

## **Leveraging Technology for Sustainable Research in Economics in Nigerian Tertiary Education**

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### **Abstract**

This paper examines the role of digital technology in advancing sustainable research practices within economics departments of Nigerian tertiary institutions. It argues that the sustainability of economics research in Nigeria is increasingly tied to the extent to which researchers, departments, and institutions integrate digital tools into data collection, analysis, collaboration, and dissemination. Drawing on a review of existing literature and institutional practice, the paper identifies key technological instruments relevant to economics research, including statistical and econometric software, cloud-based collaboration platforms, open-access repositories, and artificial intelligence-assisted analytical tools. It further discusses the structural, infrastructural, and policy-related challenges that constrain technology adoption in Nigerian universities and polytechnics, such as inconsistent electricity supply, limited broadband access, inadequate funding, and low digital literacy among faculty. The paper concludes with a set of practical recommendations for researchers, university administrators, and policymakers, including targeted investment in research infrastructure, capacity-building programmes, and stronger linkages between technology adoption and existing funding mechanisms such as the Tertiary Education Trust Fund (TETFund). The paper is intended as a conceptual and educational contribution rather than a report of primary empirical findings.

*Keywords: sustainable research, technology adoption, economics research, tertiary education, Nigeria, TETFund, research infrastructure*

## 1. Introduction

Research in economics has always depended on the tools available to generate, process, and interpret data. In the twenty-first century, that dependence has deepened considerably. What was once possible with pen, paper, and manual computation now routinely requires statistical software, large datasets, and networked collaboration across institutions and countries. For economics research to remain relevant, rigorous, and sustainable in the long term, tertiary institutions must find ways to embed appropriate technology into the everyday practice of research.

In Nigeria, the tertiary education sector faces a familiar tension. On one hand, universities, polytechnics, and colleges of education are under growing pressure to produce research that is internationally competitive, policy-relevant, and methodologically sound. On the other hand, many institutions continue to operate with constrained budgets, unreliable infrastructure, and uneven access to digital tools. This tension is particularly visible in economics departments, where empirical research increasingly demands large datasets, computational power, and familiarity with specialised software that many researchers were never formally trained to use.

Sustainability, in this context, refers to the capacity of research systems to continue producing quality work over time without depending on one-off funding, external assistance, or the individual effort of a few motivated researchers. A sustainable research culture is one where infrastructure, skills, and institutional support reinforce one another, allowing research output to persist and improve across generations of scholars. Technology, when properly harnessed, offers one of the more realistic pathways toward this kind of sustainability, because it can reduce the marginal cost of producing, storing, sharing, and verifying research over time.

This paper explores how technology can be leveraged to support sustainable economics research within Nigerian tertiary institutions. It is structured as follows: Section 2 reviews relevant literature and conceptual issues; Section 3 outlines the specific technologies relevant to economics research; Section 4 discusses the institutional and infrastructural barriers to adoption

in the Nigerian context; Section 5 offers policy and institutional recommendations; and Section 6 concludes.

## 2. Conceptual and Literature Review

### 2.1 Sustainable Research: Meaning and Dimensions

The concept of sustainability in research extends beyond the environmental connotation often associated with the term. In the context of academic research systems, sustainability refers to the ability of institutions to maintain productive, high-quality research activity over the long term, without excessive reliance on external funding cycles, individual champions, or unsustainable working conditions for researchers. Three dimensions are commonly identified in the literature: institutional sustainability (systems and structures that outlast individuals), financial sustainability (diversified and reliable funding), and human capital sustainability (a continuous pipeline of trained researchers).

Economics as a discipline is particularly sensitive to these dimensions because much of its empirical work depends on data infrastructure. Where data collection, storage, and analysis tools are unreliable or inaccessible, research output tends to be sporadic, and knowledge produced in one research cycle is difficult to build upon in the next.

### 2.2 Technology and Research Productivity

A substantial body of scholarship links the availability of digital research infrastructure to research productivity in developing-country universities. Common findings include the observation that access to statistical and econometric software shortens the time between data collection and publishable analysis, that cloud storage and version control reduce the risk of data loss, and that access to open-access journals and repositories reduces the cost barrier to literature review and dissemination. At the same time, several studies caution that technology adoption without accompanying training tends to produce underutilisation, where expensive tools are acquired but never fully integrated into research workflows.

### 2.3 The Nigerian Tertiary Education Context

Nigerian tertiary institutions operate within a policy environment shaped significantly by the Tertiary Education Trust Fund (TETFund), which provides funding for infrastructure, research, and staff training across public universities, polytechnics, and colleges of education. TETFund's Institution-Based Research (IBR) intervention, in particular, has become one of the more accessible funding channels for individual and small-group research projects. However, uptake of digital research technology varies considerably by institution, discipline, and individual researcher motivation, and funding alone does not automatically translate into technological capacity.

### **3. Technologies Relevant to Economics Research**

This section outlines categories of technology with direct relevance to economics research conducted in Nigerian tertiary institutions.

