

Perception about Utilization of Scientific Information by Policy Makers in Science and Technology Sector in Nigeria

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Introduction

The use of scientific information in policy making could significantly increase the effectiveness of state policies – policies being vital elements in development efforts. Well thought out policies are central to achieving key national goals such as alleviating poverty, raising living standards, creating good jobs, ensuring security, strengthening education, improving public health and protecting the environment (Aiyepetu, 1983). Porter and Hicks (1996) have observed that although the concept of knowledge utilization has proven difficult to operationalize in the context of policy making globally, more than elsewhere policy-relevant research seldom has an immediate or direct impact on government decisions in most developing countries. In Africa, the situation is largely the same - access and use of scientific information by policymakers are so low despite increasing global consciousness that information is a *sine qua non* for socio-economic development in an era of globalization and information economy (Adeya, 2000). An understanding of the use of research information in policy decisions is desirable not only to ensure that policy decisions are need-driven, but to derive maximum benefits of research and possibly change current development status.

In Nigeria, Olembo (2002) has shown that there is a gap between the worlds of policy makers and researchers because research output from research institutes and universities are either not available or not accessible to policy makers. Hence, low access and integration of relevant locally produced scientific information into national policies could be considered one of the limiting factors in most development plans (Onatola, 2004). Olomola (2005)

showed empirically that in Nigeria, research input into policy process is rather limited even though the role of research in policy decision process seems to have been recognised. He further observed that Nigerian policy makers take several decisions without research input while several research studies that have no policy relevance are being conducted in the universities and research institutions. The prevailing practice in using information for policy making has been that science is universal by nature, and that policy makers could therefore simply retrieve and use the information created to address local problems elsewhere. But Nwagwu (2007) has shown that such information might be inadequate for decision making, and that policy has to be based on information produced locally.

As in other sectors, policy formulation in science and technology in Nigeria follows a top-down rather than bottom-up process which does not allow for the involvement of researchers and other stakeholders. In this study, we report an investigation of the perception of policy makers in science and technology sector in Nigeria – a sector supervised by the Federal Ministry of Science and Technology - about sources, accessibility and availability as well as factors constraining utilization of scientific information in decision making. Addressing this objective is very crucial in explaining the observed relative absence of research products from universities and research institutes in state science and technology policies. In the specific case of Nigeria, the result will contribute in filling the gap identified by Porter in 1995 namely: systematic research into use of technical information by policy makers in the developing countries is yet to be undertaken.

Literature Review

Science, technology and scientific information

Science is defined as a “generalisable and replicable knowledge of nature, usually resulting from basic science performed in, or near, universities, and reproduced in refereed and published papers” (UNECA, 1997). Science also refers to any body of knowledge created through formal processes of research. Technology, on its own part, refers to the knowledge of artifacts (products, processes, services) usually resulting from applied research, development and related activities in business firms and other institutions, and embodied in the production of the artifacts themselves. In other words, technology refers to the application of science with the aim of making a difference to the world around us (UNECA, 1997). Musoke (2002) suggests that technology is everything – equipment, knowledge, including information about all kinds of skills, processes and products plus institutional and organizational know-how. The above definitions show that science and technology are closely interrelated. New scientific knowledge may lead to technological development, while a technological need may prompt scientific investigation (UNECA, 1997). Science and technology help human to conceptualize his world and fashion out tools and means by which humans go about their daily lives and satisfies basic needs.

Scientific information (SI) derives primarily from research, development, and monitoring of the activities of scientists and engineers and individuals supporting their work (Djenchuraev 2003). Nwagwu’s (2007) definition of STI as “all information developed from research undertakings in all science and technology fields” is apt in this regard. Throughout this study, information (SI) will be taken to mean the same as scientific and technical information (STI).

Policy, scientific information sources and evolution in Nigeria

Policy could be defined as a specific decision or set of decisions designed to carry out a course of action. Policy is also defined as an official statement with a specific purpose, a set of objectives, defined goals and outcomes, and a set of criteria for choosing among competing alternatives (Mudenda, 1989; Abdalla, 2003). As in all decision situations, various kinds of information are very central to good policies.

