

METHODOLOGY OF BASIC AND APPLIED RESEARCH

2nd Edition

Edited by:

A. I. Olayinka, V. O. Taiwo, A. Raji - Oyelade and I. P. Farai

METHODOLOGY OF BASIC AND APPLIED RESEARCH

Second Edition

Edited by

**A.I. Olayinka,
V. O. Taiwo,
A. Raji-Oyelade and
I. P. Farai**

Published by:

The Postgraduate School
University of Ibadan,
Ibadan.

E-mail: postgrad@mail.ui.edu.ng

Website: <http://www.postgraduateschool.ui.edu.ng>

Published 2006

All Rights Reserved

ISBN 978 - 37883 - 9 - 6

Printed by: Dabfol Printers, Ibadan.

0803-449-5517

Contents

PAGE

Contributors	iii
Foreword	vii
Preface	ix
Acknowledgements	xi
1. Definition, Spectrum and Types of Research <i>I. Fawole, F. O. Egbokhare, O. A. Itiola, A. I. Odejide and A.I. Olayinka</i>	1
2. The Link between Everyday Reasoning, Scientific Reasoning, Scientific Research and Theory <i>S. A. Babarinde</i>	19
3. Design and Development of Conceptual Framework in Research <i>O. C. Aworh, J. B. Babalola, A. S. Gbadegesin, I. M. Isiugo-Abanihe, E. O. Oladiran and F. Y. Okunmadewa</i>	37
4. Preparing a Research Proposal <i>A. I. Olayinka and B. E. Owumi</i>	53
5. Use of Logical Framework Approach in Research Proposal Writing For Grants <i>B.O. Agbeja</i>	83
6. Systematic Collection of Data <i>G. A. T. Ogundipe, E. O. Lucas and A. I. Sanni</i>	95
7. Analysis of Qualitative Data <i>A. S. Jegede</i>	113
8. Use of a Research Questionnaire <i>J. O. Osiki</i>	133

9. Statistical Analysis and Inferences.	
<i>E. A. Bamgboye, E. O. Lucas, B. O. Agbeja, G. Adewale, B. O. Ogunleye and I. Fawole</i>	151
10. Data Retrieval and Use of ICT in Research	
<i>O. A. Fakolujo</i>	203
11. Use of Computers and the Internet for Research Purposes	
<i>O. A. Bamiro, A. E. Oluleye and M. A. Tiamiyu</i>	215
12. Information and Document Retrieval on the Internet	
<i>A. O. Osofisan</i>	235
13. Writing a Phd Thesis	
<i>A. I. Olayinka and R. Oriaku</i>	245
14. The University of Ibadan Manual of Style (UIMS) for Thesis Writing	
<i>A. Raji-Oyelade, T. O. Alonge and E.O. Olapade-Olaopa</i>	267
15. Ethics in Research	
<i>O. Obono, A. Arowojolu, A. J. Ajuwon, G. A. T. Ogundipe, J. A. Yakubu and A. G. Falusi</i>	281
16. Challenges in Conducting Research in Developing Countries	
<i>G.O.S. Ekhaguere, A. I. Olayinka, V.O. Taiwo T. O. Alonge and O.M. Obono</i>	321
Appendixes	335
Index	

16

CHALLENGES OF CONDUCTING RESEARCH IN DEVELOPING COUNTRIES

*Ekhaguere, G. O. S., Olayinka, A. I., Taiwo, V. O.,
Alonge, T. O. and Obono, O. M.*

INTRODUCTION

Some of the challenges in conducting research in developing countries are described in this Chapter. An example is given of the problems faced in conducting biological and medical researches.

