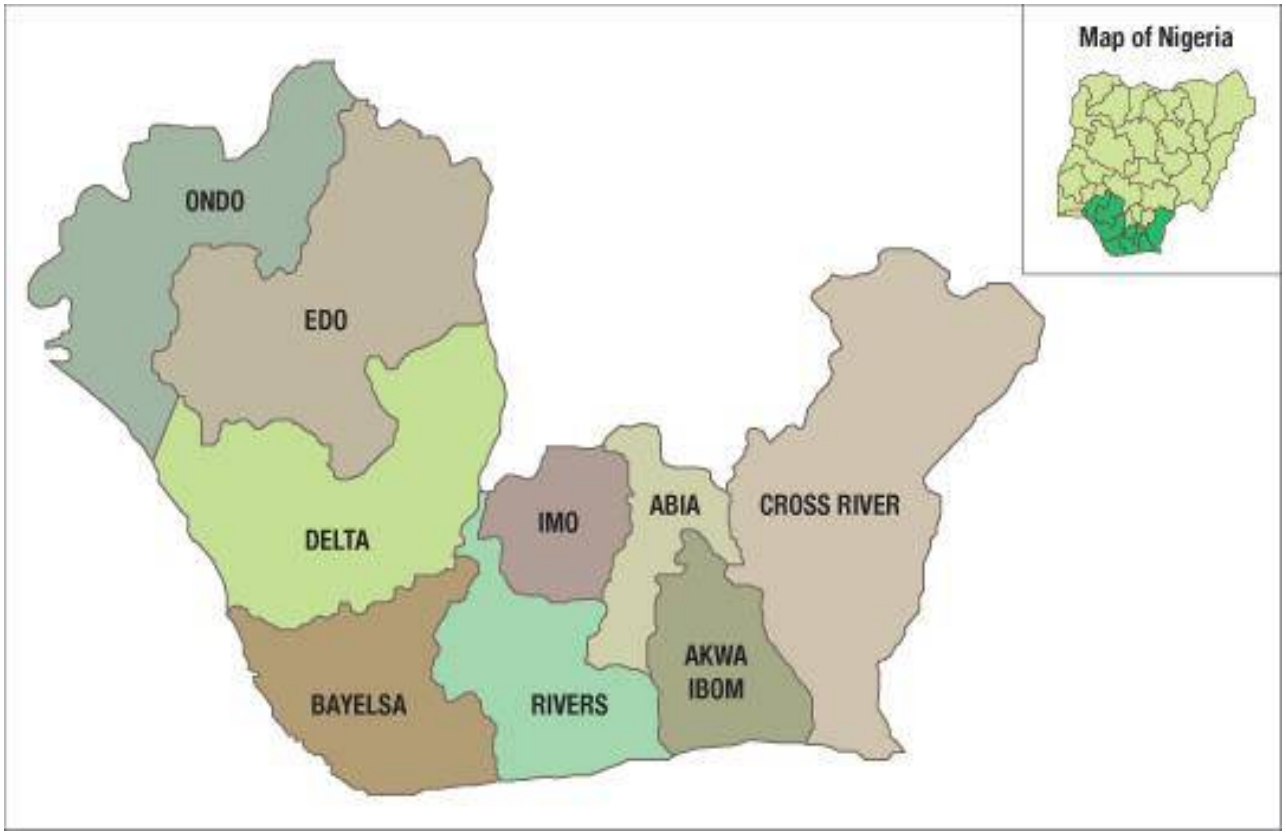

Figure 1: Map of the Niger Delta region.[1]

Going by the 2006 Census figures, the NDR accounts for about 25% of the total Population of Nigeria with an estimated population of about 36.6 million people, while over 60% of this population is rural. Again, contrary to previously known demographic profiles where females usually outnumber males, there are many idle young males than their female counterparts in the NDR. Expectedly, the NDR was ripe for the militancy to thrive, since global environmental change or the social problems of endemic poverty can trigger antisocial behaviour and terrorism (Sharma and Ruud, 2003).

The utter neglect and underdevelopment of the Niger Delta region over a period of five decades despite huge multibillion dollars oil revenue have resulted in serious socioeconomic consequences. Indeed, an overview of rural areas in the region reveals the absence of large-scale industries, difficult terrain, absence of good roads, absence of portable water, and lack of power supply (as well as absence of modern education and health facilities), which are indications of poverty (Bubou and Egai, 2012). The oil exploration and exploitation activities further compounded the situation as it led to extensive pollution and environmental degradation. The attendant frequent agitations and articulated demands for greater autonomy and control of the region's oil resources gave rise to militant confrontations with the Nigerian government and the multinational oil companies as earlier mentioned. Consequently, oil production was hamstrung as disaffected youth or organizations deliberately disrupt oil operations in attempts to effect a change. These disruptions have been extremely costly to the Nigerian oil industry and economy. Both the multinationals and the Federal Government have vested interests in ensuring uninterrupted oil-related operations and arrest the economic losses in oil production and revenue. This was the basis for the Federal Government's Amnesty Programme.

Interestingly, the developmental challenges of the NDR have long been identified even before Nigeria gained independence by the Willink's Commission of 1958. However, several attempts at meeting the multifaceted challenges have not been too successful. Indeed, the region has witnessed a number of attempts to influence the pace and nature of development, and improvement of the standard of living for her people. For the most part, the legacy of these previous schemes had translated into a picture of missed opportunities, low value for money, and enormous disappointment for communities in the states of the region whose hopes and aspirations have been repeatedly and raised shattered (NDDC, 2006).

Several intervention projects are still ongoing to change the trend. Most outstanding are the entrepreneurial trainings, technical and skill acquisition programmes embarked upon by the Niger Delta Development Commission, the newly created Federal Ministry of Niger Delta, Petroleum Technology Development Fund, State governments, Oil companies and other non-governmental organizations (NGOs). Despite the interventions by several bodies, the present amnesty rehabilitation training programmes show that there are so many people in the region who are unskilled. For instance, over 10,000 youths from the states are said to have been trained in various trades and skills, including refrigeration/air conditioning, auto mechanic and plant repair, printing, block molding, masonry, carpentry, plumbing, phone repairs, electrical installation, fashion designing, catering, hairdressing and driving. The questions are – are we really providing the right skills set to these youths to provide them a sustainable livelihood over the long run? What if there is also a mismatch between the skills that the region's young people are acquiring and those that today's employers demand? The bottom line is that an educated and skilled workforce is critical for the region to compete and succeed in today's globalised knowledge-based economy.

Indications are rife that most Africans may not have the DNA of innovation and entrepreneurship, for according to Friedman (2008) when money can be extracted from the ground, people simply don't develop the DNA of innovation and entrepreneurship. Worse still, the bane of socio-economic development in the NDR has been attributed to the apparent systemic dearth of relevant skills and capabilities and capabilities in the region, especially technical skills and entrepreneurialism. Again, the Rt Hon Gordon Brown of the United Kingdom (UK) listed the foundations of economic growth for poor African countries and regions as – sustained investment, innovation, education, skills, science and technology (S&T) (The Smith Institute, 2005). In view of that, investments in massive infrastructure in the Niger Delta region to bring about sustainable development must be complemented with entrepreneurship development (Bubou and Egai, 2012), especially technological entrepreneurship.

The dynamics of globalization and the rise of the knowledge economy have important implications for latecomer emerging economies such as Nigeria and regions like the Niger Delta. For instance, in today's knowledge-based economy (KBE) and innovation-driven economy, global competition has reduced the role of the traditional sources of competitive advantage (Blomqvist and Levy, 2006). In reality, globalization has increased the importance of skills, rather than resources, as a source of competitiveness (Schwalje, 2011a). Unfortunately, the truth is that, industrial activities of developing countries, especially low-income countries, are largely accounted for by small scale businesses that do not have capacity to acquire, develop and constantly upgrade skills by themselves (Yoshida, 2011) which is the case with the NDR. Again, rapidly changing national and global realities require change in regional economic strategies and policies. The NDR needs to be pro-active in determining its own destiny, rather than reacting after the fact. Thus, accelerating technology-based economic development in the NDR will provide select strategies for the region to take control of its economic destiny, as technology-based development is fundamental to the creation of wealth, career oriented jobs, and the material well-being of the people.

2.1 Aims and Objectives

This research project is intended to map out the existence or the lack of relevant knowledge, technical skills and capabilities in the NDR so as to provide data for informed policy decision making. It will also help to guide current and future government or non-governmental interventions with regards to job creation, employment generation, youth empowerment, education, and technology transfer for improved wellbeing of the people of the NDR. Specifically, it is aimed at identifying specific near- to long term- action/initiative for accelerated technology-based economic development in the Niger Delta region (NDR).

Thus, the broader objective is to identify the knowledge, skills and technology gaps required for technology-based economic development in the Niger Delta region, while the specific objectives are:

- To evaluate the role of basic infrastructure and social capital in enhancing technology-led economic development;
- To proffer a demand-driven competency-based technical and vocational skills training, capacity and capabilities development approach;

- To identify possible focal areas of partnership amongst various interested development partners in the region; and
- To determine the role of public policy in increasing the benefits of highly skilled workforce to the creation of value and wealth in the South-South region of Nigeria.

2.2 Scope and Limitations of the Study

The study was carried out in the Niger Delta states of Bayelsa, Delta and Rivers. Even within these states, the study was further limited to three local government areas in each state. Research was funded by a Small Research Grant and therefore could not carry out a detailed study. Also, the research was biased towards people with technical skills. Lastly, data from employers or potential employers of skilled persons was not obtained.

3. Technology and Development

To support the feasibility of this project, sufficient theoretical underpinnings and previous relevant studies are critically reviewed in this part.

3.1 Technology

Akaninwor (2008) sees technology as a systematic application of manufacturing methods and industrial arts to enhance efficiency in human activities; he went further to state that technology can simply be described as the result of man's efforts to do things more efficiently and effectively. Technology could be described as an activity resulting in procedures for building and creating things (or services) in prototypes and modes of products, in gadgets and inventions; more so it embraces a variety of practical activities that provide goods and services for man's use, enjoyments, welfare, manufacturing, transportation, communication, the processing of food and the conversion of energy into usable forms (Akinnawonu, 2008). Based on the foregone, technology can be defined as an attempt by man to apply the theories and principles of science in controlling the physical world, and the methodical utilization of natural resources to take care of man's needs. This also includes the tools and artifacts which man uses in daily activities to manipulate nature and the environment for his benefit.

3.2 Development

Development has many meanings depending on the perspective it is looked. The result is that several scholars have differently defined development depending on the context. For example, Idrisa (2009) in citing the 'Advanced Oxford Learners Dictionary' (2006) referred to development as the transforming of a people's way of living/doing things for the better. In another context, development was referred to the systematic use of scientific and technical knowledge to meet specific objectives or requirements; the process of economic and social transformation that is based on complex cultural and environmental factors and their interactions (Business Dictionary, 2012). In the context of this research project, development is seen as the systematic use of technology to meet the specific development objectives of transforming the socio-economic, cultural, environmental and material wellbeing of the people of the NDR. This will include improvements in social, physical and technological infrastructure to increase the standards of living of the people, job and wealth creation.