There are many sources of scientific information. Adams and Hairston (1995) identified as textbooks, published scientific papers, conference proceedings, computer models, position papers from professional or advocacy groups; and government agency staff, industry employees, consultants, or people with practical experience and "conventional wisdom". They maintained that these sources should be evaluated with respect to origin, possible inherent bias, and other limitations, notwithstanding how valuable the information may be.

Science and Technology policy came to the fore as an important responsibility of African governments in 1980 when the "Lagos Plan of Action" (LPA) was adopted by African countries as a framework for economic development (Abdalla, 2003). The LPA focused on the deteriorating African economies and attributed it to lack of role for science and technology as essential factors in economic and industrial development. Later on came the Abuja Treaty which showed further the importance of incorporating science and technology policy in the national plans for development, but both development initiatives failed (Abdalla, 2003). Nigeria's first National Science and Technology Policy was formulated in 1986 at the realization of the fact that overall national development could only be sustained through the effective application of scientific and technological skills for the production of goods and services.

Use of scientific information by policy makers

There are not many studies on use of information by policy makers in the developing countries (Porter, 1995). A study by Aiyepku in 1983 found that policy-makers in Nigeria did not have as high a level of information consciousness as they might, although it was not as low as suspected. He also discovered that the most important source of information for the Nigerian policy-maker is the confidential file where the well-known in-house memoranda are contained. More than 90% of the respondents reported their sources of information as 'personal source', suggesting a heavy dependence on 'opinion leaders' and 'colleagues' as an important source of information for the policy makers.

Aiyepku also found that Nigerian policymakers reported a strong preference for full-length and original documents, while abstracts and descriptive reviews of original documents were not preferred. Also, timeliness and availability of information were the two most important factors that enhanced utilization of information by policy-makers. Authority, political considerations and the activities of lobby groups were discovered to have a very important bearing on the course of public policy in Nigeria.

Factors that encourage or discourage the use of information by policy makers

There are diverse factors that affect the use or disuse of information by policy makers. Schwarz (1983) had shown that possession of information that is relevant to solve a problem in developing countries is not as easy as it sounds, due to the fact that relevant information can hardly be identified, located, retrieved and understood. Glover (2000) pointed out that factors such as the design and dissemination of research, quality of the research, including

the reliability of its methodology, did have an important bearing on research report credibility and impact.

According to Narcise *et al* (2002), use of information is limited by factors like lack of or inadequate technical capacity with regard to human, equipment and financial resources resulting to significant gaps in scientific knowledge; profusion of data that is not evaluated optimally; incomparable and/or unreliable data; lack of mechanisms for sharing and integration and reluctance of concerned institutions to share data. Others are failure to package information into understandable forms for managers and decision-makers, failure to translate information to management actions and decisions and limited understanding of some local leaders of the value of information.

Interesting finding was also made by Abdalla (2003) when he showed that factors like cultural values, attitudes, traditionally oriented behavior, and fear of ostracization, power relations and vested interests may impinge on policy makers, causing them to stick to existing routines of actions rather than make informed decision. Recently, Chandrika (2007) showed that factors such as relevance of research findings, timeliness, quality and accuracy, objectivity of research documentations and simplicity of language of research findings encourage, to a great extent, the use of research reports by policy makers for decision-making.

This brief review shows that scholars have actually taken a foray into why scientific information is scarcely used in development policies, but the extent to which these observations explain the situation in science and technology sector in Nigeria requires to be established. Given some achievements of the Ministry in the past few years, such as the launching of SAT1 in 2003 and SAT2 in 2006, as well as the development of a linkage

mechanism between the supervisory Ministry and other stakeholders, it is obvious that improved performance of the Ministry might be expected if research information is incorporated into the decision making tools of the sector. Also, the Ministry has ten research institutions whose mandates are to carry out research to aid science and technology policies. Low utilization of research information would imply that these research institutes are operating parallel to the Ministry which they are designed to feed for proper decision making. On a larger scale, it would also show the extent to which funds are wasted to execute research and maintain researchers whose outputs do not feed into the mainstream of the sectors activities.

