

Agricultural engineering profession: The perspective of employers of labour in Ilorin, Nigeria

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Abstract: An appraisal was carried out on the level of awareness of the Agricultural Engineering profession by employers of labour in Ilorin, Nigeria, to evaluate who they (employers of labour) think an Agricultural Engineer is, how relevant they think he is to their organizations and how well they have been able to make use of his (Agricultural Engineer's) expertise in their respective organizations. This was done by using structured questionnaires and personal communication. The questionnaires were distributed to the target groups and persons (these include Research Institutes, Production and Manufacturing Industries, Government Ministries, Agencies and Parastatals, etc.). The results show that only about 5% of the respondents have more than 10 Agricultural Engineers working in their organizations. The results also show that about 80% of the respondents were of the opinion that Agricultural Engineers can operate and maintain automobiles, earth moving equipment and all forms of farm tractors, while the remaining 20% opined that they (Agricultural Engineers) cannot perform such functions. An average of 78% posit that Agricultural Engineers cannot perform other functions as handling/management of water treatment plants, fabrication of industrial machines especially for processing of biological materials, designing and constructing drainage and irrigation facilities, carrying out rural electrification and hydropower projects, designing and constructing structural projects like rural buildings, roads, bridges/ culverts and storage facilities, imparting knowledge in younger generation as professional teachers/lecturers, carrying out of survey and layout works, carrying out of computer maintenance and writing computer programmes, while only 22% posit that they (Agricultural Engineers) can perform these "other functions". The 83% of the respondents most of which are from private organizations, are of the opinion that Agricultural Engineers cannot fit into their organizations. The major factors that influence the responses are Type and nature of the organizations. The findings show a gross unawareness by employers of labour (especially in private organizations) of the kind of training the Agricultural Engineer has undergone. It therefore emphasizes the need for intense sensitization/enlightenment on the Agricultural Engineering profession.

Keywords: agricultural engineers, employers of labour, awareness, employment, Ilorin

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1 Introduction

Agricultural Engineering is the field of engineering in which the knowledge of physical and biological sciences is utilized to find and apply better ways of exploiting

natural resources for the production, handling, processing and storing of food and fodder (Makanjuola, 1977). It is also concerned with finding better ways of carrying out such allied activities as rural electrification and development of farm structures. Agricultural Engineering thus involves the design, development, testing, manufacturing, marketing, operating, maintenance and repair of all agricultural tools, implements, machines and equipment which are used in mechanized agricultural operations with the objective of raising the productivity of human labour and land in the face of prevailing

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economical, human and social realities of the time and place concerned (Lasisi, 2010). Agricultural Engineering, the application of engineering knowledge to solve problems for increased food and fibre production with the goal of improving the efficacy and sustainability of agricultural practices (Brown, 1988), is divided into four major sections or specializations: Soil and Water Engineering; Farm Power and Machinery; Crop Processing and Storage; and Farm Structures and Environment (Ogunlela, 2011). Generally, Agricultural Engineering has a more recent history in comparison to some other engineering disciplines such as Civil, Mechanical and Electrical (Lasisi, 2010). Prior to the 1960s, engineering problems on Nigerian farms were tackled using the expertise and services of Agriculturists and Civil Engineers, as Agricultural Engineering was relatively unknown as a discipline in Nigeria. Due to the popularity, Agriculturists and Civil Engineers enjoyed in providing engineering services on the farm, some of them took interest in the profession and sought for opportunities to retrain themselves in what today forms the agricultural engineering profession (Mijinyawa, 2005). Since 'Farm Power and Machinery' is believed to be the 'traditional area' of Agricultural Engineering, early curricula were developed in favour of that section. With time, the meaning and role of agricultural engineering became more clearly understood and the curricula were re-developed. Today, the agricultural engineering curriculum is anchored on three points which are to ensure adequate theoretical instruction, adequate practical exposure and entrepreneurialism. This is reflected in the changing of names by many departments from 'Agricultural Engineering' to, for example, 'Agricultural and Biosystems Engineering', 'Agricultural and Bioresources Engineering', 'Agricultural and Environmental Engineering' etc. – to reflect global trends and enhance the marketability of the graduates (IAgrE, 2012). The curriculum can be broadly divided into three parts. In the first two years (i.e., 100 and 200 Levels in the University), students are exposed to the basic engineering courses such as engineering drawing, fluid mechanics, principles of electricity, engineering statistics, engineering economics, engineering mathematics, applied