Notion of Research

Research can mean one or more of the following activities:

- Free inquiry
- Painstaking search for the truth no matter where it leads
- Unfettered intellectual engagement aimed at expanding the frontiers of knowledge
- Unbiased recording and interpretation of events with a view to unveiling new facts or trends
- Knowledge mining of systems in the universe

RESEARCH IN THE CONTEMPORARY WORLD

Research occupies a strategic position as it is more important in wealth creation than the mere possession of raw materials because the key to sustainable socio-economic development comprises knowledge creation, processing, packaging and dissemination. Nations with poor research capacity must expect to regress and become poorer, since knowledge is expensive, while raw materials, with no value added, are relatively cheap.

In that case, a vicious circle is set up: poverty gives rise to poor research capacity, which in turn generates more poverty.

Today, Universities around the world are differentiated by, among other criteria,

- the level of their involvement in research
- the type of problems they attempt to solve
- the impact of any results they obtain on their societies and the world at large

As a result, many universities take great pains to promote research through the structures and facilities they make available and the way they continually empower their staff and students to engage in cutting-edge research activities. Universities which pay only lip service to research must expect to decline and be relegated in the congregation of higher education institutions.

Strategies for Sustainable Research Activities

Some of the strategic initiatives needed include:

- Building research capacity and synergy through
 - Good and implemented institutional policy on research;
 - Providing the enabling environment for research;
 - Enhancing the scope for intellectual, scientific discourse;
 - Making research a feature of various levels of training;
 - Formulating and implementing strategic national research policies;
- Promoting interdisciplinary/trans-disciplinary research collaborations;
- Making institutional research announcements, highlighting selected new developments or directions;
- Networking/collaborative activities involving various partners: industries, other research institutions, etc;
- Packaging and dissemination of research products.

Obstructions to Research Activities in Developing Countries

Attitudinal Issues

In their race to catch up with the developed countries overnight many developing countries fail to understand:

- the nature of the research enterprise;
- the long gestation periods of many research activities: the products we see on shelves in markets have taken years to get to the public;
- the expensive nature of research;
- the speculative nature of research;
- the need for continual and uninterrupted research engagement, as a strategy for sustainable development;
- the imperative of seeing research as a veritable strategy for sustainable development.

Poorly Articulated, or Obscure National Priorities

At independence, several developing countries had some clearly stated national priorities although they had only a few indigenous researchers; ironically, some forty years down the road when the countries have many experts, they have no identifiable national priorities.

That research is not a priority in many developing countries is seen in the fact that many of them, like Nigeria, do not have crucial outfits such as: national science foundations to support mission-oriented research

Substantial Loss of Sovereignty by Many Developing Countries

Developing countries are mere pawns on the chess boards of foreign organizations like the: IMF, World Bank, Paris Club, and WTO which supervise their activities on almost a daily basis. This makes it difficult for developing countries to set meaningful national priorities.

Developing countries have been oriented to look outwards for turnkey solutions to their problems, instead of searching for autochthonous or endogenous solutions. This leads to the abandonment of, or ineffectual support for, research activities by many developing countries and poor states of research infra-structure in the form of

- libraries,
- laboratories,
- facilities/funds for field trips, surveys, etc, and
- ICT infrastructure, hindering connectivity to the global information pool.

There is difficulty in obtaining vital data from statutory national agencies and

- data collection, structuring, and warehousing often not done to ensure quick retrieval;
- negligence in data collection and warehousing;
- poor, or no data security measures in place;
- data often of doubtful integrity owing to indolence, incompetence, corruption, etc;
- data often not timely; and
- official secrets act.

Mentoring of Young Researchers

Severe personnel constraints arising from bad policies invariably lead to competent persons not being available for mentoring; hence, there is a lack of poor interest in research by many young persons and incompetent mentors.

There are limited outlets for research works because:

- escalating international standards means that many young researchers cannot publish in international journals;
- cost of publishing in some international journals may be high, and unaffordable by researchers;
- cost of publishing in local journals is escalating;
- local journals are often obscure and hardly widely distributed;
- local journals have high mortality rates;
- many local journals have poor scholastic quality.

International experience is inadequate or vanishing because of lack of funds for conferences, fellowships, staff training, etc. These are mainly supported by foreign agencies, hence highly competitive, with conditionalities.