3.0 Methodology

Historical Background of the Nigerian Science and Technology Sector (FMST)

The science and technology sector in Nigeria can be understood by an overview of the evolution of the supervising Ministry namely Federal Ministry of Science and Technology. The Nigerian Council for Science and Technology (NCST) established in 1970 metamorphosed to National Science and Technology Development Agency (NSTDA) in 1977. Later, the civilian regime of Alhaji Shehu Shagari created the Federal Ministry of Science and Technology in 1980 which absorbed the functions of NSTDA. In 1983, the military administration of General Buhari merged the Federal Ministry of Science and Technology with the Federal Ministry of Education as Federal Ministry of Education, Science and Technology. But General Ibrahim Babaginda re-accorded the ministry a separate status as the Ministry of Science and Technology in 1985, a status the Ministry enjoys till date. The functions and mandates of the FMST have been outlined by Chidi (2007) as

follows: initiation, formulation, monitoring, and review of the national policy on science and technology. Promotion and administration of technology transfer programmes; promotion and coordination of scientific and technological innovation in Agriculture, industry, communication, electronics, medical, pharmaceuticals, roads and building, energy research and basic sciences. The functions of the Ministry also include coordination and supervision of the research and development efforts of all the national research institutes and agencies, and the development and production activities of the national infrastructure development complexes as well as establishment, promotion and maintenance of Federal-state linkages in science and technology.

Research design

A survey research method was adopted, and following Aiyepku (1983), the study covered senior members of staff of the Federal Ministry of Science and Technology (FMST) in the ranks of levels 8 and above as well as equivalent staff in the ten research institutes that carry out research in the area of mandate of science and technology Ministry. The institutes are Nigerian Institute of Social and Economic Research (NISER), Federal Institute of Industrial Research (FIRO), National Centre for Technology Management (NACETEM), Project Development Agency (PRODA), Regional Programme for Technology Management (REPTM), and Energy Commission of Nigeria (ECN). **Not up to tenXXXX**

From the staff records which were obtained from the Directors of Personnel in the institutions, a sample frame of the policy makers in the Federal Ministry of Science and Technology, numbering 221 from FMST was constructed and a random sample of **157** was selected. Data was collected using a questionnaire, administered personally by the first author and her assistants. The design of the questionnaire was geared towards eliciting information

on the background of the respondents; perceptions about uses, availability, accessibility, and sources of scientific information to policy makers. The data, which was not disaggregated according to institutions was analysed descriptively first, and then with Chi square to establish association among variables, placing our significance level at $p < 0.05$. Regression analysis was further employed to gauge whether the frequency of use of the sources is a function of their availability and, or accessibility.

4.0 Result

One hundred and fifty seven copies of the questionnaire were distributed to the respondents in the eight departments of Federal Ministry of Science and Technology (FMST) and ten research institutes, and 121 were returned to the researcher, a 77% rate of return considerably very high in an unsolicited survey.

Demographic characteristics

Table 1 below presents the demographic characteristics of the respondents. On whether the respondents consult scientific information in their decision making, 95.7% of the respondents answered in the affirmative, while 4.3 % did not. There is no significant association between the demographic characteristics of the respondents and whether they use scientific sources in their decision making activities ($p > 0.05$). Regarding whether the respondents know that there are research institutes dedicated to carrying out research in line with the mandate of FMS&T, 78.6% of the respondents acknowledged, but 1.4% did not. Most of the respondents (77.1%) revealed that they use research output from research institutes to make decisions, while

(4.3%) did not. This shows that respondents consider research outputs from the research institutes valuable

Table 1: Demographic characteristics of respondents (N=121)

Variable	Measurement	Frequency	Percent
Age	Above 60 years		None
	50-60 years	67	55.7
	40-50 years	9	7.1
	Less than 40 years	45	37.2
Working Experience	Below 10 years	64	52.9
	10-15 years	9	7.1
	15-20 years	21	17.1
	20-25 years	16	12.9
	Above 25 years	12	10.0
Qualification	Bachelor's degree	72.6	60.0
	Master's degree	31.097	25.7
	Doctoral degree	8.591	7.1
	Diploma	5.203	4.3
	Others	3.509	2.9
Gender	Male	98	81.4
	Female	5	4.3
	n	108	85.7

for their decision-making. Except for working experience ($p < 0.034$), there is no significant association between knowledge of the existence of research institutes attached to the ministry and the other demographic variables. About 60% of those who have spent less than ten years reported being aware of research institutes more than those who have spent 10-15 years (7.1%), 15-20 years (8.9%), 20-25 years (10.7%) and above 25 years (12.5%).

