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INFORMATION USE AND PRODUCTIVITY OF AGRICULTURAL ENGINEERS IN NIGERIA

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Abstract. The study sought to determine the sources and types of information used by agricultural engineers in Nigeria and the extent to which the information usage of agric engineers determine their productivity level. The study made use of 261 agricultural engineers who were selected by stratified random sampling technique according to their different places, of work. Data was collected through the use of questionnaire tagged information Utilization Scale (IUS). The data was analyzed using percentages and simple correlation statistics. The results show that a large percentage of the respondents utilize agricultural engineering textbooks and manuals (67.8%), journal publications (66.7%), and conference/workshop papers (66.7%) to a great extent. However, the result established that 67% of the respondents do not use information about laws and states, administrative rules and executive order. Moreover, the result shows that on the average the respondents altogether produced one published research paper, two conference papers, one extensive pamphlet, two research designs, one prototype and two-fabricated equipment per year.

Introduction

The role of information in the enhancement of any profession cannot be over-emphasized. Information is an important resource ranked fourth after land, labour and capital. Therefore, all organizations require information to function (Chukwudebe, 1997). Information not only serves as an input resource for effective development planning, but is also essential for the optimal allocation and utilization of all other resources. It is necessary to state that the only way whereby information can play any important role in productivity is when it is properly utilized. Researchers (Opeke, 1984, Aiyepoku, 1989, and Tiamiyu, 1990) were of the view that information is used for uncertainty reduction. Several sources of information are normally available to the user, but Lancaster (1979) reported that accessibility and ease of use seem to be the most important factor that determines whether or not a particular source is used or can be used.

The fact that a particular situation needs information in order to achieve its goal/objective, or that sources of information are accessible and available to the searchers does not mean that the information will be processed or used

(Wilson, 1997). Information is used if it leads to changes in the user's state of knowledge, behaviour, values or beliefs. The use of information is dependent upon the context of use as information need is dependent upon the situation under which it arises (Bandura, 1986).

Agricultural engineers like all other professionals benefit in the use of information while carrying out their various goals and objectives. Although the productivity of these engineers may vary according to their specific occupation or places of work, their goal remain the same, which is mainly the application of the knowledge, techniques, and disciplines of various fields of engineering to the solution of problems arising in the fields of agriculture and rural living, with the objective of reducing labour, improving agricultural productivity per worker, raising the standard of living of the farmers and increasing the overall earnings per worker.

The achievements of agricultural engineers in Nigeria are quite low, judging from the level of food production in Nigeria. Farming is still widely practiced using human labour and mainly traditional tools. Labour component constitutes the highest factor in produce cost studies carried out in Nigeria (Pingali et al 1987). Instead of the farm population dwindling with time, it is increasing (Igbeka, 1995).

Nigerian agricultural engineers have therefore been called upon to find a solution to the problems the peasant farmers/masses face by stepping up efforts on indigenous innovation of engineering technology and the production of gadgets that are compatible with the prevailing conditions (Ayinmodu, 1988). Accordingly, Abimbola (1997) stated that there is a challenge for agricultural engineers to put effort into research and development of simple and more efficient farm tools and equipment. These could not be possible if the agricultural engineers do not have adequate and current information. Verma (1988) while citing the Indian experience on agricultural productivity stated that, one of the methods used in achieving their objectives was through the provision of adequate information centres, which promote speedy dissemination of information and documentation of new knowledge to agricultural engineers on request.

Igbeka (1995), on the information needs of agricultural engineers in Nigeria, found out that most of the libraries used by agricultural engineers in their places of work do not have adequate and current information sources. The sources that are available sometimes do not contain the type of information the engineers would like to use. There is need therefore for librarians in these libraries to know the type and sources of information used by the agricultural engineers. The use of these information sources could provide them with the type of information they would want to use to improve their productivity.

This paper therefore seeks to find out the information sources, and the types of information used by agricultural engineers in Nigeria and the extent to which they use these sources and types of information. The study would also find out if the use of these information sources/types of information correlates with the agricultural engineers' productivity.

Based on this, three research questions were posed and one hypothesis was formulated for the study:

Research Questions

1. What is the extent of use of various information sources by agricultural engineers in Nigeria?
2. What type(s) of information are used by agricultural engineers in Nigeria?
3. What is the productivity level of agricultural engineers in Nigeria?

Hypothesis

The information utilization of agricultural engineers in Nigeria is not related to their productivity.

Methodology

This study was conducted using the ex-post facto research approach. Stratified random sampling technique was used to select 261 agricultural engineers as samples according to their places of work (tertiary institutions, government establishments/ministries, research institutes and private organizations). The proportional allocation to sample was adopted to obtain the sample size for each stratum i.e. $(f = fh)$ and $fh = nh/N$.

The instrument used for the study was a questionnaire tagged Information Utilization Scale, which was developed by the research following a modified 4/point Likert scale format.

Data analysis involved the use of percentages and correlation coefficient.