mechanics and workshop practice. Students get into the main Agricultural Engineering programme in the third year, spend the third, fourth and fifth years in studying Agricultural Engineering courses in the various specialized sections. Of recent, information technology and computer application, have been emphasized. As a broad knowledge of Agricultural Engineering is all about at the end of the fourth year, students in their final (fifth) year are to undertake a project, which, in most cases, determines the area of specialization that they would be interested in after the first-degree level. Building on the agricultural engineering background, the curriculum of which spreads across all engineering disciplines, statistics, general agriculture, economics and engineering law, many agricultural engineers could fit in into various sectors such as oil companies, financial industries, manufacturing industries (especially the agro-based ones) and even in the information technology industry. Wherever they are working, most agricultural engineers attribute their success to their broad agricultural engineering background.

1.1 Research problem

Agricultural Engineering is one profession whose name, aims and objectives and its role in the society have been grossly misunderstood even by the agricultural engineers themselves because the earliest agricultural engineering intervention had much to do with the reduction of drudgery with the use of tractor. For a very long time, agricultural engineering was synonymous with tractorization (Mijinyawa, 2005; IAgrE, 2012). Early agricultural engineering curricula dwelled mainly on tractor application and repairs such that when the name was changed to farm mechanization and much later agricultural engineering following a better knowledge of the profession, its widening curriculum and role in agricultural development, many did not perceive it beyond the already well-known tractor maintenance and use (Mijinyawa, 2005). This wrong notion and the great task of disabusing people's mind have seriously affected the development of the profession in many areas. Data from results print out from the Joint Admission and Matriculation Board (JAMB, 2005) shows Agricultural Engineering as one of the least subscribed engineering

courses. In many cases, those who choose the course, make it a second choice as a guarantee of securing a place into the universities should they not be admitted to the course of their first choice. The long-term plan of such candidates is to get admitted into the university and thereafter seek for change of course to those other more competitive engineering disciplines they are interested in. This opinion which one would attempt to convince the students to discard is rather confirmed while pursuing the programme by the non-availability of any form of financial aids (especially from multinational companies/organizations) for Agricultural Engineering students. Where students from other engineering disciplines especially Petroleum, Chemical, Mechanical, Electrical and Civil, have the option to choose as to which of the scholarship schemes they would want to apply and compete for, almost none exists for the Agricultural Engineering students. It is clearly difficult to convince the student that his role in the society is as same as that of students from other engineering disciplines (Senzanje, 2003). The Agricultural Engineer has his first post-graduation unpleasant experience when he sees an advertisement for a job that is clearly an agricultural engineering in nature but the list of those qualified to apply does not include agricultural engineers. Some have ignored such advertisements and put in application and at interviews are bluntly told that an Agricultural Engineer is not the best trained person for that job. Interestingly, such interview panels sometimes have an Agricultural Engineer on the team (Senzanje, 2003). These and a catalogue of other problems have militated against the number of students who are admitted into the programme every year. Beside the smallness in the number of annual intakes, some at the end of the first year fail to meet the requirements to proceed to the second year since they were not the very best and are asked to withdraw while some of those who qualify to proceed to the second year and bent on pursuing the programme of their initial dream, request for transfer to other programmes. The university regulations allow this. The resultant consequences are a further reduction in the number of students that proceed and graduate. It is believed that most employers already formed an opinion and did not

see the individual called an Agricultural Engineer different from a mechanic or tractor driver no matter what additional information was taught to him for as long as he wears that tag 'Agricultural Engineer'. Hence the need for an appraisal of the awareness and acceptance level of the Agricultural Engineering profession by employers of labour. This study was thus conducted to determine the level of awareness of the Agricultural Engineering profession by employers of labour in Ilorin, Kwara State Nigeria.