Technology is a reflection of economic activity of a region (UNCTAD, 2010) and S&T are linked to economic growth (UNCTAD, 2004). Scientific and technical capabilities determine the ability to provide clean water, good health care, adequate infrastructure, and safe food (UNCTAD, 2004). Various factors have been seen as a contributing factor towards attaining development in any nation which among are the youths (Adesope et al., 2010) and technologies and policies (Sigurdson, 2004). Technology has been viewed as an important tool in attaining development in recent times (Sigurdson, 2004). Accordingly, the role of technology in development is highlighted in the next subsection.

Countries and regions have now recognised the benefits from advances in S&T and are therefore adopting appropriate strategies at harnessing S&T for the sustainable development of their societies. For instance, development practitioners and economists alike have maintained that the importance of S&T, including knowledge for development cannot be understated as they are undeniably fundamental to the wealth and health of individuals. In the same way, S&T is said to play an instrumental role in the reduction of poverty, improvement of competitiveness and delivering results in key sectors – (education, agriculture, health, information and communication, transportation, biotechnology among others. But most importantly, moving technology from the scientific discovery stage to a commercially successful product is one of the major drivers of economic development in today's world order (Jordan et al., 2006).

Like many other regions in Africa, capacity is insufficient even to stay meaningfully connected to global advances in S&T. Hence there is the urgent need to place policy emphasis on emerging opportunities such as renewing infrastructure and building human capabilities in science, technology and innovation (STI) Juma in (The Smith Institute, 2005).
Role of technology in development

Historically, technology, technology changes and technological progress have played an important role in development of human kind (Šimurina and Tica, 2006) and advancement in technologies has demonstrated opportunities to the people to utilize it in their socio-economic and cultural development in a better and more sophisticated way (Giri Rao and Pattnaik, 2006). The history of technological change spanned from the Stone Age where humans shaped and used stones as tools to the discovery and utilization of fire, then the agrarian society to the industrial economy (Šimurina and Tica, 2006). The First Industrial Revolution is taken to be when the human society broke through from agrarian society to industrial domination (Šimurina and Tica, 2006).

STI and entrepreneurship have been proven, not only to be the impetus for growth and economic prosperity, but also serve as the foundation for the transformation of the new economy (Sankat, 2007). Accordingly, in the 21st century the success of all countries and societies around the world increasingly depend on their capacity to generate and access STI (Bajracharya, 2005). Likewise, social development and power of a nation is closely related to technological innovation and the transfer and application of technology (Youlin, 2005). It means that development to a large extent depends on a country's ability to understand, interpret, select, adapt, use, transmit, diffuse, produce and commercialize scientific and technological knowledge in ways appropriate to its culture, aspirations and level of development (Watson et al., 2003). Therefore, technology has become a critical input for economic development and poverty alleviation as advances in technological knowledge has made possible the significant reductions of poverty and improved quality of life in both developing and developed nations throughout the 20th century. No wonder, among the broad set of top-down Millennium Development Goals (MGDs) that the United Nations (UN) established in 2000 (http://www.un.org/millenniumgoals), the most outstanding one has been: "Make available the benefits of new technologies – especially ICTs."[1]

Discussing the role of S&T in development, Sharma (2005) maintain that scientific and technological development presents tremendous opportunities for economic growth, poverty reduction, and human development. In the author's view, technology not only helps in doing old things in better ways but also demonstrates new ways of doing previously unimagined things, the technological development - industrial revolution, green revolution, advancement in health sciences, improvement in transport technology, the fusion of information and communication technology (ICT), progress in knowledge and education - has broken the bounds of cost, time, distance and capability of doing things. These developments have helped to increase production and productivity of the economy dramatically, but that the dissemination and utilization of technological development have been uneven and the benefits of these developments have been distributed to the poorer countries poorly (Sharma, 2005).

UNCTAD (2004) and Sigurdson (2004) posit that, the impact of a nation's investment in technology has been felt greatly in their developmental progress as being seen in the case of Malaysia and Brazil in the recent time. In fact, there is almost an agreement that the level of development of a

[1] Brewer et al (2005), 'The case for technology in developing regions', available at: http://tier.cs.berkeley.edu/docs/CFT-ieee.pdf.

country is related to the level of technological use (Fernado, 2009). On the contrary, the consequences of lack of technologies on the society were manifested in acute poverty, high unemployment, wide economic and social disparities and malnutrition and have been quite damaging for national esteem. Technology is also inarguably the drive for the course of cultures and economies in the modern world (Carayannis and Alexander, 2010). Thus, despite the relative infancy of technology studies in developing regions, anecdotal evidence suggests that access to technology has a beneficial economic impact.[2]

3.3 Technology in Rural Development

The term rural development connotes overall development of rural areas to improve the quality of life of rural people. In this sense, it is a comprehensive and multidimensional concept, and encompasses the development of agriculture and allied activities, village and cottage industries and crafts, socio-economic infrastructure, community services and facilities and, above all, human resources in rural areas. As a phenomenon, rural development is the end-result of interactions between various physical, technological, economic, social, cultural and institutional factors[3].

Rural development has been a critical issue according to Maxwell et al (2001), with their argument that most poverty in the world is rural and reaching the international development target means giving high priority to rural development. There is a divide between the rural poor and those who live in the urban areas especially in most developing nations**.** The divide is basically caused by lack of facilities and low infrastructural development in the rural areas (Watson et al, 2003). These rural-urban disparities have been an endemic problem of most developing countries and a major source of the continuing increase in their urban population.

Nigeria is made up of diverse ethnic groups and different geographical areas of varying material and human resources and the emerging patterns of development show that there are disparities in development between urban and rural areas and among different geographical areas in the country (Adeniyi, 1983). As stated earlier, the NDR is largely rural so the same or similar situations apply to it.

Generally, technology is seen as the primary engine for economic development but most rural communities have been found backward in development because of the absence of the systematic application of technology (Soboyejo, 2005). The rural poor need technologies for renewable energy generation maintenance, water treatment, and farming techniques for sustainable livelihood.

Interestingly, there are no universally accepted approaches to rural development. It is a choice influenced by time, space and culture. However, rural areas can move from being technologically backward to being technologically advanced. Thus to remedy the urban-rural technology development gap, it is necessary to consider the following suggestions:

- The need for development of technical skilled personnel and training centres with equipment to enhance training;
- Appropriate Technology: We need to embark on the acquisition of the technology that is appropriate and useful to specific rural areas. Each rural area has to look inward at their peculiar environment to see what their local people can do, and fabricate machineries, tools and equipment that will assist them to do these things more efficiently **(**Uwaifo and Uddin, 2009).
- Fund to support the operation and maintenance of infrastructures through skills acquisition and training centres.

With the adoption of technology in the rural area, the following can be achieved which will bring about development:

- Uninterrupted availability of power for agriculture and revitalization of the irrigation network.

[2] Brewer et al (2005), 'The case for technology in developing regions', available at: http://tier.cs.berkeley.edu/docs/CFT-ieee.pdf.
[3] Singh, 1999 as in 3 above.
[3] Retrieved from www.pindfoundation.net, on April 12, 2011.

- Greater access to potable drinking water, better roads, better educational infrastructure particularly primary education, and extension of quality health services.
- Generation of additional employment opportunities in the private sector by promoting investment, improving marketable vocational skills with widespread use of information technology.
- Uplifting the underprivileged sections by enhancing beneficiary-oriented social security programmes, as well as specific employment generating programmes to increase their income and improve the quality of life.
- Strengthening the process of rural renewal by greater thrust to schemes for reaching out quality facilities to the rural population.
- Restructuring agriculture to meet the challenges of food security[4]

In conclusion, technology plays the pivotal role in the growth of a developing nation and also provides people with opportunities a platform merging the gap between the rural and urban areas.

3.4 Technology in Regional Development

According to Bamberry (2006), technology plays a significant role in regional development, which enables regions especially in the manufacturing areas to exhibits incremental improvement in the design and processing methods to arrive at increased outputs substantially for improved economies of scale. Likewise, Sigurdson (2004) expresses another importance of technology and its development towards the regional issues as it brings about shift in the focus and attention of the government towards the provision and sustenance of frameworks and resources; increasingly closer industrial and technological links. This creates an avenue for industrial clusters to form the basis for further development in the regions as successful development of clusters requires capabilities and facilities to meet a number of demands for physical infrastructure such as water and power supplies, physical transportation and telecommunications. In fact, telecommunications is a reflection of economic activity of a society (Giri Rao and Pattnaik, 2006). In order to remedy the rural-urban telecommunications gap, it is necessary to address the economic gap in living standards between regions.

The importance of technology in any regional development will bring about the existence of organizations which will effectively utilize human resources and the development of innovation systems in the regions[5]. This is so because technology strives to develop new and better technical approaches and capabilities, guiding basic research to meet regional projected long-range needs, and promoting partnerships and collaborations with other regional agencies, industries and academia for competitive advantages (Fernado, 2009).

On a different note, regional development constitutes a significant framework for a balanced growth and development in a country (Jelili et al, 2008). Nigeria, as a complex and developing nation with different geographical units, needs a comprehensive and articulate factor of development that takes care of every segment and interest of the nation (Adeniyi, 1983). On this note, articulating the peculiar development needs of the NDR and the proposition of a technology-led regional development strategy becomes paramount.

3.5 Technology in Socioeconomic Development

Technological changes contribute to the economic development of a region due to incremental changes, problem-solving and collaboration (Lemarche, 1986). It also shows the level of government commitment and support for technological development through the provision of adequate funds and support to encourage regional firms and the academia (Lemarche, 1986).

[4] Retrieved from: http://planningcommission.nic.in/plans/stateplan/sdr_punjab/sdrpun_ch5.pdf, on June, 14, 2012.
[5] NISTEP Report No.11, Basic study on Promotion of S&T in Regions (1)- study on the cases of local area development based on S&T, retrieved from: www.nistep.go.jp, accessed 18th June, 2012.

3.6 Role of Infrastructure and Social Capital in Enhancing Technology-led Development

One of the reasons the Industrial Revolution succeeded to a greater degree in the United States than in other economies was the investment in "traditional" economic infrastructure like roads, bridges, canals, and railroads which unified regional markets and greatly increased economic efficiency (Tassey, 2008). It has been argued that while the lack of infrastructure is hindering the economic growth in many developing countries, on the other hand, investment in infrastructure has the effects of contributing to increased productivity and economic growth in developing countries where infrastructure is still insufficient (Kim, 2006). Interestingly, the development of physical as well as social infrastructure plays an important role in the overall advancement of the rural economy[6]. While income disparities between urban and rural areas have a trend to deteriorate when infrastructure investment is extremely focused on urban development, conversely, infrastructure investment in rural areas had a trend to correct the regional income disparities (Kim, 2006).