More than half of the respondents (58.6%) reported that they have access to the research outputs from the research institutes, while only (15.7%) reported having no access. There is no significant difference between demographic factors and access to the outputs of the research institutes, except for educational qualification. Those respondents who have bachelor's degree (22.22%) and masters degree (18.9%) are less likely to use the outputs from the research institutes compared with those who hold doctoral degrees (52.8%), while

those with diploma and other qualifications altogether account for less than 7% use of the outputs.

Availability and accessibility of information sources

We listed information sources and asked the respondents whether they considered the sources as available or not available. Table 2 revealed that the most reportedly available information source was newspaper (88.6%), followed by colleagues or superiors (82.9%) and the Internet (81.4%). Other information sources that were reported to be available by at least 50% of the respondents are government opinions (publications), in-house memoranda, and reports from research institutes, heuristics (personal experience), conference proceedings, researchers and learned journals. The least information sources reportedly available were books of abstract (30%), indexes (28.6%) and students’ theses and dissertations (20%).

We investigated the association between the availability of sources and their consultation in order to have a better understanding of whether consultation of sources is determined by the availability of the sources. We found that a significant association exists between availability of consultation of sources in decision making and conference proceedings (p=0.040), learned journals (p=0.011), and colleagues or superiors (p=0.000). Further association was found with students thesis and dissertations (p=0.000), books on abstracts (p=0.000), and reports from research institutes (p=0.000).

Table 2: Availability of information sources

Sources Consulted	Available (%)	Not available (%)	Don’t Know (%)
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Newspapers	88.6	-	-
Colleagues or Superiors	82.9	10	1.4
Internet	81.4	5.7	-
Government Opinions (publications)	74.3	30	-
In-house memoranda (classified/ unclassified)	72.9	5.7	1.4
Reports from research Institutes / universities	71.4	32.9	-
Heuristics (Personal experience)	67.1	4.3	12.9
Conference proceedings	61.4	28.6	1.4
Researchers	52.9	8.6	-
Learned Journals	51.4	11.4	1.4
Committee	48.6	4.3	1.4
Books and monographs	47.1	2.9	1.4
Research Libraries	47.1	11.4	-
Subject Specialists or Authorities	44.3	7.1	2.9
Books of Abstract	30	38.6	1.4
Indexes	28.6	30	-
Students theses and dissertations	22.9	29.9	1.4

About 81% of those who reported that conference proceedings were available actually accepted having consulted scientific sources in their decision making processes whereas only 1.5% of those who reported that conference proceedings are not available accepted using scientific information sources. For learned journals, 79.5% of those who reported consulting scientific sources also reported learned journals as being available while 4.5% of those who consider learned journals as unavailable and reported that they do not consult scientific sources. Except for theses and dissertations where those who reported consulting scientific information also reported that the source was not available, the direction of association appears to be that those who consulted scientific information sources also considered the sources as available. There is no significant relationship between all the demographic variables and availability of scientific information sources.

We used a different scale to investigate the accessibility of these information sources – whether the respondents considered the sources as accessible to a large extent, low extent or not available. Our result shows that the information sources that are reportedly accessible to a large extent are colleagues or superiors and heuristics (personal experience) (70.0%) each, followed by newspapers and in-house memoranda (55.7%) each, and then the Internet

(54.3%). The information sources that are the least accessible are the reports from research institutes (37.1%), followed by government opinions (publications) and books of abstract (35.7%) each. Expectedly, the most inaccessible information sources were student theses and dissertations (40%) each, followed by learned journals (25.7%), indexes and books\monographs (22.9% each).

