Consultancy Study on the Level and Impact of Telecommunications-based Research Innovations in Nigerian Tertiary Institutions – SRFP/NCC/RD/08/2021

Executive Summary

Synopsis

NCC as the Nigerian telecommunications industry's regulator, has the responsibility of ensuring qualitative and efficient telecommunications services in Nigeria - a responsibility which it has lived up to over the years. Amongst others, encouraging effective research and development efforts by all communications industry practitioners, is one of it mandates. NCC, through the award of research grants on telecommunications-based research innovations to Nigerian tertiary institutions, has remained committed to this mandate. These grants are awarded with a goal of assisting with the development of commercially viable prototypes that can address upcoming challenges in Nigeria. Between year 2015 and 2020, NCC awarded 31 research grants valued at about N300 million to 21 Nigerian tertiary institutions for telecommunications-based research innovations.

This project involves evaluating and assessing the different research areas and collaborations, effectiveness, efficiency, gaps, challenges and opportunities with the telecommunications-based and ICT research innovations projects in tertiary institutions across the country.

Methodology

Project implementation was achieved through a combination of methods. These includes:

a. Review of documentations, reports, publications relevant to the project such as OECD reports on innovation, NSTI policy, NDISEP, NDEPS, numerous research papers and journals on research innovation in Nigeria, etc.
b. Census based field survey of lead researchers who were beneficiaries from 2015 to 2020. This involved quantitative data collection, discussion sessions & interviews with researchers. We sampled 25 out 30 beneficiaries (5 were either out of the country or unreachable).
c. Qualitative survey via interviews and discussions sessions with subject matter experts in the Nigerian telecommunications-based research innovation eco-system.
d. Analysis and triangulation of gathered data.

Findings on Research Innovations in Nigerian Tertiary Institutions

There are no fewer than 554 tertiary institutions in Nigeria offering different courses around 13 major fields of discipline (faculties). Several research grants are available to lecturers and researchers in Nigerian tertiary institutions; some of the major sponsors

include: TETFund, NCC, CBN, NCDMB, NITDA, PTDF, NCS, NASENI, Ministry of Defence, etc. Research grant values range from as low as N1million to N50million depending on the sponsoring institution. NCC is the major sponsor of telecommunications-based research, development and innovation in Nigeria.

63% of researchers affirmed that the research projects have resulted in collaborations with other lecturers/researchers within the academia community. 52.6% have collaborated with domestic research institutions while only 36.8% of sampled researchers collaborated with international research institutions. 84% of the research projects claimed to have used at least one new or emerging technology (such as 5G, IoT, etc.). Over 90% of sampled researchers have published at least one technical paper inspired by the research project.

Access to funds, access to specialized components and raw materials, inadequately equipped research facilities and lack of basic infrastructure topped the list of challenges faced by researchers in implementing their telecommunications-based research innovation projects. Funds disbursement process from NCC to the institution has the most bottleneck, followed by funds disbursement from the institution to the researcher. Some researchers revealed that it takes well over 30 days from date of payment request to receive payment.

"Funding & Investment" and "Branding & Marketing" are the most barriers that researchers anticipate they will have during the commercialization stage of their innovation; 89.5% of researchers agreed or strongly agreed that the market exists to patronise their research innovations outputs when commercialized.

Over 70% of all sampled researchers agreed or strongly agreed that the research innovation program has had the following impacts:

a. Improvements in collaboration between researchers within the academia community.
b. Improvements in collaboration between researchers and stakeholders in the Nigerian telecommunication industry.
c. Building indigenous capacity in Nigerian tertiary institutions around telecommunication engineering, new and emerging technologies, etc.
d. Good potential for job creation when commercialization commences.
e. Strong Potential for attracting foreign investments into the telecommunication sector, etc.

The OECD defined 9 Technology Readiness Levels (TRL) which starts from TRL 1 (basic research) and ends at TRL 9 (early deployment of near-commercial technologies). Most of the research projects are at TRL 4-5 and TRL 6-7. Nigeria is currently at strength level 2 of the triple helix linkage framework i.e. the push-pull stage. An assessment of the triple helix innovation linkages in Nigeria (i.e. government-academia, government-industry and academia-industry) showed that the government-academia linkage performs above average, government-industry linkage is at average level while the academia-industry linkage has a below average.