Kim (2006), corroborating the views of other development economists referred infrastructure as social overhead capital that encompassing activities that share technical features, such as economies of scale and economic features like spillovers from users to non-users; that social overhead capital contributes to enhancement of productivity and assists in the realization of the potential ability of human capital, and creates situations in which that potential can fully function. On the contrary, social capital is multi-dimensional in nature and is therefore most frequently defined in terms of groups, networks, norms, and trust.

In study also, infrastructure will be referred to as social overhead capital and electricity, transportation, and communication will be regarded as economic infrastructure.

While the [World Bank, 1994] emphasized that there is a close relationship between infrastructure and economic growth, interestingly, a study by (Kim, 2006) revealed that infrastructure availability positively correlated with economic growth in both Japan and South Korea. Thus, Kim (2006) declared that infrastructure was indispensable to achieve the main development targets in developing countries, such as urbanization, industrialization, export promotion, equitable income distribution, and sustainable economic development.

Given the importance of infrastructure, the World Economic Forum (WEF) (2011) in its Global Competitiveness Reports placed infrastructure as the second pillar of competiveness. According to the report, extensive and efficient infrastructure is critical for ensuring the effective functioning of any economy, as it is an important factor determining the location of economic activity and the kinds of activities or sectors that can develop in a particular instance. Well-developed infrastructure reduces the effect of distance between regions, integrating the national market and connecting it at low cost to markets in other countries and regions. In addition, the quality and extensiveness of infrastructure networks significantly impact economic growth and reduce income inequalities and poverty in a variety of ways.

The same describes the importance of specific infrastructure types thus; effective modes of transport, including quality roads, railroads, ports, and air transport, enable entrepreneurs to get their goods and services to market in a secure and timely manner and facilitate the movement of workers to the most suitable jobs. Economies also depend on electricity supplies that are free of interruptions and shortages so that businesses and factories can work unimpeded. Finally, a solid and extensive telecommunications network allows for a rapid and free flow of information, which increases overall economic efficiency by helping to ensure that businesses can communicate and decisions are made by economic actors taking into account all available relevant information (Soboyejo, 2005).

Nevertheless, the above social objectives require several industries in each case to deliver the technology systems that achieve the objective, whose efficiency is again determined to a large degree by the availability and quality of the supporting technology infrastructures (Tassey, 2008). He maintains that today's winners and losers across countries from the rapidly evolving globalization of

[6] Retrieved from: http://planningcommission.nic.in/plans/stateplan/sdr_punjab/sdrpun_ch5.pdf, on June 14, 2012.

the technology-based economy will again be significantly affected by investments in new kinds of infrastructure. One of such is the relative ability among economies to identify and accumulate the complementary private and public technology assets that address the increasing complexity of emerging technologies, while the second is the need to manage those technology infrastructures effectively.

Unfortunately, small and medium-sized entrepreneurs (SMEs) in least developed countries are unable to develop infrastructure and technology significantly on their own (Nganga *et al*., 2011). This brings to the fore, the need for industrial infrastructure planning and development that seeks to promote access to, acquisition and development of technologies for improved efficiency, effectiveness and productivity of the small manufacturing enterprises. Thus, SMEs cannot attain growth unless they employ technologies that allow for competitiveness. The technology acquisition and development can only be facilitated by appropriate and relevant infrastructure (Nganga *et al*., 2011).

Infrastructure development is therefore one of the most integral parts of the public policies in developing countries since any government's policy to develop a more skilled workforce will not work unless there is investment in developing a robust and sustainable infrastructure for improving the workforce's literacy, language, numeracy and technical skills.

3.7 Technical Skills and Competencies

In the rapidly integrating world, knowledge and skills are becoming increasingly important as the source of competitiveness and productivity. As such, countries with low and outdated knowledge and skills are more and more likely to be excluded from gainful opportunities created by globalization (Khan, 2005). Equally, youth unemployment, social exclusion and poverty have led many decision-makers to refocus their attention on providing skills development opportunities that respond to evolving social and economic demands[7]. Nonetheless, Shoesmith (2011) maintains that it is problematic to define the term 'skills'. According to her, sometimes, 'skills' is taken to have a broad meaning and can encompass any and all of the following: basic skills, such as literacy and numeracy, life skills, employability skills, practical skills and technical skills. But that, in more recent times, the term 'skills' has become synonymous with technical and vocational education and training (TVET) and this has created an assumption that skills from TVET programmes only relate to technical skills, sometimes also referred to as 'manual' or 'non-cognitive' skills. Equally, maintained that definitions of skills, and by association TVET, have been further complicated and confused because skills are often viewed as the answer to any number of social and economic problems (Shoesmith, 2011).

- Basic skills – the literacy and numeracy skills that are the foundation for developing all other skills;
- Generic skills - also known as interpersonal or life skills. Their broader relevance to daily life, not just to the workplace, is why they have been separated out from employability skills;
- Employability skills build on the generic skills and while they are specifically about helping individuals become and remain active participants of the labour market, they are transferable between sectors and occupations; and
- Finally, technical or job-specific skills are defined as the skills needed to work in a particular industry or business. It is perfectly possible that one person may have more than one area of technical expertise (Shoesmith, 2011).

Twenty-first century skills are those high-priority skills, competencies and types of understanding that individuals need to be productive and creative workers and citizens of the 21st century (Bowman, 2010). They are the generic skills earlier mentioned that are required by all individuals.

An apparent disconnect exists between the demand for and the supply of skills in the NDR. It is a common saying that the youths of the region generally lack skills and are mostly unemployable. However, globally, there has been a rise in demand for skilled manpower. Skills gaps typically occur

[7] Tang, Q. (2012) 'TVET for a Changing World: Global Developments, Local Resonance', http://norrag.wordpress.com/2012/07/05/tvet-for-a-changing-world-global-developments-local-resonance/

due to a lack of or shortfall in soft skills (problem solving, reading, writing, and communication) or technical skills such as familiarity with particular fields of science, engineering, or ICT (Schwalje, 2011b).

According to Schwalje (2011a; 2011b), skill-biased technological change (SBTC) has been advanced as a main driver for the relative increase in global demand for skilled labour. He maintains that, a major corollary of SBTC is technology-skill complementarities which theorize that pairing skilled workers with capital has productivity enhancing effects that could contribute towards development. A skilled workforce is crucial for economic recovery of any region as it strengthens businesses, creates and retains jobs, and ensures productivity and prosperity for families. Kapstein in (Schwalje, (2011a), contended that, by generating higher levels of national skills, countries become more attractive to foreign and domestic private investment which in turn facilitates economic growth and prosperity. No wonder, many developing countries that have enjoyed a period of steady growth over the last decade or so due to strong demand for commodities and raw materials are now embarking on investment in skills development to modernize and increase the value added of their economies to remain competitive in the global economy (Yoshida, 2011). For that reason, public policy should be geared towards building the skills of the people, especially women and youths of the NDR.

Thus, this project sought to underscore the importance of technical skills to the development of a region like the Niger Delta. As a consequence, certain critical skills and competencies were highlighted and their existence in the NDR investigated. Examples of such technical skills and competencies are shown in Tables 1 and 2.

Table 1: Technical Skills.

Vocation/Trade/Skills	
Metal Works/Welding/Fabrication	Masonry
Auto-Mechanics	Vulcanizing
Woodwork & Joinery/Upholstery	Painting
Air Conditioning & Refrigeration	Boat & Ship Building Technology
Plumbing/Fitting	Ceramic Technology
Scaffolding & Rigging	Foundry
Electrical Works	Horticulture & Landscaping
Fitting & Machining	etc

Table 2: Disciplines and Competencies.

Science, Technology and Engineering Disciplines/Competencies	
Mechanical Engineering	Environmental Engineering
Civil Engineering	Physics
Electrical/Electronic Engineering	Food Science & Technology
Marine/Hydrological Engineering	Geology/Applied Geophysics
Chemical/Petrochemical/Petroleum Engineering	Biochemistry/Bioinformatics/Biotechnology
Materials & Metallurgical Engineering	Fisheries Technology
Agricultural Engineering	Microbiology
Aeronautics/Space Engineering	Land Surveying
Computer Engineering	Quantity Surveying
Industrial Engineering	Estate Management
Industry Chemistry	Laboratory Technology/Instrumentation

The world situation with regard to higher learning as well as TVET has seen active discussion of the need for graduates to have generic (employment) skills or core competencies in areas that most employers require (Ruhizan *et al*., 2011). It is generic in the sense that they are skills that an employee should possess besides the knowledge and skills directly related to their job. There is no one-size-fits-all situation with generic skills as different countries have structured their generic skills

sets to meet their own need. These generic skills are known as core skills, key competencies, transferable skills and employability skills, which are developed throughout a person's life and in multiple settings including work, life and educational settings (George, 2011).

One outstanding case is that of the Malaysian Ministry of Higher Education's identified generic skills which include: effective communication in English and the local language, critical-and creative-thinking and problem-solving skills; teamwork and multicultural skills; lifelong-learning skills including self-reliance and information management; entrepreneurial skills including the ability to explore opportunity and risk management; ethics and professional morals; and leadership skills (Ruhizan *et al*., 2011). Generic employability skills have thus become part of a national agenda in education and training for primary, secondary, further and higher education, and their development is a priority for the UK government (Greatbatch and Lewis, 2007). These generic skills and competencies are applicable to any country or region. The Nigerian Higher Education subsector seems not to provide for most of the skills mentioned above to graduates. Consequently, most Nigerian graduates are seen as unemployable, either in self- or paid-employment.

Also, TVET is considered as an important measure for the development of trained labour force required for the socio-economic development of a country and it is believed to be an effective answer to reduce unemployment and migration to urban centres (Kazimi, 2007). Thus, after a period of neglect, TVET is now firmly on the agenda of governments around the world[8]. As a consequent, a demand-driven competencies-based skills development programme that will factor in both generic and other technical skills will be proposed and discussed in much more details in a later chapter.

According to International Labour Organization (ILO) (2011), the cornerstones of a policy framework for developing a suitably skilled workforce are: broad availability of good-quality education as a foundation for future training; a close matching of skills supply to the needs of enterprises and labour markets; enabling workers and enterprises to adjust to changes in technology and markets; and anticipating and preparing for the skills needs of the future.