Does perception about accessibility relate to consultation of the sources? In other words, do the respondents consult the resources because they are accessible? To address this question, we investigated the relationship between the accessibility $r = 0.0894$ most icessib25.0.0005ionsh

Reasons for non-use and inaccessibility of information for decision-making

Majority of the respondents, 82.9% agree that they actually need scientific information in their decision making activities, but 14.3% are inhibited by the inadequacy of the sources, while 7.1% reported not knowing where to get information or that information is not accessible respectively. Some of the respondents (4.3%) agreed that not having time to consult information sources is not a strong reason for non-use of the information sources.

Regarding inaccessibility of research reports from research institutes, 15.7% do not consider access to ICT facilities as a reason, but exactly this proportion (15.7%) does not consider many reports as relevant for their decision making activities. Ten percent each are not interested in using scientific reports and that the reports are meant only for the superiors, while (8.6%) observed that research reports are not usually available. On the other hand, 1.4% considered highly classified nature of research report as a constraint to their access, while 7.1% observed that the reports are mainly packaged for the superiors and that research reports are not available.

Frequency of use STI sources as a function of availability and accessibility

Does frequency of use of scientific information sources relate to whether the sources are available and or accessible? Addressing this question is very important in deciding whether there are other factors that influence the frequency of use of each of the sources we have listed. Table 3 shows the result of a linear regression model.

Frequency of use as a function of availability and accessibility

Sources	Availability			Accessibility		
	B	Se	p	B	Se	P
Newspapers	1.409	0.606	0.024	1.213	0.160	0.000
Books & monographs	0.246	0.461	0.597	0.351	0.286	0.227
Conference proceedings	0.314	0.270	0.253	0.575	0.156	0.001
Learned journals	4.495E-2	0.065	0.492	0.680	0.145	0.000

Colleagues or superiors	1.409	0.298	0.000	4.545E	0.195	0.816
Heuristics (personal experience)	-9.218E	0.100	0.361	1.009	0.133	0.000
Students thesis & dissertation	-1.128E	0.375	0.976	0.835	0.259	0.003
Government opinions (Publications)	1.590E	0.373	0.966	0.849	0.163	0.000
Committee	-0.298	0.200	0.145	1.556	0.141	0.000
In-house memoranda	-0.115	0.363	0.725	0.757	0.202	0.000
Research libraries	2.021	0.294	0.000	-0.194	0.234	0.413
Indexes	1.427	0.337	0.000	5.411E	0.215	0.803
Books of abstract	-0.275	0.316	0.391	0.648	0.281	0.028
Report from research Institutes	1.357	0.416	0.002	0.376	0.190	0.053
Subject specialists or authorities	0.346	0.299	0.256	0.821	0.184	0.000
Researchers	-0.118	0.327	0.720	0.965	0.158	0.000
Internet	1.121	0.333	0.043	0.102	0.113	0.001

There exists a significant relationship between availability of newspapers, colleagues, research libraries and research from research institutes and frequency of use of the sources; the slopes are very small although they are positive. Respecting accessibility, newspapers, conference proceedings, learned journals, heuristics and students theses and dissertations as well as government opinions, committee and in-house memoranda have significant relationship with their frequency of use. Also, access to books of abstract, subject specialists, researchers and Internet relate to their frequency of use. This result shows that there is likelihood that these sources are used because they are available or accessible, and that for most of the sources availability alone may not explain their use in policy making.

Factors encouraging use of research outputs

The opinions of the policy makers regarding the factors that encourage their use of information sources was sampled and the result is presented in the table below. Table 7 shows that the factors that encourage respondents the most to use research outputs to a great extent is the availability of the report (52.9%), followed by the simplicity of the language of presentation. Accessibility of research findings and quality of research findings (50.0%) each also play a role in encouraging the use of information sources.

Table 4: Factors that encourage use of research outputs

	Great extent	Little extent	Do not know
It is readily available	52.9	21.4	1.4
Language of presentation of findings is simple	50.0	22.9	4.3
Accessibility of research findings	50.0	14.3	4.3
Relationship with researcher\institute	41.4	20.0	1.4
Identity of researcher\institute	42.9	17.1	1.4
Quality of research findings	50.0	14.3	1.4
Specificity of research recommendations	34.3	20.0	1.4
Desire to be recognized as the greatest contributor to the solution of a problem	31.4	15.7	4.3
It is reliable	8.6	27.1	7.1
	8.6	30.0	18.6

The factors that contribute to a little extent is the volume (30.0%) and reliability (27.1%) of such sources. There is a significant association between age, and, gender, and, availability and accessibility factors – all other dimensions are not significant. Those who are below fifty years reported availability (65.5%) and accessibility (44.5%) as factors that encourage their use of scientific information sources while males considered availability (56.3%) and accessibility (43.9%) as encouraging factors.