2 Materials and methods

2.1 Study area

Ilorin is the state capital of Kwara in Western Nigeria. The result of the 2006 National Population Census released by National Population Commission of Nigeria shows that it had a population of 777,667, implying that it is the 6th largest city based on population in Nigeria. Kwara State was created in 1967 and Ilorin has since been the capital. The state is endowed with a large area of rich agricultural land. The limestone and dolomite of Oreke, Idofian Kaolin and clay near Ilorin and other parts of the state, pure gold in Kaiama and the Patigi area, and the highly exportable rich tantalite deposit of Iporin make Ilorin home to many industries. Initially, Ilorin had only a few industrial companies, notably Global Soap and Detergent Industries Nigeria Limited and the International Tobacco Company. The efforts of successive administration have made Ilorin become the hub for cashew processing in Nigeria and Olam International has set up Africa's biggest cashew processing plant. The plant processes 100 MT of cashews every day and provides employment to over 2000 workers. Recently established industries include Dangote Flour Mills, Tuyil Pharmaceutical company, KAMWIL, Golden Confectionate Food Industries, Chellaram Motor-Cycle Assembly plants, and Rajrab Pharmaceuticals. Aside these, Ilorin is also home to so many institutions of higher learning such as the University of Ilorin, Kwara State University, Kwara Polytechnic, and a host of other privately-owned tertiary institutions. Ilorin is also home to so many agricultural related research institutes and government parastatals such as the National Centre of

Agricultural Mechanization (NCAM), Agricultural and Rural Management Training Institute (ARMTI), National Stored Product Research Institute (NSPRI), Lower Niger River Basin Development Authority, Sugar Cane Research Institute, etc.

2.2 The questionnaire

A comprehensive questionnaire was drafted; the questionnaire was at the end of the interview made to answer the following three basic questions.

1. Who the respondent thinks an agriculture engineer is?
2. How relevant the respondent thinks an Agricultural Engineer is to his organization?
3. How well the organization has been able to utilize the Agricultural Engineering profession in the areas relevant to them?

One hundred (100) questionnaires were randomly distributed to the target groups/persons out of which a total of eighty-six (86) were thereafter collected. The collected data was subjected to statistical analysis essentially using the descriptive statistics tools of Microsoft excel 2016.

2.3 Visited organizations

About 50 organizations/industries/parastatals/ deemed to be relevant to the Agricultural Engineering Profession were selected at random. In all the visited organizations, depending on the size of the organization, a minimum of one and a maximum of three questionnaires were given to either the head of the organization and/or the head of the human resources department and the head of the engineering section where it does exist.

3 Results and discussion.

3.1 Collected questionnaires and their distribution

Eighty-six questionnaires were returned which represent 86% of the total 100 distributed. Figures 1 and 2 shows the type and nature of the organizations from which the 86 returned questionnaires were collected. Figure 1 shows 65% of the returned questionnaires were from Private organizations, 28% were from Government organizations while only 7% identified were others. Those that identified as ‘others’ are most likely non-interest or charity organizations. Figure 2 shows that most

(55%) of the returned questionnaires were from production and manufacturing organizations, 15% were from research institutes, 13% were service providers, 7% were government ministries and parastatals, 6% were financial institutions while the remaining 4% identified as others. These spreads were adjudged good as it represents the overall spread of the total distributed questionnaires and the spread of type and nature of organizations in the study area.