[8] Tang, Q. (2012) 'TVET for a Changing World: Global Developments, Local Resonance', http://norrag.wordpress.com/2012/07/05/tvet-for-a-changing-world-global-developments-local-resonance/

3. Methodology

It is conventional to employ either one of two approaches, namely quantitative or qualitative to understand a research problem (Lourens, 2010). However, researchers can decide to triangulate the quantitative findings by qualitative means. Triangulation refers to the process of adding value to research results by combining research methods Maree in (Lourens, 2010). Thus, qualitative approaches like in-depth interviews and Focus Group Discussions (FGDs) can be combined with questionnaires to provide a greater level of confidence in the research results. A mix-methodology was to provide breadth, depth, qualitative and quantitative information. Accordingly, a mix-methodology was adopted which included extensive desk review of secondary literature consisting of materials gathered from journals, magazines, government sources; a survey; an in-depth interview protocol (IIP); and FGD were undertaken.

3.1 Study Area

The study area has been extensively discussed in the introductory chapter. While the NDR is made of nine states, only three states were eventually selected for the survey. The states were, Bayelsa, Delta and Rivers States. These states were selected based on, among other things, the notion of their primacy in the scheme of things in the NDR, their huge crude oil and gas deposits, large scale exploration and exploitation, and their similar experiences in youth restiveness. There are 8 Local Government Areas (LGAs) in Bayelsa State, 18 LGAs in Delta State, and 23 LGAs in Rivers State. For the survey, Kolokuma/Opokuma, Ogbia and Yenagoa LGAs were selected in Bayelsa State; Asaba North, Ughelli North and Warri South LGAs were selected in Delta State, while Ekwerre, Emuoha, and Obio/Akpo LGAs were selected in Rivers State.

3.2 Sampling

The sampling technique adopted for the study was both purposive (also known as purposeful or judgmental). It is purposive when participants have been selected due to their specific characteristics (Patton, 2002), as in the case of the selection of states and LGAs. It was also judgmental in the sense that, samples consisted of respondents who, in the judgment of the researchers, will best supply the necessary information (Page and Meyer, 2000). This latter technique was very useful in the selection of participants in the questionnaire administration, FGDs as well as for the in-depth interviews.

Consequently, 300 respondents in the 3 States were targeted for the questionnaire administration. 198 non-graduates were selected, 66 each per state and 22 per LGA, while 72 graduates were selected, 24 per state and 8 per LGA. 30 organizations, 10 per state providing training and/or support for technical skills acquisition were also randomly selected.

3.3 Research Instruments

Three types of instruments were developed for the study. They were:

- Structured and Semi-structured Questionnaire: these formed the survey which was intended to gather information over a large sample of respondents from the NDR to provide quantitative data to enable the researchers generalize findings from the study. For instance, Worley (in Lourens, 2010) claims questionnaires are one of the most efficient and effective ways of collecting data that can be administered to a large number of people simultaneously. Hence, three sets questionnaires (for graduates, non-graduate with technically skills and organizations) were developed to elicit responses from three different categories of respondents. This was to, among other things, confirm to presence or absence of technical skills, to evaluate the challenges faced by technology-based skilled persons; to determine the role of basic and technological infrastructure to a technology-led development in the NDR.
- A protocol for In-depth Interviews: this was one of the qualitative data collection methods used to gain an understanding of the development challenges and issues of lack of skills,

especially technical skills in the NDR. These differ from FGDs because they are one-on-one interviews and they differ from surveys because they permit participants to give detailed responses to each question. Key informants chosen for the discussion are supposed to be experts or highly experienced persons in the issues being discussed. Interestingly, in-depth interviews strengthen the research process as they support the interpretation of results from surveys and other quantitative methods.

- Focus Group Discussions: FGDs were employed for this study because this is an effective technique for eliciting views and opinions from artisans who are actively engaged in one form of vocation or the other in the NDR. One other reason is that, FGDs can produce highly useful information about issues under investigation that the other instruments might not have able to capture.

Three sets of questionnaires were designed as research instruments for administration to the following respondent groups, namely, graduates, non-graduates with technical skills, and organisations either providing training or some form of support or even both. For the non-graduates, the questionnaire was divided into four sections. Section 'A' primarily dealt with demographic information of the respondents. Section 'B' was designed to capture the highest academic qualification, the type of skills acquired and preference for additional skills by the respondents. Sections 'C' and 'D' captured information relating to the type of support that respondents have either received or will prefer to receive and the challenges they encounter respectively. The questionnaire for graduate respondents contained only two sections, with section 'A' having questions to gather bio-data about the respondents. Section 'B' of this questionnaire was designed to capture the highest educational level attained by the participants, preference for additional skills by respondents. In all, the questionnaire contained 15 questions.

Unlike any of the preceding two, the questionnaire for the organisations was divided into three sections. Similar to the earlier questionnaires however, section 'A' sought to establish some demographic information about the organisations as well as that of the respondent within that organisation. Section 'B' was to determine the programmes and activities of the organisation, while the last section was to ascertain whether or not the responding organisation have collaborative arrangements with other organisations and also to know if they receive some form of external support from other bodies.

In order to validate the research instrument, a pilot test was conducted in one of the states to test the reliability, clarity of purpose and adequacy of the designed instrument. Subsequently 300 questionnaires were administered, out of which 287 were retrieved, with a very high recursive rate of 95.7%. Out of the 30 organizations selected for the survey, only 13 responded.

The IIP had nine questions [see Appendix 2], and five key informants spread across different strata of the development community were interviewed. Among the key informants were a former Minister of Science and Technology, and a serving Member of State House of Assembly who is Chairman of the House Committee on Youth, Conflict Resolution and Employment Generation. Others were a Lecturer who had been an active community development officer in one of the oil majors in the region, and lastly, a one-time representative of one of the oil majors who currently serves as an Overseer on the NDDC board. Then a technology entrepreneur who was once a craft man but now owns a firm that is consulting to other oil majors and providing training to youths of NDR.

The FGD guide also contained nine questions [see Appendix 3]. In all, about 408 discussants grouped into 10 clusters of skills participated in the focus group discussions. In all, 30 FGDs were held in the three states. Activities during the artisan meetings and FGDs are shown in Figures 2, 3, 4 and 5.

Figure 2: Cross-section of leadership of trade associations in Yenagoa, Bayelsa State.

Figure 3: Meeting with leadership of trade associations in Yenagoa, Bayelsa State.

Figure 4: Meeting with a cross-section of artisans before a FGD in Warri, Delta State.

Figure 5: Group photographs and discussion in Port Harcourt.

4. Data Analysis and Discussion

4.1 The Survey

Field data was captured into the Statistical Package for Social Sciences (SPSS). The data is reproduced and analysed below.

Table 3: Demographic Information of Non-graduate Respondents.

STATE OF ORIGIN			
		Frequency	Percent
Valid	Bayelsa	60	30.3
	Delta	66	33.3
	Rivers	66	33.3
	Total	192	97.0
Missing	System	6	3.0
Total		198	100.0
GENDER			
Male		154	77.8
Valid	Female	37	18.7
	Total	191	96.5
Missing	System	7	3.5
	Total	198	100.0
AGE			
Valid	15-20	9	4.5
	21-25	38	19.2
	26-30	52	26.3
	31-35	44	22.2
	36-40	23	11.6
	41-45	11	5.6
	Above 46	16	8.1
	Total	193	97.5
Missing	System	5	2.5
Total		198	100.0
EDUCATIONAL LEVEL			

		Frequency	Percent
Valid	None	8	5.2
	Primary	29	18.8
	Secondary	77	50.0
	Technical College	22	14.3
	HSC-A level	12	7.8
	Total	148	96.1
Missing	System	6	3.9
Total	154	100.0	

Table 4: Skills Distribution of Non-graduate Respondents.

SKILLS DISTRIBUTION OF NON-GRADUATES			
		Frequency	**Percent**
Valid	Invalid	19	9.6
	Metal work/Welding/Fabrication	23	11.6
	Auto-Mechanics	20	10.1
	Woodwork & Joinery/Upholstery	5	2.5
	Air Conditioning and Refrigeration	4	2.0
	Plumbing / Fitting	6	3.0
	Scaffolding and Rigging	6	3.0
	Electrical works	6	3.0
	Vulcanizing	3	1.5
	Painting	8	4.0
	Boat & Ship Building Technology	2	1.0
	Horticulture and Landscaping	1	.5
	Total	103	52.0
Missing	System	95	48.0
Total		198	100.0

Statistical data from the study revealed that 75.49% of the non-graduate respondents have acquired technical skills and 78.6% of them are self-employed, with 11.0% working with NGOs, and the remaining 7.6% and 5.9 % practicing in both the public and private sectors respectively.

When asked whether or not they were satisfied with their practice/jobs, 41.7% of respondents answered in the affirmative, while 58.3% of respondents said they were dissatisfied. Again, when further asked for the reason for the dissatisfaction, 62.6% of the respondents attributed their dissatisfaction to low pay/wage and that their jobs were not related to their acquired skills, while 62.1% and 53.5% attributed reasons for their dissatisfaction to lack of facilities and unconducive environment respectively.

Those respondents without skills and willing to acquire technical skills specified the skills they would prefer to acquire as shown in Figure 6. Most of them would prefer to acquire skills in Metal Work/Welding/Fabrication; some others prefer Electrical works and Painting while the rest prefer other technical skills.

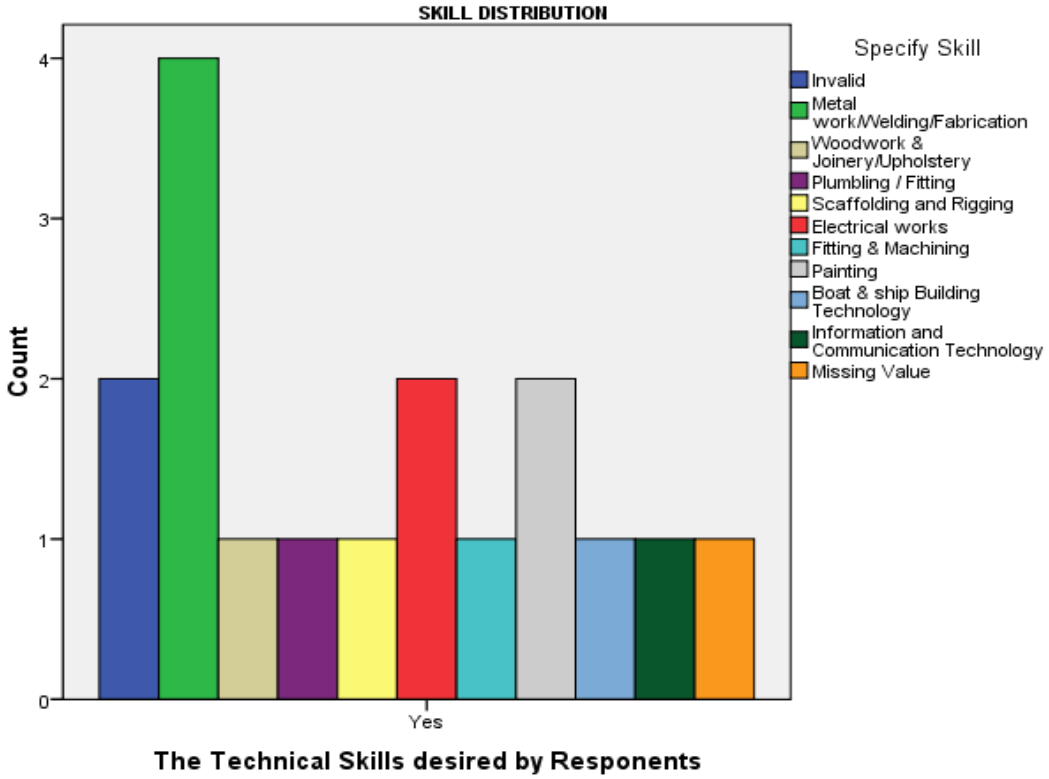

Figure 6: Preferred technical skills of non-graduate respondents.