The research projects were analysed and found to have viable applications for different user groups such as: service providers, individuals & households, physical & online businesses, government MDAs, national regulatory agency, agriculture, health, military and security-provision institutions.

The legal risks generally associated with research grant practices in Nigeria include: IP ownership, IP theft, plagiarism and Force Majeure.

SWOT Analysis of NCC Telecommunications-based Research Programme

Strengths:

a. Funding from NCC (Over N500million has been invested in research grant).
b. Applied research regime based on strong research needs-assessment by NCC.
c. Integration of several new and emerging technologies (5G, IoT, AI, etc.).
d. Knowledge and skillset of Researchers.
e. Good Government-Industry linkage.
f. Strong Collaboration between researchers in academia community.
g. Capacity building vehicle for tertiary institution.

Weaknesses:

a. Weak Academia-Industry linkage.
b. Collaboration bottlenecks between researchers and NCC.
c. Funds disbursement bottlenecks (NCC to institution and institution to researcher).
d. Low IP protection enforcement.

Opportunities:

a. Investment opportunities (local and foreign) in commercialization of research outputs.
b. Socioeconomic development post commercialization.
c. Export potential for commercialized products and services.
d. Multi-sector application of research outputs e.g. telecoms, health, security, regulation, military, etc.

Threats:

a. Economic Instability (high inflation and high exchange rates
b. Problem of Insecurity.
c. IP theft due to early publication of research papers without patenting as well as prototype fabrication abroad.
d. Legal risks in research grant practices.

A comparative analysis of the major ICT and telecommunications-based research grant programmes in Nigeria was also conducted (see chapter 4.11).

Conclusion

The NCC telecommunications-based research innovation programme has been effective in driving interest among researchers in Nigerian tertiary institutions to engage in and collaborate on various applied research and development activities. The program has also helped in building indigenous capacity within the academia in this regard. A good number of these research projects are nearing the prototype completion stage and have good commercialization potentials for use in telecommunications service provision, homes & businesses, telecoms industry regulatory services, security, agriculture, health, etc.

NCC has also been instrumental in facilitating and strengthening linkages between academia, industry and government through this programme. Bottlenecks in the funds administration process, access to specialized components & raw materials, impacts of the

COVID-19 pandemic and high foreign exchange rates have been the biggest barriers faced by lead researchers in the NCC telecommunications-based research grant programme. The commercialization of prototypes, once fully developed, is essential to addressing existing and emerging socio-economic challenges in Nigeria and promotion of investments.

Recommendations

a. Design, Development and Deployment of a centralized online portal platform for management of the NCC research grants program. This will assist in workflow automation and streamlining of key processes involved in the research grant management process amongst others.
b. Establishment of a state-of-the art design and fabrication facility/laboratory to facilitate access to digital design and production technologies.
c. Strategic collaboration & partnership between NCC and CBN to facilitate lead researchers' access to FOREX for purchase of specialized components.
d. Strategic collaboration & partnership between NCC and Nigerian Customs Service to facilitate importation of "restricted items" needed by lead researchers in research projects that require such.
e. NCC should consider increasing the maximum grant value owing to the prevailing inflation rates in Nigeria.
f. NCC should consider an upward review of the initial tranches especially for hardware-centric projects that require fabrication at initial stages.
g. Conduct a separate consultancy for Commercialization of the R&D outputs.
h. Creation and promotion of policies that will drive local content adoption in the Nigerian telecommunications industry.
i. NCC should foster academia-industry linkage by encouraging private sector participation (e.g. telecommunications service providers) in telecommunication-based research and development activities.
j. NCC should consider benchmarking innovation outputs with regional and international standards to ensure future-proof R&D outcomes.
k. NCC should consider conducting entrepreneurship development workshops for lead researchers during the research & development phase of their projects.