The consultancy syndrome has resulted in rushed data collection and analysis and data manipulation to meet clients' expectations.

Collaboration/networking with foreign partners

Institutions in developing countries are seen by foreigner scientists as mere outposts for data collection, hence home scientists are relegated to the subordinate role of data

collection while the academic/intellectual role is assumed by the foreign partner.

Only data that support some predetermined position held by foreign partners are considered valid/acceptable and therefore, reports are prepared to conform with the views/expectations of the foreign partners.

The wages of underdevelopment are manifested in

- Poor municipal and other facilities such as
 - Electricity
 - Water supply
 - Roads and transportation and
 - Lack of security.
- High inflation in the economy.
- Shifting economic paradigms (SAP, deregulation, etc).
- Widespread corruption
- Fake and adulterated products

Ethical Issues

Young researchers have little or no knowledge about the ethics of research, hence unethical practices in research are increasing in the form of

- manipulation and falsification of data,
- reporting experiments that were never done,
- results that are not reproducible,
- lack of truth and trustworthiness in research

These arise from compromised peer-review system and unethical practices in the larger society

WTO/GATS/TRIPS and research

- Commodification of knowledge
- Withdrawal/reduction of public support for research in higher education institutions
- Trade-Related Aspects of Intellectual Property Rights (TRIPS): patents, trademarks, and copyright issues
- Foreign domination of developing countries
- Emphasis will be on commercial research

Some fall-outs from the difficulties in doing research in

developing countries include the following:

- **Polemic** responses to intellectual discourse
- Research is often merely **mimetic**, with no depth, **foundation** or **relevance**: this means that research hardly addresses key development issues
- Poor **quality** of research output
- Progressive enthronement of **mediocrity**
- **Brain drain**

CONSTRAINTS TO ACADEMIC LINKAGES

The main obstacle to conducting research in developing countries can be attributed to inadequate institutional funding (Ekhaguere 2004). Arising from this are such other problems as the following:

- poor teaching, learning and research environments, evident in the poor state of libraries, laboratories and the ICT infrastructure,
- poor living conditions of staff and students
- incessant strikes by university staff unions which lead to disruptions in academic calendars.
 - It has been reported (Abubakar 2003) that the nationwide strike embarked on by the Academic Staff Union of Universities (ASUU) from January to May 2003 led to a financial loss of some N43.3 billion.
 - Other losses include the loss of worth of our certificates, knowledge, skills and overseas' scholarships.
- inadequate resource provision for inter-institution cooperation
- poor quality staff (teaching, technical and administrative)
- lack of scholarship and bursaries to the vast majority of students
- poverty among students, leading to many cases of those who are registered as full-time students but are at the same time working full-time/part-time
- declining ethical and moral values,
- inadequate staff development activities,
- rising scourge of the HIV/AIDS pandemic on

campuses,

- poor state of campus facilities such as roads, water supply, and electricity supply,
- unsafe campus environment and endemic campus violence,
- poor campus sanitation.

The challenges in conducting research in Nigeria can be grouped into two main classes:

- those caused by the proprietors,
- those that are self-inflicted.

The political and economic crises of the last 20 years or so have caused social dislocations, resulting in:

- inadequate funding,
- inadequate human resources,
- loss of the academic ideals, ethics and transparency.

Government has never treated universities as worthy partners. Universities are neither encouraged nor challenged to play constructive roles in research and development, through generous discretionary funding from government. Nigerian universities as corporate bodies are hardly involved in projects that are sponsored by government.

In developed countries, universities are major contractors to government because they bid for projects that provide the basis for the knowledge that is to be used to move society forward. Postgraduate students in turn work on the projects that are headed by their professors

Reforms are needed to recover the academic ideals, but these must be democratic in nature. These will entail:

- constructive criticism
- consultation
- participation in decision making by individuals and units
- academic freedom

What is required:

- academic mentoring
- peer criticism

- quality assurance in publications
- definition of publications has been so lax in many cases, more so in these days of desktop publishing.