When asked to state how important the following basic infrastructure – power supply, workspace, roads, telecommunications and water supply were to their productivity, 59.8% of the respondent rated power supply as important, 71.3% of them rated workspace as important, 68.3% of respondents rated roads as important to their productivity, 63.3% rated telecommunications as important, while paltry 16.3% rated water supply as important to their productivity.

Table 5: Institutional Support Received by Respondents.

Variable	Responses		Frequency	Percent
Training	Valid	Yes	33	16.7
		No	158	79.8
		Total	191	96.5
	Missing	System	7	3.5
	Total		198	100.0
Grants/ Starter Pack	Valid	Yes	2	1.0
		No	190	96.0
		Total	192	97.0
	Missing	System	6	3.0
	Total		198	100.0
Loan	Valid	Yes	5	2.5
		No	188	94.9
		Total	193	97.5
	Missing	System	5	2.5
	Total		198	100.0
Subsidies	Valid	Yes	2	1.0
		No	189	95.5
		Total	191	96.5
	Missing	System	7	3.5

	Total		198	100.0
Tax Rebate	Valid	yes	2	1.0
		no	189	95.5
		Total	191	96.5
	Missing	System	7	3.5
	Total		198	100.0
Technology Incubation Centre	Valid	yes	3	1.5
		no	189	95.5
		Total	192	97.0
	Missing	System	6	3.0
	Total		198	100.0
Trade Union/ Association	Valid	yes	4	2.0
		no	188	94.9
		Total	192	97.0
	Missing	System	6	3.0
	Total		198	100.0
Informational (technical & market information)	Valid	yes	9	4.5
		no	137	69.2
		3.00	6	3.0
		4.00	36	18.2
			Total	188

Table 6: Demographic Information of Graduate Respondents.

		Frequency	Percentage
STATE OF ORIGIN			
VALID	Bayelsa	25	34.2
	Delta	23	31.5
	Rivers	23	31.5
	Total	71	97.3
	System	2	2.7
TOTAL		73	100.0
GENDER			
VALID	Male	53	72.6
	Female	19	26.0
	Total	72	98.6
MISSING	System	1	1.4
TOTAL		73	100.0
AGE DISTRIBUTIONS IN YEARS			
Valid	21-25	8	11.0
	26-30	26	35.6
	31-35	16	21.9
	36-40	10	13.7
	41-45	8	11.0
	Total	68	93.2
Missing	System	5	6.8
Total	73	100.0	
EDUCATIONAL LEVEL			
Valid	OND/NID	13	17.8
	NCE	7	9.6
	HND	9	12.3
	B.Sc.	34	46.6
	M.Sc.	8	11.0
	Total	71	97.3
Missing	System	2	2.7

	Total	73	100.0
EMPLOYMENT STATUS			
Valid	Yes	42	57.5
	No	31	42.5
	Total	73	100.0

From Table 7 above, 57.5% of the graduate respondents claimed to be employed; 26.0% are self-employed, 37% are working in the public sector and 20% are working in the private sector. Out of the 73 graduate respondents, 80.8% are willing to acquire additional skills if given the opportunity and 11.0% do not desire additional skills acquisition. The remaining 8.2% were neutral.

Table 7: Disciplines of Graduates.

FIELD OF STUDY		FREQUENCY	PERCENT (%)
Invalid		29	39.7
Valid	Mechanical Engineering	3	4.1
	Civil Engineering	2	2.7
	Electrical/Electronic Engineering	5	6.8
	Chemical/Petrochemical/Petroleum Engineering	4	5.5
	Agricultural Engineering	3	4.1
	Computer Science & Engineering	7	9.6
	Environmental Engineering	1	1.4
	Physics	1	1.4
	Food Science and Technology	1	1.4
	Geology/Applied Geophysics	1	1.4
	Fisheries Technology	1	1.4
	Microbiology	3	4.1
	Laboratory Technology/Instrumentation	2	2.7
	Health Related	3	4.1
	Geography	1	1.4
	Mathematics	1	1.4
	Total	68	93.2
Missing	System	5	6.8
Total		73	100.0

Table 8 provides information on the study fields of graduates respondents. The table reveals that more engineering graduates, almost 25 of them, were interviewed compared to other technical professions.

Table 8: Name, Type and Location of Organizations that returned Questionnaires.

S/N	Organization	Type	Address	location
1	Development Prospect and Initiatives	NGO	51, Okporo Road, Port Harcourt	Rivers State
2	Ministry of Commerce and Industry	Government	State Secretariat, Yenagoa	Bayelsa State
3	Bio Resources Development Centre BIODEC	Government	Along Otorotani Road, ODI	Bayelsa State

S/N	Organization	Type	Address	location
4	Bayelsa Youth Reformation Movement	NGO	58, Main Street, Yenezue-Epie, Yenagoa	Bayelsa State
5	Yenagoa Chamber of Commerce and Industry	Private Sector	63, Imgbi Road, Yenagoa	Bayelsa State
6	NIIT	Private Sector	43, Airport Road, Effurun	Delta State
7	Skills Acquisition Centre	Government	SSG office, Asaba	Delta State
8	Delta State Government	Government	State Secretariat. Asaba	Delta State
9	Mainstreet Bank Limited	Private Sector	Ekeki, Yenagoa	Bayelsa State
10	G-Site Technologies	Private Sector	272, Effurun	Delta State
11	Staff Training Centre	Government	Asaba	Delta State
12	Yenagoa Entrepreneurial Development Foundation	NGO	30, Gwegwe Street, Yenagoa	Bayelsa State
13	Technology Incubation Centre	Government	Okaka Housing Estate, Yenagoa	Bayelsa State

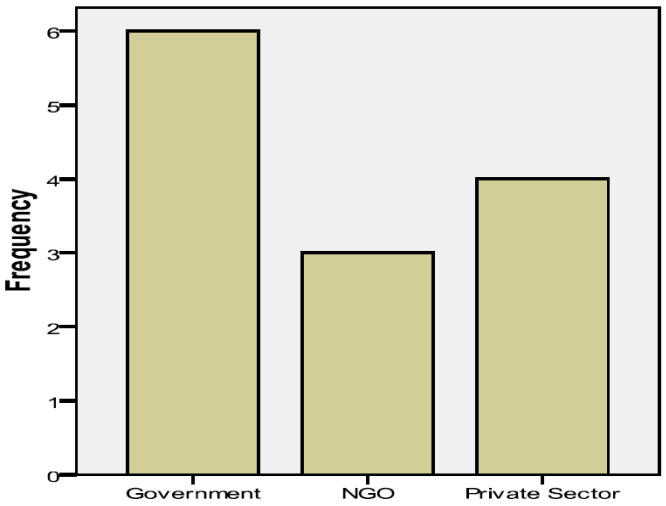

Figure 7: Types of organisations sampled and their frequency.

Figure 7 gives information on the type of organizations that formed part of the survey. Out of the 13 organizations interviewed, 38.5% claimed to have received some form of external support while 61.5% claimed not have received any form external support. 46.2% of responding organisations claimed to be collaborating with other governmental organizations and NGOs, while the remaining 30.8% claimed not to be collaborating with other bodies be they governmental or non-governmental.

Table 10: Organization Main Programmes and Activities.

TYPE OF ACTIVITY	GOVERNMENT		NGOs		PSOs	
	Yes	No	Yes	No	Yes	No
Capacity Building (Managerial)	3	3	2	1	1	2
Funding and Support	0	6	1	2	0	3
Skills and Vocational	3	3	1	2	2	1

Table 10 shows the main activity areas of responding organizations. From the table, it can be seen that 6 out of the 13 organizations were into capacity building in the areas of providing managerial training. While only one organization, an NGO was providing funding support, 7 of the organizations were providing technical and vocational skills trainings.

Table 11: Number of Persons Trained by the Organisations.

TYPE OF SKILL	GOVERNMENT		NGOs		PSOs		TOTAL
	All	NDR	All	NDR	All	NDR	
Metal Works/Welding/ Fabrications	-	-	258	243	-	-	501
Woodwork and Joinery/ Upholstery		-	17	-		-	17
Agricultural Technology	240	240					480
Scaffolding and Rigging	-		402	402	-	-	804
Computer Editing		-	355	355	-	-	710
IT Training	3000	2800	30	30	4350	3260	13470
Product Development	9	-					9
Total	3249	3040	1062	1030	4350	3260	15991

Table 11 above gives the number of persons trained by the responding organizations, the skills acquired by the trainee, as well as the number of trainees from the NDR.

4.2 In-depth Interviews

Most of those interviewed believed that the developmental challenges of the Niger Delta region are multifaceted and will need multi-lateral approaches. However, a key informant noted that capacity building in technology-based enterprises will be a laudable salutary strategy to socio-economic development.

All key informants except one of them attested to the fact that there is apparent lack of technical skills in NDR. The divergent view believed that there where indigenous technologies in NDR which helped the people to survive the environmental challenges in the region. They constructed their own canoes and built their houses on top of water bodies. The informant stated that there were deliberate attempts to undermine the region by not citing industries in the region. He also questioned the rationale behind the training of NDR youths in technical skills by some oil companies but who turn back those same trained youths when it comes to employment.

All the informants believe that technical skills are necessary for the socio-economic development of NDR. The region needs to build competences in biotechnology, solar energy technology, Marine engineering, civil engineering, Metallurgy and Material science and not only in areas directly in demand in the oil industries. NDR also need technical skills in foundry, fabrication, Ship building, ICT. Moreover, a key expert stated that the region must revitalize her basic technical education at the secondary school level. He noted that that was responsible for the slack in technological led development of the region.

The informants believed that technology has a key role in the development of NDR, and there was a suggestion to connect the oil industry in the region with other sectors. The technologies and innovations in the oil sector should diffuse to other sectors in the region. One expert stated that the oil sector has tended to operate as an island in the region and the country as a whole.