Results

Table 1 shows the extent to which the agricultural engineers utilize various sources of information.

Table 1. Information Utilization and Sources Used by Respondents

To What extent do you use information from the following sources?	Percentage Response		
	1 %	2 %	3 %
Persons in Federal and State Government/Ministries	49.8	24.5	25.7
Teachers in Institutions	38.3	32.6	29.1
Persons in universities and research institutions	24.6	28.7	46.7
Persons in private sector organizations	50.9	25.7	23.4
Internal files of your organizations	42.6	19.9	37.5
Government publications (plans, budgets, gazettes, etc, published by Nigerian Federal and State Government).	49.1	25.3	25.7
Consultancy reports (commissioned by the Federal and various State Government of Nigeria)	44.9	28.0	27.2
Conference (Workshop) papers (i.e. papers presented at various State and National academic conferences etc.)	9.6	23.8	66.7
Agric. Eng. Textbooks and library manuals	10.8	21.5	67.8
Information Systems/Cd-ROM Databases	64.8	15.3	19.9
Journals and publications	10.4	23.0	66.7
Other Information Sources	52.5	27.2	20.3

Code: 1 = Not at all/Never
 2 = Some extent/sometimes
 3 = Very great extent/always

The table shows that 49.8% of the agricultural engineers do not use information from persons in the Federal and State governments as against 25.7% of them that use information for such persons only. 29.1% of the engineers use teachers in institutions to obtain information, while 38.3% do not use such sources. However, popular among the sources used to a great extent are agricultural engineering textbooks and library manuals (67.8%), conference/workshop papers, (66.7%) and journal publications (66.7%). 46.6% of the engineers utilize persons in the universities and research institutions as sources of information. Some of the sources are never utilized by many of the respondents, for example, CD ROM Databases (64.8%), consultancy reports (44.9%), persons in private sector (50.9%) and government publications, plans, budget, gazette etc (49.1%). The above therefore, shows the extent of use of information sources, textbooks, journals and conference materials are found to be the most extensively used sources of information by Agricultural Engineers in Nigeria.

On the type of information used by the engineers, table 2 shows that a greater percentage of the agricultural engineers (64.4%) always use information about their field; (62.1%) of them utilize information about procedures for

performing their tasks and responsibilities, while (49.4%) utilize information on results from scientific and social research surveys.

Information on knowledge of what to impart to students and summary of original document are utilized by (42.5%) and (47.5%) of the engineers respectively. However, majority (67%) of the respondents do not use information about laws and statutes administrative rules, and executive orders. In the same light, (59.0%) of the engineers do not make use of summary statistics about the population, government revenues and budget. Other types of information not very popular with the engineers include information about institutions, companies and places since they are utilized by only (47.5%) of the engineers. The table also shows that (41.4%) of the agricultural engineers do not utilize information from descriptive documents.

Table 2. Information Utilization and Types of Information Used by Respondents

Item Description	Never	Sometimes	Always
To what extent do you use each of the following types of information?	%	%	%
Information about institutions companies and places	47.5	25.7	26.8
Results of Scientific and social research surveys	21.8	28.7	49.4
Information about procedures for performing your tasks and responsibilities	19.5	18.4	62.1
Information about your field (Agric. Eng.)	12.7	18.0	69.4
Knowledge on what to impart to students	36.8	20.7	42.5
Information about laws and statutes administrative rules, executive orders.	70.0	22.2	16.9
To what extent do you use each of the following types of documents?	%	%	%
Full-length original document	31.1	39.8	29.1
Summary of original document	19.6	33.0	47.5
Review of original document	30.6	44.1	25.3
Evaluation of original document	38.3	37.5	24.1
Descriptive document	41.4	37.5	24.1

From the above, it could be observed that a greater percentage (64.4%) of the agricultural engineers always use information about their field. However, 67% of the respondents do not use information about laws and statutes administrative rules and executive order.

Table 3 shows that agricultural engineers in tertiary institutions and research institutes publish more research papers than those in the private and public sectors. Those in tertiary institutions publish an average of two papers while those in research institutes publish about one. Those in private and public sectors publish an average of 0.4 and 0.26 papers respectively. However, as can be seen in the table, those in the private sector produce more prototypes (3.95) and research designs (4.93) than those in the tertiary institutions and research institutes. They also fabricate more machines than those in any other sector. Teaching and supervision are carried out mainly in the tertiary institutions, in the range of 7.37 course workload and 3.2 project supervision annually.