MENTORING

The word mentor can be employed to mean:

- a trusted counsellor,
- guide
- tutor or coach

usually older (and/or more experienced) than the person being counselled, guided or tutored. The number of experienced academic staff who are willing to be mentors is grossly inadequate (table 1). The younger academic members are overworked and find little time for personal professional development beyond the required postgraduate degrees (Sonaiya 2004). Opportunities to attend learned conferences are limited

Table 14.1:
Distribution of academic staff by grade in the University of Ibadan, as at December 2003.

Grade	Number of staff
Assistant Lecturer	101
Lecturer II	253
Lecturer I	222
Senior Lecturer	295
Reader	27
Professor	249
Total	1147

Source of data: Osasona and Olayinka (2004)

PASSION FOR RESEARCH

In order to produce excellent results, a researcher must believe passionately in what s/he is doing. There are reported cases of many academics even in developed countries of the world who have all the necessary facilities at their disposal, but who lost interest in any serious research once they obtained tenure (Spittler 2004). Conversely, there are many badly equipped

researchers who work in an environment that is indifferent or hostile to their research, who still manage to do excellent work. The latter group ought to be encouraged and some of them may be interested in doing fundamental research. They most certainly need to network (e.g. by e-mail) with people who share similar opinion.

It would seem that from about 1985 till 2000 many young scholars were not interested in having a career in universities or research institutes largely on account of the very poor salaries and lack of research facilities. Some of the most popular and imaginative slogans, developed by ASUU, and which members displayed on their office doors and as car stickers were "My take home pay cannot take me home", "My boss is a comedian, the wages he pays is a joke". I think the "boss" in the latter should in fact read "employer". Employment within the Nigerian university system became very unattractive to most potential scholars. The private sector, especially the banking sub-sector and oil exploration and production companies offer much better attractions. In such circumstances it became very difficult for young scholars to have any enduring passion for research.

It might be encouraging to start an academic career if universities teaching and research are prestigious activities within the society. Even if the income prospects are lower than for persons engaged in the private sector, it may still be attractive to plan for an academic career. For example in Germany, a university professor ranks high in society. There, a university professor always ranks highest, followed by doctors and pastors, and far higher than politicians (Spittler 2004).

STRENGTHENING COLLABORATION BETWEEN UNIVERSITIES

Some of the measures that can help in fostering inter-university collaboration include the following:

- strategic planning
- striving for excellence in teaching and research
- improving the ICT infrastructure
 - For a university to be in a position to compete

favourably in the present-day world, the need for a functional and robust website cannot be overemphasized

- Apart from other information, it is necessary to showcase the reservoir of expertise that abounds within the university.
- improving the state of infrastructure on the campuses (roads, water supply, electricity supply, telecommunication)
- regularizing the academic calendar
- improving ethical standards in teaching and research
- recognizing credits for studies abroad
- operating a functional international relations office
- internationalizing the curriculum
- dealing with policy and management issues
- broadening participation in regional initiatives (e.g. NEEDS, NEPAD, AGOA)

There is an urgent need to strengthen inter-university cooperation in Nigeria in order to promote academic mobility within the country. This will also foster national and international inter-university collaboration in research projects.

The following are some of the factors that may constitute obstacles to productive research.

Researcher's Factors

- lack of conviction
- lack of focus
- unclear motives
- fear of failure
- poor motivation

Supervisor's Factors

- lack of interest
- poor mentoring
- poor remuneration
- frustrations

Institutional Factors

- poor motivation

- unrealistic institutional policies
- lack of reward for excellence
- defective information system
- lack of commitment
- national factors!!!