Most of the informants believed that the development of the infrastructural base of the region will be a good developmental strategy. To a large extent they seem to suggest that the provision of basic infrastructure will bring about development in the hinter lands of the region. They offered strong advice to government and other developmental institutions in the region to target small and medium scale industries and businesses. Moreover, there was a strong voice on the need to develop community-based enterprises in the area of crop and fruit plantations (Plantain, banana, palm plantations, etc), and fish farming. There are areas of partnership between the development agencies; and one informant insisted that there should be building of social network that can help build and share knowledge on developmental strategy for the NDR. One of them suggested that there should be a roadmap where each partner can take part in the developmental programme either at the downstream or upstream operation of the Oil and Gas sector.

Government institutional support can come in form of patronizing local MSME industries, incentives to technology based industries who can build plants in the region. The various levels of government in the region should open up industrial zones with infrastructure that will attract technological entrepreneurs.

There were diverse opinions by the key informants on the kind of policy support that will drive a technology-based development. One was of the opinion that the region should embrace and domesticate the National Science & Technology policy, while another pointed out that there should be elaborate basic technical education programme where citizens of the region are encouraged to acquire basic technical skills.

4.3 Focus Group Discussions

Contacts were made with various trade associations of artisans and craftsmen with different technical skills from the three states covered in the research project. Some of these groups included auto-mechanics and their associated groups, welders, riggers, fitters, metal works and fabricators, grinders associations, electricians, electronics and computer repairers, wood workers and joiners, furniture makers, etc.

Most of the discussants in all the focus groups selected agreed that they like their practice but are faced with one challenge or the other. Also, many of them especially the young ones stated that they will want to take up other skills if given free training on the new skill. For example, one young grinder from one of the FGDs in Yenagoa said: "if opportunity is provided, I will like to learn industrial welding as it is closely related to my present work". Most of the respondents who wanted to basically change from their practice to other ones were the young ones compared to those close to their 40s.

Most of the discussants in all the groups interviewed stated without hesitation that they are yet to get support from any quarters, whether government, NGOs, PSOs or multilateral organizations. Availability of workspace is one fundamental challenge that faces most technicians in the region. For instance, some of the discussants in both Warri and Port Harcourt have this say; "our occupation is threatened because we do not have places to work anymore". In support of the earlier speaker, another auto-mechanic from the Auto-Mechanic group in Warri remarked thus; "when we help backfill swampy areas to do our jobs, and once the piece of land we're working in is strong enough, the landlords will evict us to convert the land for building purposes". Also, a welder from one of the FGDs in Port Harcourt decried the absence of work space thus; "we do not have a place to do our work, like they have a mechanic village in Bayelsa State". They found it hard to remain in a particular workshop as they often lose the plots of land to the Landlords or are evicted by local authorities for environmental concerns. The discussant in Delta State stated that they are yet to get an industrial area or any Mechanic village where they can easily practice their trade. Moreover, they do not have the opportunities for training and re-training for new skills in their fields of practice.

A serious challenge is the low enrollment of new trainees and that threatens the future of most of the groups interviewed. For instance, the Chairman of the Warri Chapter of the umbrella body of auto-mechanics and associated artisans, National Automobile Technicians Association (NATA) has this to say; 'we offered free training opportunities to interested youths in Delta State, but we hardly get new trainees". A similar comment was re-echoed by a fabricator in one of the focus groups in Yenagoa who said "we hardly get young ones who come to serve us as apprentices anymore.

4.4 Summary of Discussions

In summary, the data from the survey shows that there are people with skills in the NDR but this study did not go further to establish if these skills were the ones demanded by the employers of labour in the region. However, some organizations carrying out training were surveyed and used as a proxy variable in this study for the skills in demand in the NDR.

The field data showed that most technically skilled persons were self-employed, and a few others employed in private and public organizations. Most of these self-employed technicians are faced with several challenges which range from a lack of institutional support to patronage from government, lack of both basic and technological infrastructure, etc. The focus group discussions

with the technicians in the region confirmed the lack of infrastructure, workspace and training programmes as what constrain their practice in the NDR.

Training and re-training of technicians remains a focus area of partnership between Developmental Partners, NGOs and government. Then the development and maintenance of technology incubation sites, industrial parks, Science parks, mechanic villages, etc, are also possible areas of partnership.

The in-depth interviews provided insights for some policy implications. For instance, there was an identified need for a regional innovation system which should endeavour that SMEIs are nurtured and groomed in technological based enterprises, and give them all the necessary support that will enable them competitive both locally and globally.

5. Strategic Framework for Technology-Based Development

Rapid technological innovation and diversification in market requirements are generating significant shifts in industrial activity and dramatically transforming many economies from primary output to the manufacture of high value-added products and from the production of goods to the provision of services. This is an area in which the capability of SMEs to respond flexibly works to their advantage. SMEs can therefore be at the forefront of driving further structural sophistication and sustained economic growth. Such industrial development according to Gilbert (2006) must however, be built upon the presence of SMEs with appropriate managerial and technological know-how. It will also depend upon the development of suitable supporting infrastructure for SMEs (Gilbert, 2006).

According to UN Millennium Project (2005), reaping the benefits from S&T depends on a number of factors including: (i) investment in human resources training and development; (ii) the demand for knowledge by the private sector; (iii) public policies that provide the appropriate enabling environment for strong knowledge institutions; and, (iv) the level and quality of the ICTs systems that permit the flow and dissemination of knowledge and information.

Maxwell et al (2001) are of the view that sustainable industrial policy and development strategies encompassing a variety of inter-related economic, social and environment objectives such as encouragement of an open and competitive economy, the creation of productive employment and protection of the natural resources through efficient use of renewable and nonrenewable resources is required. Indeed, the connection between clean energy and rural development is already established (UNCTAD, 2010). Such a policy and strategy should create a self-sustaining industrial sector having strong linkages with domestic economy.

Technological progress should not be confined to the industrial and mechanical arts. It should also include improvements in economic organization - perhaps a reform of marketing arrangements and better management of the economy. Furthermore it covers improvements in skill, resulting from formal training or from 'learning by doing'. These types of changes can also lower average cost sometimes substantially and improve the effectiveness of the program dramatically (Sharma, 2005).

Since the NDR is largely rural setting with its attendant rural characteristics vis-à-vis, the absence of the basic amenities, it is imperative that there should be technical knowledge on how to utilize the natural resources in those areas to enhance living conditions and more so create sources of livelihood. Therefore, the central concern here is that joint actions needs to be engendered in the planning and developing of the basic social and technological infrastructure, targeted to support the informal sector (especially technological-biased SMEs), access better or improved technology and hence, the growth of the individual enterprises and its contribution to the development process of the NDR.

5.1 Basic Technological Infrastructure and Development

Technology infrastructure is said to support the design, deployment and use of both individual technology-based components and the systems of such components that form the KBE[9]. Thus, technology infrastructure plays a central role in the innovation process and in the promotion of the diffusion of technologies and is therefore an important element contributing to the operation of innovation systems and innovation performance in any modern economy[10]. One of such platform technology infrastructure that has contributed to economic development has been ICT.

Advance Manufacturing Technology Facility

Advanced Manufacturing Technologies (AMTs) are manufacturing process technologies that are computer controlled automated-process technologies. AMTs are regarded as highly efficient technological applications, with the potential of improving the competitiveness of manufacturing businesses. Since product standardization is an issue in the country, an AMT facility will help artisans manufacture uniform components. This will also be useful when developing appropriate technologies

Industrial Parks

One veritable scientific infrastructure that will enable technological entrepreneurship is the Industrial Park. It provides occupants with high-quality infrastructure including workspace, power, telecommunications and etc. Industrial Parks can be designed to accommodate SMEIs and large-size firms. Industrial parks also have the benefits of the avoidance of costly title disputes, reduction of risks and delays associated with land acquisition zoning and permitting.

Science Technology Parks

Another infrastructure that can support local firms is the Science or sometimes called Technology Park. Science Parks provide complementary services and support to local firms and strengthen the local institutional infrastructure, to provide greater social capital and institutional 'thickness'.[11] A Science Park is a business support and technology transfer initiative that:

- encourages and supports the startup and incubation of innovation led, high growth, knowledge based businesses;
- provides an environment where larger and international businesses can develop specific and close interactions with a particular centre of knowledge creation for their mutual benefit; and
- has formal and operational links with centres of knowledge creation such as universities, higher education institutes and research organisations'.

Technology Business Incubators (TBIs)

A technology-business incubator (TBI) is a support infrastructure for technology-based start-up firms. Some of the support provided by TBIs include, work space to be occupied for a period of three years, electricity, internet facility, mentorship and managerial trainings, amongst others. One of the means young high-tech companies receives support and assistance is through the tutelage in a TBI. Technology incubators are a special type of business incubators that focuses on new ventures that employ advanced technologies (UN Millennium Project, 2005). TBIs present the leeway to reverse that situation as they stimulate innovation and entrepreneurship culture resulting in the emergence of new technologies and structures that enhance nations' competitiveness as well as fostering local and regional economic development[12].

[9] Antonelli et al (2009), 'Technology infrastructure' retrieved from; http://www.routledge.com/books/details/9780415472661/, June 28, 2012.
[10] Ibid
[11] United Kingdom Science Parks Association (UKSPA)
[12] Federal Ministry of Science and Technology's Technology Incubation Programme in Nigeria: Policy, Functions, Structures and Operational Guidelines.

While there are a few TBIs in the NDR, they have not been properly coordinated to provide the kind of support needed by start-up entrepreneurs in the regions. Indeed, some of them are engaged in activities other than technology related businesses.

Technology Venture Capital Fund

One of the greatest barriers to starting or growing SMEs is capital and with the level of poverty in the NDR. The Venture Capital model can be explored to provide succour to technology-based start-ups. It is financial support platform for SMEs, mostly start-up firms. Venture capitalists bring money to the table and also help groom start-ups into multinational institutions. They do this by looking SMEs business proposals that have strong potentials for survival and then buy into the investment as equity partners, nurture such investments unto growth stage.

Introducing venture capital markets to developing countries may help ensure the sustainability of the companies in which they invest and a study by Gaspar in (Bubou and Egai, 2012) confirmed that venture capital and business incubation contribute positively to the decision of creating a new enterprise and to the survival of the young companies. It means that one of addressing technology-based start-ups can be through the establishment of a technology venture capital fund (TVC) in the NDR.

5.2 Development of Appropriate Technologies

One of the problems of technology transfer is the inappropriateness of technology. Technology does not become useful and sustainable if it is not appropriate. However, if the technology is simple, labour intensive, applicable to small productive units, carries smaller risk, and suits the country conditions the technology will be more sustainable (Sharma, 2005). Appropriate technology is that set of technology that is appropriate to meet the needs and the development goals of a country[13].