Constraints to using research outputs

The major constraints to using research output by the respondents were inaccessibility of research outputs (31.4%), followed by unsuitability of university study\research (24.3%).

Table 5: Constraints to using research outputs

	Great extent (%)	Little extent (%)	Do not know (%)
Too much information to absorb	4.3	37.1	15.7
Information already available can delay	14.3	24.3	18.6
Very little time to read publications	11.4	44.3	1.4
University study\research is often unsuitable for use by policy makers	24.3	18.6	14.3
Data for research are scarce and not very reliable	8.6	42.9	5.7
Knowledge of research findings is not necessary for decision making	22.9	18.6	18.6
Actions of interest groups	14.3	40.0	1.4
Cost of implementing research recommendations	22.9	40.0	-
Inaccessibility of research outputs	31.4	24.3	2.9
Unavailability of research reports	14.3	34.3	4.3

The main factors that discourage, to a little extent, the use of research output are the following reasons: very little time to read publications (44.3%), data for research are scarce and not very reliable (42.9%), actions of interest groups and the cost of implementing research recommendations (40.0%) each.

Discussion of Results

Our result shows that policy makers in the Federal Ministry of Science and Technology in Nigeria are mainly persons above 50 years, although more than half of the respondents have worked for below 10 years, implying that majority of the respondents might have joined the service relatively late. This observation is supported by the fact that only about 10% of the respondents have spent 25 years and above. Furthermore, majority of the policymaking staff hold only first degrees and are males.

Policy makers in Science and Technology sector affirm their need of information input into policy decisions, with at least 50% of them reporting having ever used the seventeen listed information sources. Use of scientific information for policy making is not biased according to demographic characteristics. The respondents are aware that there are research institutes whose mandates are to carry out research to aid science and technology policies and consider research outputs from the research institutes valuable for their decision-making. Of interest is the high percentage of respondents who use research output from research institutes to make decisions. There is higher consciousness about use of research findings in policy making among those who have spent less than ten years than those who have spent longer periods. Access to research outputs of the institutes is related to educational qualification, with bachelors and masters degrees holders expressing more

consciousness than the others. This could be probably because these workers often constitute the middle level staff where bulk of data gathering and analysis are concentrated in the public service. It is also probably an indication that the awareness about the possible role of research information in policy making is a recent issue, catching up with younger workers more than the older ones.

It is understandable why newspapers should be reported by the respondents as the most available source of scientific information, although newspapers might not be considered, in a strict sense, a priority source of scientific information for policy making. Top policy makers are by regulations of the public service entitled to daily newspapers, but the newspapers often contain soft and public awareness news, which keep the policy makers abreast of happenings in the policy environment. Like in Aiyepoku's (1983) study, colleagues are very handy in scientific information seeking because they are easy to reach and using them may involve no cost. Also, public service entails some mentoring of the junior by senior persons and is also somewhat hierarchical in structure – and these require decisions by junior persons to be vetted and approved by senior officers. On the most part, information seeking from colleagues might dwell on matters that might not be easily extracted from other information sources, such as the experience, personal knowledge and encounters of fellow human beings. This fact is buttressed by an observation that the formal writing culture of public servants in Nigeria is that government matters are circulated in-house, and not published in peer reviewed sources. This contrasts with the situation in the United States, for instance, where there exist government-owned journals where government and related information are published.

The mass deployment of computers in the public service and the provision of Internet connectivity in the recent years might be yielding positive results as the respondents considered the Internet as another readily available source of information to them. Of all the information sources we listed, committee reports, books and monographs, research libraries, subject specialists or authorities, books of abstract, indexes, and students' theses and dissertations were the least reportedly available. The low rating of committee reports as a source of policy making information is surprising since it could also be considered as having 'personal' components, but not as much as libraries whose significance in the public service is known to have dwindled seriously. The study shows that some of the sources such as conference proceedings, learned journals and books of abstracts would have been good sources of information if they were available.