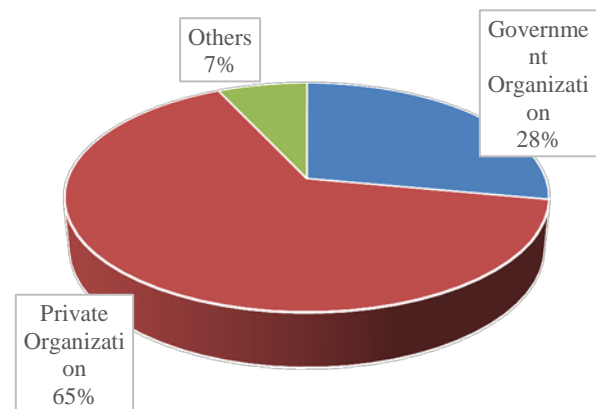


Figure 1 Type of organization

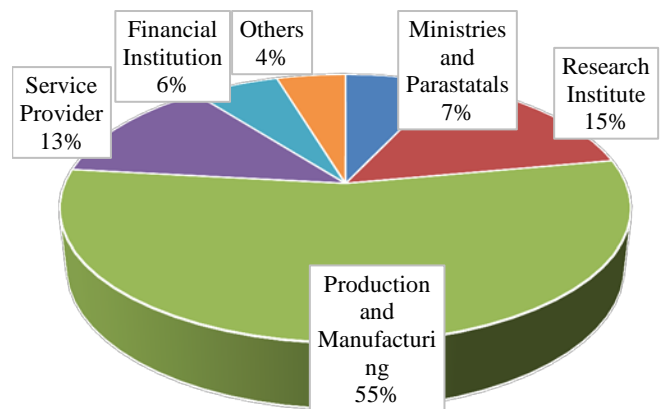


Figure 2 Nature of organization

3.2 Number of agricultural engineers present in the various organization

Figure 3 shows that about 6% of the respondents have between 1 – 5 Agricultural Engineers in their organizations, 8% have 6 – 10 Agricultural Engineers in their organizations, only 5% of the respondents have above 10 Agricultural Engineers working in their establishments, while 81% have no Agricultural Engineer working in their various organizations. Statistical Analysis shows that the type of organization and the nature of what the organization does significantly (P<0.05) affected the number of agricultural engineers in

a particular organization. More than 90% of the organizations with over five agricultural engineers are government establishments and more than 90% of organizations without an agricultural engineer are privately owned and they are largely production and manufacturing or service provider in nature.

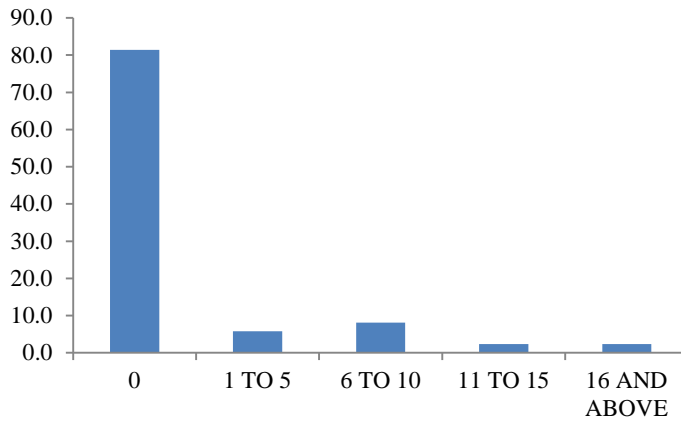


Figure 3 Number of agricultural engineers working in their respective organizations

3.3 Directly worked with or working with agricultural engineers?

Figure 4 shows a chart presenting the responses of the respondents when asked if they are directly working with or have worked with an agricultural engineer before.

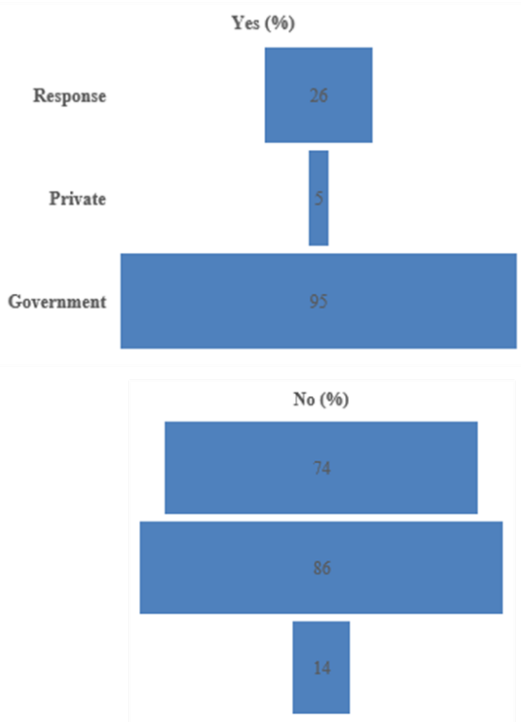


Figure 4 Have you worked with or are you working with an agricultural engineer

74% of the respondents have never at one time or the other worked with an Agricultural Engineer before and

are not working with one at the moment while only 26% have either worked with them in the past or currently working with them. 86% of those that have never worked with an agricultural engineer before work in a private organization while about 95% of those that have worked with them before and/or are working with them at present work in government owned organizations and the nature of their organization is either Government ministries or parastatals or research institutes most of which are actually government owned. Also, more than 90% of those that have worked directly with agricultural engineers before or are currently working directly with them are from organizations with more than five agricultural engineers.