Six Phases of a Research Project

- enthusiasm
- disillusionment
- panic
- search for the guilty
- punishment of the innocent
- praise for the non-participant

CHALLENGES OF CONDUCTING RESEARCH IN BIOLOGICAL AND MEDICAL SCIENCES IN DEVELOPING COUNTRIES

Introduction

A significant number of research studies have been conducted in the developing world, as can be observed by the contributions to published scientific and biomedical literature. However, the results of most of such studies seem to be less likely to be published in international journals, particularly in influential scientific journals, compared with reports from similar institutions in developed countries. Allusions have been made, in some international and local circles, to the effect that studies and research for development in biological and medical sciences in the developing countries have been largely inefficient, ineffective and unable to attract commendable international acclaim worthy of say, Nobel Prize or such likes. This is due to the fact that they have been plagued by factors attributable to the following:

- There are usually no policy-driven quest for scientific research in the quantum needed, and neither are there incentives to create the enablement and zeal by scientists to carry out scientific research; Most of these countries prefer to import scientific results and technology at great cost.
- Many of these studies have not investigated major

scientific and medical innovations aimed at solving national problems, but have focused on less significant problems, or at best a replication of studies carried out elsewhere.

- Most of the well-researched, result-oriented studies have been external donor-driven, usually catering to the priorities of donor agencies, instead of national priorities.
- The quality of research in many instances is lower.
- The information generated from such researches have not been well documented, disseminated and put to use by policy- and decision-makers at all levels of governance and sectors of society.

The Challenges

Although there may be some substance in the above assertions, it is also true that in most developing countries, researchers have to do their work under extremely difficult conditions. The challenges facing these researchers can be grouped into four categories: the macro-environment, work environment, personal factors and the intrinsic and specific nature of biological and medical research.

The Macro-environment

A fundamental determinant of the level of scientific research capability and activity in developing countries is the general social, economic and political environment. Apart from lack of political will by leaders in most developing nations for basic scientific and applied research, prolonged military rule, natural disasters such as famine and drought, man-made disasters such as civil wars and wars with neighbouring countries, international economic recession and local administrative mishaps have changed (and continue to change) the socio-economic landscape of these countries. Such political, economic and social instabilities are obviously not conducive to fruitful research activities.

Another challenge is the lack of demand for (and social appreciation of) research from developing countries. Policy- and decision-makers do not demand and utilize results of most scientific findings. At best, when requested for, the results of the probably poorly funded researches end up in filing cabinets.

In countries where there is a semblance of democratic rule, the public and politicians who represent them are not aware of the utility of research. The main reason for this is a low level of scientific culture, due to underdevelopment, high level of illiteracy and absolute poverty in these nations, especially in sub-Saharan Africa.

Resource allocation for scientific research from public funds is essential if research is to be of use for national development. However, few governments in the developing world are willing to allocate a sizeable amount of resources for research in general and for biomedical research in particular. Because of limited funding from the public sector, researchers have a restricted choice of topics, and thus are frequently unable to institute research into wider problem areas. Where external funding is available, the objectives of investigations are usually dictated by donors, and results used for their own selfish ends.

The Work Environment

The research infrastructure in low-income countries is generally weak. Inadequate and insecure budgets, inadequate equipment and supplies and scarcity of technicians and support staff are commonplace. Until recently, in areas where there is development of internet-based information communication technology, limited access to up-to-date journals and books in their particular disciplines is probably the greatest challenge facing most researchers. Literature review is essential in order to be able to study the background to a particular research problem, to justify research proposals, to avoid 're-inventing the wheel', and to write good reports. Particularly in Nigeria, the internet is expected to alleviate this problem, but research staff with computer and internet facilities are still in a small minority.

Because of the low level of development of human resources in biomedical sciences in developing countries, particularly in Nigeria, the number of skilled researchers is limited and the exchange of experience between investigators is either impossible or is extremely limited.