We now turn to access to these information sources. Colleagues/superiors and heuristics are the most accessible sources of information, while newspapers which ranked number one in availability now ranked number three. Consulting colleagues or using heuristics might not require breaking off from duty unlike newspapers which one has to read. Also, newspapers contain mass awareness news which might not often directly relate to the activities of the respondents. Furthermore, not all the respondents are at the ranks which entitle them to newspapers, implying that consulting newspapers might be inhibited by bureaucracy – users might collect them from the offices of senior persons or might require permission from their superiors in order to use them. Moreover, a cursory observation about work processes in the public service shows that reading of newspapers while at work is often

considered a distraction from one's duty¹ – newspapers are therefore usually consulted in casual fashion.

This may also explain the low ranking of accessibility of Internet. Ironically, research reports from the research institutes and government opinions were not very much accessible to the policy makers while students' theses and dissertations, learned journals, indexes and books\monographs were reportedly the least accessible. It is a common knowledge that local indexing services are largely nonexistent or are poorly managed when they exist; the inaccessibility of learned journals to even academics in Nigeria is a common knowledge, whether journals are relevant to policy makers is even a matter of global argument in developed countries where they are accessible.

The pattern of use of the sources shows that superiors/colleagues, heuristics and the Internet which were also reportedly more available and accessible were also the most used by the policy makers. The policymakers consider the inadequacy of information as well as locating the information sources as major reasons for their non use. When the policy makers use the information sources, they are encouraged by availability and simplicity of the language of presentation as well as accessibility and quality of the research. On the other hands, when they do not use the sources, they are discouraged mainly by the inaccessibility of the sources. This is related to the findings of Chandrika (2007) where he showed that factors such as relevance of research findings, timeliness, quality, accuracy, objectivity of research documentations and simplicity of Language of research findings encourage, to a great extent, the use of research reports by policy makers for decision-making.

Coincidentally, a policy on the linkage of the Federal Ministry of Science and Technology with the universities, and national and international research institutes has been

¹ Based on experience as a Statistician with the Federal Ministry of Health during 1989 to 1995

formulated in the recently revised national policy on science and technology, yet students theses are still inaccessible, unavailable and unutilized by the policy makers. If the set policy objectives could be met and strategies for achieving these objectives properly implemented with a continuous evaluation of progress, there would be a visible progress in bridging the gap between the Federal Ministry of Science and Technology, Nigeria and the universities and research institutes (both national and international). A policy that will ensure that those research institutes attached to FMST submit copies of their reports to the FMST should be enforced in order to enhance proper dissemination of such reports to the policy makers in the science and technology sector. It is evident from this study that there is a poor linkage between the policy makers in the S&T sector and the universities and research institutes. Of all the information sources consulted by policy makers, students' theses, index and books of abstract were the least available, least accessible and least consulted by policy makers.

Summary and conclusion

Using a survey method to collect data from policy makers in the Federal Ministry of Science and Technology, this study investigates the utilization, availability and accessibility, as well as constraints, to using scientific information in policy making. This result calls for creation and encouragement of use of institutional repositories in both the universities and the Ministry, and the linkage of this repository to those who either supply or use the information. There is also need for implementing the linkage with university-Ministry linkage programmes to ensure that research results are shared by those who need them. Also, joint conferences and workshops that address the need for synergy between the Ministry and the Universities are required to stimulate an interaction among the various stakeholders. The National Planning Commission has a role to play in collating research studies from different

ministries periodically, identifying suitable research components, and together with the relevant ministries, design mechanisms for joint implementation. There is also need for increased access to computers and the Internet across the rank and file of the officers in the Ministry in order to increase options for information searching and dissemination among policy making members of staff. While each of the information sources we listed contributed something to the policy makers' information need, more studies are required to establish, among others, the effectiveness of each the information sources: which information sources makes contribution to policies in comparison with the others?

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