Bangladesh, a developing country like Nigeria, considers appropriate technology to be a mix of modern, intermediate and simple technologies. The Bangladeshis' example of appropriate technology aims at a better balance of the three levels of technology that is modern, intermediate and simple or traditional in order that (a) effective and sustainable development and (b) accelerated growth can be achieved and (c) firms use them can stay competitive with their products[14]. The same can hold true for Nigeria, more so for the NDR. This means that PIND's effort at introducing the appropriate technology initiatives can be vigorously pursued and adopted as part of a region-wide technology-based development strategy.

Sustainable appropriate technology transfer can be achieved through education, the scientific literature and direct human contact (Barton, 2007). A good example, according to Adekoya and Babaleye (2009) is that, processing technologies are about improving farm incomes and reducing rural poverty by empowering farmers and developing agribusiness and as it also offers employment, often in rural communities, and it is an opportunity to package and brand products in an attractive manner using local resources.

5.3 Demand-driven Competencies-based Skills Development Programme

According to the ILO (2011), equipping the workforce with the skills required for the jobs of today and those of tomorrow is a strategic concern in the national growth and development outlooks of all G20 countries. Thus, the G20 leaders have together pledged to support robust training strategies to meet the challenges of fostering strong, sustainable and balanced growth in each country and globally.

[13] Ahmed, S. (2003) 'Economic Policy Paper on Assessing Appropriate Technology for SMEs', The Dhaka Chamber of Commerce and Industry (DCCI) & The Centre for International Private Enterprise (CIPE)
[14] Ibid

Generally, Nigeria's and specifically the NDR's workforce is characterized by low skills, and is poorly prepared to compete in today's globalized world. However, rapid technological changes now require individuals to learn and re-learn skills throughout their working lives in order to ensure their relevance and effectiveness (Kazimi, 2007). Also, employers today are looking for more than just technical skills and a university degree (George, 2011).

Kazimi (2007) emphasizes that investment in priority areas of education and skills development becomes very important for reducing the gap between a knowledge-based workforce and a low-skilled workforce; and that promoting a knowledge-based economy puts a huge premium on acquiring an appropriate education and demand-driven skills. Equally, Bessette (2011) posits that in recent years, models of skills development and TVET have moved from a provider-driven training model, where people received training without the assurance that it was aligned to an identified need in the labour market, to a demand-driven one. The need to link training to employment (either self or paid employment) is at the root of all the good practices and strategies documented.

However, Bessette (2011) outlined three challenges encountered by efforts at demand-driven skills development programmes. According to the author, the first is to identify the marginalized unemployed youth as well as the sub-groups of vulnerable young women and men who are outside the formal training system and work place. Understanding their needs and situation, and linking this analysis to a situational analysis in term of needs in the labour market or the livelihood system seems like our first task. The second challenge consists in linking literacy and basic life skills to technical and vocational education. The third challenge is to put in place the financing mechanisms that would facilitate access to marginalized groups such as youth engaged in subsistence economy.

In contrast, Barton (2007) maintains that skills training is very costly, on the average four times more expensive than general secondary education; but in and many developing countries [including Nigeria], state funding is inadequate to meet the high costs of equipment, materials, infrastructure and instructor training needed to offer quality demand-driven technical skills acquisition programmes. Given that technical skills alone will not, in all probability, win individuals jobs or see them keep those jobs; moreover, they will not enable businesses and nations to meet their targets, nor are they often the answer to any number of social and economic problem, Shoesmith (2011) emphasizes that a more holistic approach to understanding skills is therefore needed; and that any such technical skills development strategy should include; basic skills, generic skills, employability skills, and technical or job-specific skills. The above not withstanding any public policy tailored at providing skills in the NDR should be considered in the context of the 'twenty-first century skills'.

5.4 Clustering

Regional technological clusters may provide illustrations of specific characteristics of Nigeria's zonal development. Since the return of the democratic rule to the nation, the central government has been very influential in establishing various industrial and technological developments in the zones which all have strong regional dimensions, in particular, the South-South region of the country (Sigurdson , 2004).

Clustering hinges on a number of development factors which include labour division, specialization by micro, small and medium-sized entrepreneurs (MSMEs), rapid production of specialized products, emergence of suppliers to handle raw materials, component parts and machinery; emergence of service providers such as technical, legal, communication among others; emergence of marketing agents; emergence of a pool of skilled workers and formation of consortia or associations for specific services and lobbying (Nganga et al., 2011). These will facilitate collective efficiency as it leads to the combined improvement in the fields of technology, marketing, transportation, communication, access to services and waste management with the benefit of reduced costs in overcoming difference (Nganga et al., 2011), all of which need to be considered in infrastructure planning and development. Since SMEs in LDCs are unable to develop infrastructure and technology significantly on their own, then collective efficiency paradigm need informs the infrastructure planning and development, so that SMEs engage in joint actions (Nganga et al., 2011). According to the above authors, collective efficiency in their context, refers to joint actions or collective efforts that are made by enterprises working together to facilitate their individual enterprises improved performance.

For industrial infrastructure planners and developers, that is important since it indicates that micro and small enterprises need supportive infrastructure, institutions and structures that enable them to gain from collective efficiency. They will however outgrow such mechanisms to a point where they are able to influence their own infrastructure, technology, structures and supply chain partnerships and collaborations (Nganga et al., 2011). Nevertheless, the regional firms' growth allows them to hive off specialized divisions, leading to the formation of new regional enterprises which tend to select locations close to their 'parent' firms and contributes to the development of clusters of linked industries, a process that stimulates regional development (Lemarche, 1986). It is therefore recommended technology regional clusters hinged on the paradigm of collective efficiency would be important in informing, planning and in the development of industrial infrastructure supportive of SMEs growth.

5.5 Building Partnerships for Technology-based Development

Partnerships are defined as collaborations between communities, the private sector, civil society, and government to commit to work together on a project or programme in pursuit of common goals and in which the different partners bring complementary resources, contribute to the design of the programme and share risks and benefits (adapted from Rogerson, 2009).

In most cases, developmental interventions have been so far devoted to the establishment and operationalization of regulated Private-Public-Partnerships (PPPs) "with considerable energy put into developing the necessary legal framework and guidelines (Rogerson, 2009). A good example is the government of India which have taken since 2007 to encourage skill up-gradation by using the instrument of PPPs and, in addition, encouragement of private sector initiatives to up-grade skills (Mehrotra, 2011). Such initiatives included the National Skill Development Corporation (NSDC) supporting the setting up of profit-making companies, since 2010, to promote skill up-gradation among others.

However, Mehrotra (2011) states that a lesser known form of partnership is the Cross-Sector Partnership (CSP) which is unregulated. CSPs are sometimes referred to as multi-stakeholder partnerships. Essentially, CSPs involve some form of structured collaboration between organisations from business, government and civil society organizations (CBOs) on the basis of converging or mutual interests, focused on achieving common – or at least complementary- goals (Hamann et al., 2011; Rogerson, 2009). They maintain that such partnerships exist on different scales and take different forms, but they have in common the expectation that the participants can achieve their objectives more effectively and efficiently through strategic alliances with others rather than acting independently. And that unlike regulated PPPs, CSPs do not result in private sector enterprises profiting directly by providing public services; rather they tend to be more 'organic' and often arise haphazardly where there is a need, with partners who share a common interest (often including civil society partners) and with a structure shaped by the history and context out of which they've formed.

Similarly, CSPs between private, public and not-for-profit organizations have become important drivers of economic development and social change in transnational arenas (Manning and Roessler, 2012). And transnational CSPs are often project-based, innovative and complex undertakings involving multiple stakeholders whose strategies are guided by different national context conditions and sector-specific operational logics, e.g. profitability (private sector), public service and national interests (government), and civil society objectives (not-for-profit). Recognizing mutual interests, establishing common ground, and translating joint interests into legitimate objectives and feasible tasks are complex processes that need to be understood. According to the Origo[15] the advantages of CSPs are that:

- Alliances between parties drawn for example, from businesses, government and civil society, that strategically aggregate the resources and competencies of each to resolve a specific problem/challenge.
- Partnerships across different sectors of society imply transcending some of the divides between business/NGOs/governments. Interest from many governments and NGOs in working with business is quite high so the partnership model has been replacing the adversarial model.

[15] Background information on Cross Sector Partnership by Origo Social Enterprise Partners

- Partnering across sectors means that different sectors of society are open to communicate and collaborate with each other, fostering and creating more inclusive-participatory models for solving problems.
- A management tool to deliver business, social and environmental development outcomes by optimizing the effectiveness of different partners' resources core competencies.

5.6 Technology-based Socioeconomic Development Strategy for the NDR

In view of the results obtained from the survey, interviews and discussions, as well findings from desk review which in most cases is corroborated by the results, the authors hereby propose the following technology-based socioeconomic development strategy for consideration by intervention agencies in the NDR. It looks at both the near-, medium- and long-term measures for the socioeconomic development of region (see figure 8 below).