#### **3.1 Statistical and Econometric Software**

Tools such as Stata, EViews, R, and Python (with libraries such as pandas, statsmodels, and scikit-learn) remain central to quantitative economics research. These platforms support regression analysis, time-series modelling, panel data estimation, and increasingly, machine-learning-based forecasting. Open-source tools such as R and Python offer a particular advantage for resource-constrained institutions, since they eliminate licensing costs while still supporting advanced econometric techniques.

#### **3.2 Data Sources and Repositories**

Access to reliable data remains one of the central constraints on empirical economics research in Nigeria. Technology has expanded access to national and international data sources, including the National Bureau of Statistics online portals, the World Bank's Open Data platform, the IMF's data repositories, and the Central Bank of Nigeria's statistical database. Cloud-based storage and version-controlled repositories (such as institutional repositories or platforms like the Open Science Framework) further support the long-term preservation and shareability of research data.

#### **3.3 Collaboration and Communication Platforms**

Cloud-based collaboration tools, including shared document platforms, video-conferencing software, and reference management systems, allow researchers across institutions, and across borders, to co-author papers, share data, and coordinate research without the cost of physical travel. For Nigerian researchers seeking international collaboration, such tools substantially lower the practical barriers to joint publication.

### **3.4 Artificial Intelligence and Automation Tools**

Emerging AI-assisted tools now support literature screening, language editing, citation management, and preliminary data cleaning. Used appropriately, and with due attention to academic integrity, these tools can reduce the time researchers spend on repetitive tasks, allowing more time for analytical and interpretive work. Their use, however, requires clear institutional guidelines to avoid misuse in areas such as data fabrication or inappropriate authorship claims.

### **3.5 Learning and Capacity-Building Platforms**

Massive open online courses (MOOCs) and other e-learning platforms have made specialised training in econometrics, data science, and research methodology far more accessible to Nigerian researchers than would have been possible even a decade ago. These platforms partly address the shortage of in-house specialised training available within many departments.

## **4. Barriers to Technology Adoption in Nigerian Tertiary Institutions**

### **4.1 Infrastructural Constraints**

Unreliable electricity supply and limited broadband penetration remain the most frequently cited barriers to sustained technology use in Nigerian research settings. Even where digital tools are available, inconsistent power supply disrupts long-running analyses and discourages researchers from relying on technology-intensive workflows.

### **4.2 Financial Constraints**

Licensing costs for proprietary statistical software, subscription costs for academic databases, and the cost of hardware capable of running modern analytical tools represent a recurring financial burden, particularly for individual researchers and smaller institutions without dedicated research computing budgets.

#### **4.3 Digital Literacy and Training Gaps**

A significant proportion of academic staff in Nigerian tertiary institutions were trained before the widespread availability of modern research software, and structured retraining opportunities remain uneven across institutions. This generational gap in digital literacy limits the extent to which available technology is actually used in day-to-day research practice.

#### **4.4 Institutional and Policy Gaps**

Many institutions lack a clear, funded strategy for research technology adoption. Where funding exists, such as through TETFund IBR grants, it is not always explicitly tied to technology acquisition or digital skills training, leaving individual researchers to make ad hoc decisions about how much of their grant, if any, to allocate toward technological capacity.

### **5. Recommendations**

#### **5.1 For Individual Researchers**

Economics researchers should prioritise the acquisition of at least one open-source analytical tool (such as R or Python) to reduce dependence on costly proprietary licences, and should actively participate in available online training to build competence in modern econometric and data-management techniques.

#### **5.2 For Departments and Institutions**

Departments should consider establishing shared computing resources and institutional data repositories that can be used across research groups, reducing the need for individual researchers to independently fund similar tools. Where possible, institutions should negotiate group licences for statistical software to lower per-researcher costs.

### 5.3 For Policy and Funding Bodies

Funding mechanisms such as TETFund's Institution-Based Research grants could be structured to explicitly ring-fence a portion of research funding for technology acquisition and digital skills training, rather than leaving this allocation entirely to the discretion of individual grant recipients. Coordinated investment in campus-wide broadband infrastructure would also yield returns across disciplines, not economics research alone.

### 5.4 For Capacity-Building

Structured, recurring training programmes, whether delivered through university ICT centres, professional associations, or partnerships with online learning platforms, should be prioritised as a complement to infrastructure investment. Technology adoption without corresponding skills development tends to produce underused infrastructure rather than sustained research improvement.

## 6. Conclusion

Sustainable research in economics within Nigerian tertiary institutions depends on more than isolated technology purchases; it depends on the alignment of infrastructure, funding, training, and institutional policy. This paper has outlined the technologies most relevant to economics research, the barriers that currently limit their effective use in the Nigerian context, and a set of practical steps that researchers, institutions, and policymakers can take to close the gap. As Nigerian universities and polytechnics continue to seek greater international research visibility, the institutions that succeed in embedding technology sustainably into their research culture, rather than treating it as a one-time acquisition, are likely to be the ones that produce the most consistent and competitive research output over time.

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