Table 3. Productivity and Mean Levels of Agricultural Engineers in Nigeria based on their different places of work per year

Productivity	Private		Public Sector		Tertiary Institution		Research Institution		No per year	Mean
	No.	%	No.	%	No.	%	No.	%		
Research paper	12	0.26	29	0.4	171	1.68	44	1.46	256	1
Conference paper	68	1.5	96	1.18	164	1.56	55	1.8	383	2
Extension pamphlets	70	1.55	122	1.5	15	0.14	11	0.36	218	1
Research Designs	223	4.95	115	1.4	95	0.90	83	2.7	5.16	2
Prototypes	178	3.95	90	1.1	47	0.44	47	1.5	362	1
Fabricated machines	176	3.9	120	1.48	65	0.619	63	2.1	424	2
Course work load	58	1.2	15	0.18	774	7.37	3	1.16	882	3
Supervision	62	1.3	31	0.38	336	3.2	18	0.6	447	2

The above table therefore reveals that on the average, the agricultural engineers (altogether) produce one published research paper, two conference papers, and produced one extension pamphlet, two research designs, one prototype, and two fabricated equipment in a year. There are also indications that on the average, the engineers teach three units of course work and supervise two research projects in a year.

Table 4 shows that the means score of information utilization by agricultural engineers in Nigeria is $\bar{x} = 37.7$, $SD = 3.7$ while that of their productivity is $\bar{x} = 71.9$, $SD = 9.3$.

Table 4. Showing Test of Significance of Correlation between Productivity and Information Utilization of Agricultural Engineers in Nigeria

Variables	No	Mean	Std. Dev.	r
Productivity	261	37.7241	3.6739	.2501
Information utilization	261	71.9349	9.2445	

$P < 0.001$

The study established that there was a positive significant correlation between information utilization and productivity of agricultural engineers in Nigeria. ($r = 0.2501$, $p < 0.001$).

Therefore, the hypothesis that the information utilization of agricultural engineers in Nigeria is not related to their productivity is rejected.

Discussion and Conclusion

As can be seen from the above results, the agricultural engineers utilize different information sources and different types of information in varying degrees. Some of the sources and types of information used are more popular than others. The extent of utilization could depend on the availability of these sources; in other words, the sources not used (for example the information systems, CD-ROM databases etc.) might not be available in their different places of work. Another reason could be that the source or system may be difficult to use. In support of this, Wilson (1981), states that "the user may seek and use information from other people, rather than from systems". This is in cases where there is a choice. In other cases, information systems/CD-ROM databases may not be available, and even when they are, the engineers in some cases may not know how to use them to obtain or find the information they need. According to Mooers (1960), an information system will tend not be used whenever it is painful to retrieve information from it. Liebacher et al (1996) therefore opined that different plans of action are necessary to enhance adoption and use of the electronic databases and Internet. One of them is training programs, and identification of the information needs of specific user groups.

In support of the engineers' popular choice in the use of journals and publications, Subramanyan, (1981), ascertained that journal articles "have been

found to be the important bibliographic unit, because journals and textbooks provide authentic guide to theoretical models".

Conference and workshop papers provide information from conferences and workshops where these engineers often meet and exchange information, which in most cases are very current. Thus Drott (1995) concludes that conferences consolidate and present a discipline's current information.

Due to the differences in their places of work, the type of information and style of presentation of information used by the engineers might also differ. For instance, the academics will tend to use more of academic information, while those in the ministries and private sector may be interested more in statistics laws, statutes and publications. This view corroborates Tiamiyu's (1990) opinion that " three factors influence the use of information and information sources in organizations, namely the characteristics of the task environment, length and/brevity of source, accuracy, subject content and the extent to which sources provide information that enables users to justify or account for official decisions.

The productivity of the agricultural engineers from the results is encouraging, more so, when it takes a lot of time to produce an engineering publication, a research designs, a machine fabrication or prototype in the face of the relevant activities of the engineers. However, there are indications that the productivity level of the engineers can still be improved if they are supplied with more current information. This supports Rafea et al's (1994) work on expert systems. The Expert System was used for improved crop production of cucumber and citrus (oranges and limes) by using CD-ROM based CANDIDE software for the University of Florida.

The mean age (39.15years) and a working experience of 1-10 years of most of the respondents (60.5%) could have affected the results of the productivity level. Working experience does in most cases enhance productivity; therefore, this might have militated against their productivity.

The result of the hypothesis revealed that information utilization necessitates an increase in the productivity level of the agricultural engineers in Nigeria. Accordingly, the more an agricultural engineer makes use of information in his or her work, the more his/her productivity is enhanced. This finding is in line with Popoola's (1999) study that information, when properly used, enhances workers' productivity. Thus, Verma (1988) while citing the Indian experience, stated that one of the methods used in increasing productivity by means of indigenous technology was through the provision of adequate information centres which promote speedy dissemination and utilization of information for the documentation of new knowledge for agricultural engineers on request.

Recommendations

Based on the findings of the study, the following recommendations were made

1. There should be adequate provision of current publications (Journals, textbooks, manuals) supplied to the libraries of the various institutions and establishment where the agricultural engineers work.
2. There should be provision of On-Line facilities in their libraries. Computer system utilization opportunity should be made readily available in the engineers' places of work to facilitate Internet connectivity for the provision of current information.
3. Training facilities in the use of the new information technologies should be made available by their various establishments.
4. Linkage programmes should be encouraged among allied institutions to enhance information exchange.
5. The engineers should be encouraged to subscribe to agricultural engineering journals for current information.

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