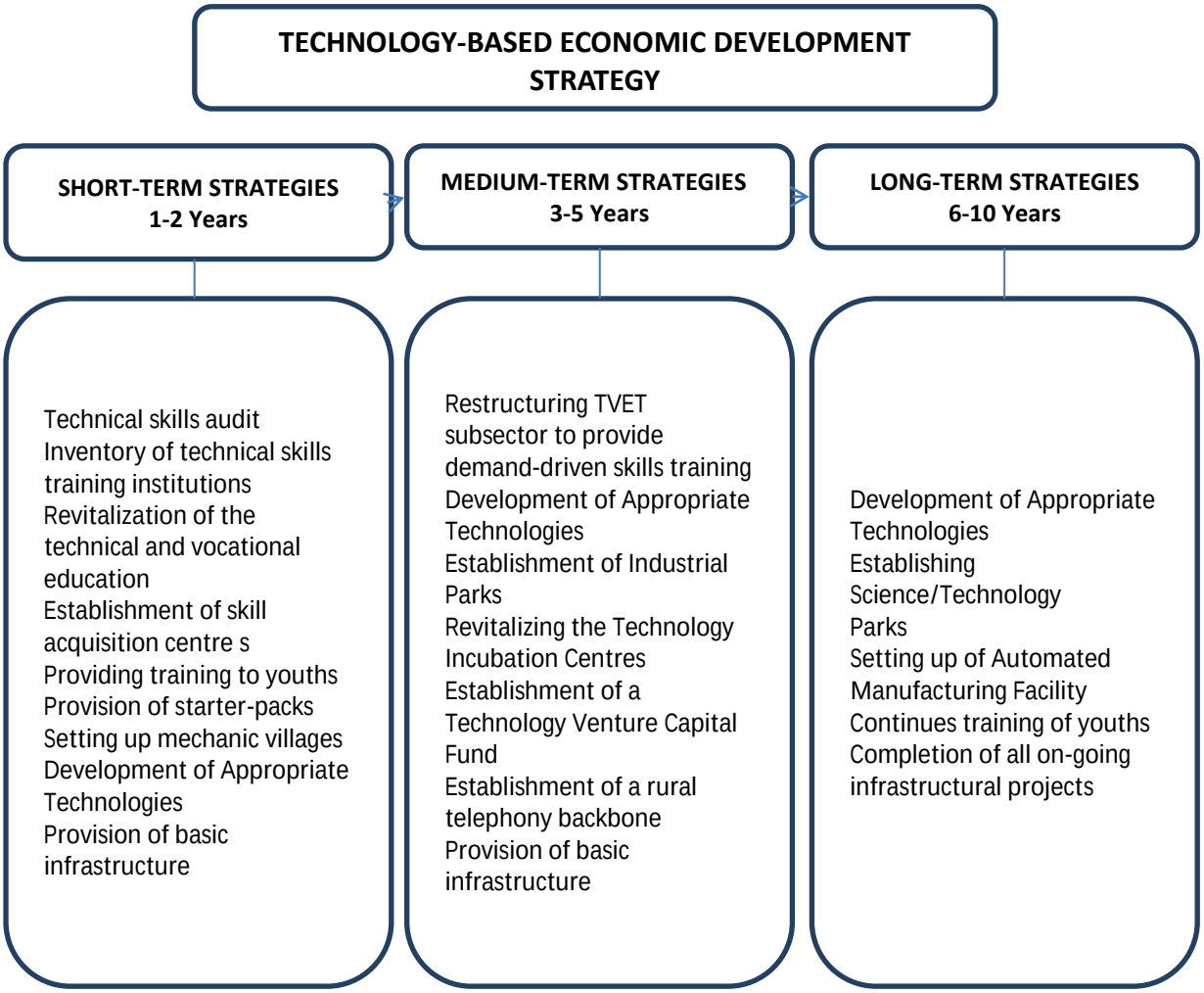

Figure 8: A strategic framework for technology-based economic development of the NDR.

The immediate steps to be taken within the first one-to-two years towards a technology led development of the NDR is classified in Figure 5.1. The first step to be considered should be carrying out of a detailed technical skills audit to determine the actual skills gaps and an inventory of all technical skills capacity building institutions to evaluate both human and material/equipment.

TVET has become a central instrument in most capacity development programmes globally, hence, restructuring and revitalizing the subsector to align it with global realities is imperative. The subsector should be restructured to provide demand-driven skills and competencies training.

Skills acquisition centres should be established to provide 100,000 indigenes of the region annually within the short and medium term, while waiting for restructuring of TVET subsector of the educational system. Such trainees should also be provided with starter-packs to practice their newly acquired vocations.

Considering the rural nature of the region, the development of appropriate technologies to tackle the common challenges inherent in the region needs to be emphasized. To this end, PIND's appropriate technology initiatives can be broadened within a CSPs approach.

Governments and development partners need to set up mechanic villages in all the states of the region. Also, basic infrastructure like road, electricity and water which are already included in the Niger Delta Master Plan be completed to improve the standards of living of the people.

The medium-term strategy is supposed to include the steps advocated for the short-term. In addition, in states where there are no TBIs, new ones needs to be established, where TBIs exist they are to be ones revitalized. The TBIs will provide a platform for SMEIs to share knowledge and experiences, form alliances and partnerships both local and abroad, since the centre will provide further training and support. It is also proposed that a TVC be established. The TVC fund may take the form of public-private-partnership (PPP) arrangement with the NDDC and other development partners providing contributory equity.
Industrial Parks need to be developed in the regions to accommodate both small and large firms. Furthermore, the rural telephony backbone once muted by the federal government should be established to provide the much needed telecommunications infrastructure.

The long-term strategies proposed include the establishment of Science Parks in selected universities in each of the states and at least one AMTs facility. The Science or Technology Park will encourage and support the startup and incubation of innovation led, high growth, knowledge-based businesses as well as provides formal and operational links with centres of knowledge creation like the universities, other higher education institutions and research organisations. The AMTs facility will help standardize the components designed and produced by craftsmen and technicians from the region. This will improve both the technical and business performance of products from the area and will contribute to the economy of the region. The long-term strategy equally advocates the continuation of the activities of the earlier two strategies.

However, since the NDR is part of the Nigerian nation, it means that whatever strategy adopted for its development will only work if the right institutional frameworks exist in the country, as strong and effective institutional frameworks encourage productive entrepreneurship Baumol and Karabegović, et al as cited in (Bubou and Egai, 2012). Therefore, governments at all levels and other stakeholders need to take initiatives to ensure that the overall policy environment encourages industrial activity in general, and SMEI activity, in particular, given the latter's significant contribution to general economic activity in many countries Kamesam, 2003 as cited in (Bubou and Egai, 2012).

6. Conclusions and Recommendations

6.1 Conclusions

The NDR is faced with multifaceted developmental challenges and tackling these challenges will require multidimensional approaches. This study used a mixed methodology to map the technical skills in the NDR. The survey was biased towards skilled persons and could not really identify the technical skill gaps in the NDR. There are skilled persons but there are issues on their competencies and employability. However, it was interesting to know from the study that even the graduate respondents, aside the non-graduate skilled and unskilled persons were willing to acquire new skills.

Unfortunately, there is lack or low level of infrastructural development in NDR as well as inadequacy of training facilities. Thus, unskilled persons requiring training and skilled ones who need re-training do not easily find training facilities and programmes that will help them acquire their preferred skills.

The easiest way to reduce restiveness is to reduce the high level of unemployment and poverty in the region. Intervention agencies and developmental partners have to utilise the window of opportunity provided by the Amnesty programme by engaging the youths of NDR by enlisting them into technical skills training programmes that will provide them with the means of livelihood. This will help the youths to contribute to the economic development of NDR. Nevertheless, emphasis on the sustainable development of NDR should not only include the provision of basic infrastructure; such as good roads, housing, electricity and good drinking water, but also capacity building towards technical skills that will give the populace of NDR the capability to sustain themselves. Common facilities which should include industrial parks, mechanic villages, TBIs and Science/Technology parks will encourage the people of NDR to engage in technology entrepreneurship. Those with technical skills should be given the opportunity to practice in those common facilities and also give job opportunities in firms located in the region than employing expatriates who learn on the job.

Again, the technical skills and technologies prevalent in petroleum sector are yet to diffuse to other sectors in the NDR and Nigeria as a whole. For instance, technologies and technical skills acquired in the oil industry ought to have helped in the development of marine and land transportation sector, fabrication of barges and boats, construction (houses, roads and bridges), distillation of gin, but that is not the case.

Studies perused and comments from key informants agree that TVET remains the most viable approach to a demand-driven capacity development strategy for any nation.

It was observed that synergy amongst state, development partners, intervention agencies and governments at the different levels. This can be seen in the duplication of projects embarked upon by different agencies and development partners. Key focal areas of partnerships for development in the region that have been identified include the training facilities, development of appropriate technologies, and a technology venture capital fund. Such partnerships can take the form CSPs as against the regular PPPs.

Development in the NDR will certainly need concerted efforts from development institutions, and then smart strategies which also need collaborations and partnerships in implementing the developmental programme of the NDR. Such is the one, the strategic framework for a technology-based economic development of the region, proposed in this study. A strategy that is anchored the provision of basic and technological infrastructure to support rural industries and with an emphasis on a technically skilled work force development. After all, among other things, supporting rural industries constitute an essential part of the industrial infrastructure needed for expanding and stimulating the formation of regional production networks, and contributing to domestic and regional economic growth (Fernado, 2009).

We believe that this study will be of benefit to the people of the NDR as they stand to gain from its adoption. It will also be useful to policy makers, intervention agencies, and development partners who are interested in finding a lasting solution to the development challenges of the region. However, it is suggested that further studies like a technical skills audit and an inventory of training institutions are carried out.

6.2 Recommendations

Consequent upon the revelations of the positive impacts of technology and a technically skilled workforce to the socio-economic development of regions it is recommended that:

- TVET as it is currently, be restructured and revitalized as TVET has now become a fundamental instrument for skills development globally. For instance, while, the 2012 *Education for All (EFA) Global Monitoring Report (GMR)* – due on the 16th October this year – is dedicated to skills development, concurrently, UNESCO is producing a *World TVET Report* and held the 'Third International Congress on TVET in Shanghai from 13 – 16

May, 2012[16]. TVET should emphasize the acquisition of generic 21st century lifelong learning skills as earlier discussed;

- Technical skills training programmes should match technical skill relevant to the region as demanded by geography and potential employers;
- Basic infrastructure as stated in the Niger Delta Master Plan be completed so as to support technology led development;
- Technology infrastructure such as AMTs facilities, Industrial Parks, Science/Technology Parks, TBIs and TVC fund be established to fast-track the socio-economic development of the region;
- Stakeholders should collaborate to set up technology venture capital funds primarily for the funding of viable technology-based enterprises;
- A training centre is established, appropriate technologies developed and a TVC fund is set up;
- A regional science, technology and innovation policy is created that properly articulates the role of technology in regional development be formulated;
- Stakeholders adopt the strategic framework outlined in this paper to develop local capacity (both human and material) and to empower the next generation of home-grown leaders for the benefit of the region, Nigeria and society at large; and
- An effective Regional Innovation System be developed with elements that will nurture and support technological learning and innovation in the NDR.

[16] Palmer, R. and King K. (2012), 'Towards a New Global World of Skills Development? Or to Boldly Go Where TVET has Gone Before?' Available at: http://norrag.wordpress.com/2012/07/02/towards-a-new-global-world-of-skills-development-or-to-boldly-go-where-tvet-has-gone-before/, accessed on July 5, 2012.

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8. Appendices

Appendix 1: Main Survey Instrument

The main survey instrument can either be obtained from PIND or NACETEM South-South Office.

Appendix 2: In-depth Interview Guide

- What is your understanding of the development challenges of the Niger Delta Region (NDR)?
- There is an apparent lack of skills, especially technical skills in the NDR. What is your take on this?
- If one was to provide skills training for the people of the NDR, what particular skills set do you think should be emphasised?
- Are you conversant with the role of technology in development? If yes please discuss what the role is?
- Can you proffer any development strategy for the NDR?
- What are the possible areas of partnership opportunities are open to development agencies including government?
- What institutional support can government can put it place to enhance a technological-driven economy?
- What policy support can government can put it place to enhance a technological-driven economy?
- Is there any other information you would like to provide?

Appendix 3: Focus Group Discussion Guide

- Freely discuss your vocation/occupation
- What do you like about your vocation?
- What are the challenges you are facing in your practice?
- What form of support either from government or any other source have you received since you have been in the practice?
- In your opinion was the support relevant and sufficient? And why?
- If any organization was to provide support by way of training or funding, what kind of support will you prefer? And why?
- How do you acquire your training and/ or re-training?
- What can any intervention agency do to improve your profession?
- Provide us with any other information you consider may be useful to any intervention body.

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