Lack of, and if present, inadequate and poor infrastructural facilities such as uninterruptible power and water supplies are a bane to any scientific and biomedical research. The inept

national power supply and backup systems do not guarantee effective temperature-dependent research and storage of laboratory reagents and biologicals, not to talk of uninterrupted and timed research protocols. The loss and psychological frustration a scientist suffers when there is power outage during a research work or surgical operation are better imagined. Catastrophic losses have been and are still being encountered in avoidable destruction of valuable biologicals in most biomedical research laboratories nationwide. Frequent and epileptic power and water supplies have led to avoidable loss of sensitive scientific equipment in many laboratories. There is a dearth of modern equipment, and old ones when available are no longer serviceable because the manufacturers have long phased them out of their production lines. The few modern equipment available are always jealously guarded by their owners because of insecurity. In most universities, and notably Ibadan, there is no central research laboratory where maximum advantage of the few scattered equipment can be tapped and the over-blown well trained laboratory staff can be put into effective use.

Personal factors

Relatively low salaries and emoluments of researchers are a major and perennial problem in developing economies. This has forced a considerable number of most of the highly trained (mostly overseas trained) researchers and scientists to seek greener pastures either in developed countries or developing countries where the pay packet is bulkier. This is the popular brain-drain syndrome, which to date is still in force. Most of the few well-trained scientists who choose to remain at home devote substantial amounts of their time to other income-generating activities such as private practice and consultancies instead of research.

The vast majority of the younger scientists who carry out research in developing countries, especially in Nigeria in the last 15-20 years, are products of in-breeding by senior colleagues, who either studied here or at best enjoyed overseas training in the late 70's or early 80's, when things were much better than now. This phenomenon has placed a lot of restrictions on the quality and quantity of scientific findings,

up-to-date equipment and infrastructural facilities for good research.

Insufficient training of staff working in scientific and medical laboratories, protocol development, fund soliciting, project execution and financial management is another challenge. Although these workers may be highly skilled in their respective disciplines, few have had the necessary training to plan and implement research projects.

Intrinsic Nature of Biomedical Research

Biomedical research comprises of fields of study that are implicitly exact in their form and outlook. They are not only basic; most of the research results are applicable to life and living. In almost all cases, they determine life and death of persons, plants and animals; essentially life and existence on mother earth. No amount of semantics and philosophy can add to or remove from the significance of biomedical research findings. In essence, results of biomedical research may not be varied to suit purposes for which they are not intended. Hence, they require specialised equipment, well trained staff and a good and efficient work environment for good results.

Conclusion

The problems that have plagued research in biomedical sciences in most developing countries are not insurmountable. Despite the multitude of challenges facing them, probably the most important incentive for researchers in developing countries is their conviction that they are working in places where the need for their research is greatest, and that at some future date (hopefully soon) policy- and decision-makers will recognize the need for research and development in biomedical sciences as priority areas that need adequate resource allocation, and that the results of their research will be used to improve the living conditions of individuals, families and communities in these countries.

REFERENCES

Abubakar, M. 2003. Government lost N43.3 billion to ASUU strike, says NUC. *The Guardian* (Lagos). Retrieved 24 June 2003, from <http://www.guardiannewsngr.com/-news/article06>

Ekhaguere, G. O.S. 2004. Strengthening inter-university cooperation in Africa. Paper presented at a Seminar on Developing and Sustaining Academic Linkages at the University of Ibadan, 1 April 2004. 12 pp.

Osasona, O. and Olayinka, A. I. 2004. Evaluation of the implications of age on postgraduate teachers at the University of Ibadan. *Internal Report submitted to the Vice-Chancellor, University of Ibadan*. February 2004. 22 pp.

Sonaiya, E. B., 2004. Peer criticism and academic mentoring: experience with TAG. *Paper presented at a Workshop on Faculty Development*, Goethe Institute, Lagos, 22-23 October 2004. 11 pp.

Spittler, G. 2004. Research and development in West Africa: the challenges for universities. *Paper presented at a Workshop on Faculty Development*, Goethe Institute, Lagos, 22-23 October 2004. 13 pp.