3.4 Past and Present Experience with Agricultural Engineers

The 92% of those that have worked with Agricultural Engineers are of the opinion that they have above effective performance in their chosen carrier while only 7% said they have average performance as shown in Figure 5. None of those that have worked with an agricultural engineer in the past or present rated them as not effective. This result is however subjective, and it may depend on the personal circumstances of the individuals involved.

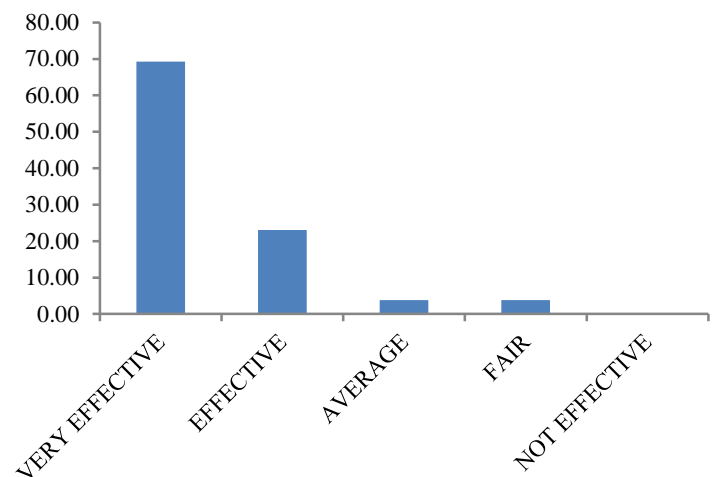


Figure 5 Past and present experience working with an agricultural engineer

3.5 Need for agricultural engineers in the organization visited

The 83% of the respondents are of the opinion that Agricultural Engineers are not needed in their

organizations while only 17% of the respondents thinks the employment of an additional Agricultural Engineer is necessary in their organization. As shown in Figure 5, 86% of the 83% that thinks an agricultural engineer has no role or place in their organization works in the private organizations while almost all those who think agricultural engineers are needed in their organization are respondents from government organization.

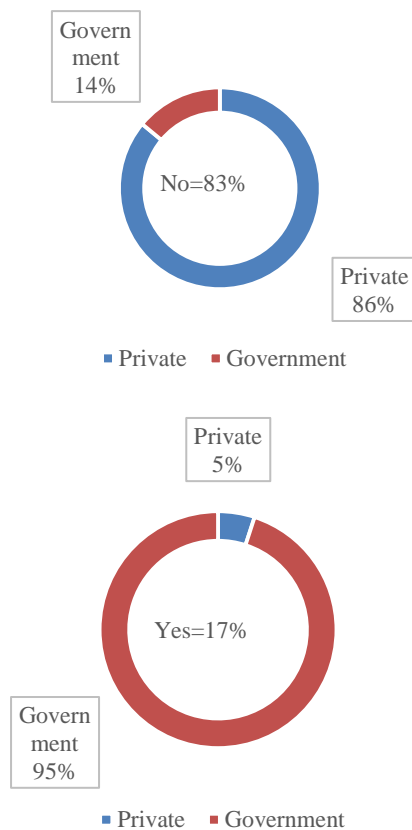


Figure 6 Need for an agricultural engineer in your organization

Table 1 Ability of agricultural engineers to operate and maintain tractors, automobiles and other earth moving equipment

S/N	QUESTION	YES (%)	NO (%)
1	Do you think an Agricultural Engineer can carry out maintenance and repair of a farm tractor? (A1)	95.3	4.7
2	Do you think an Agricultural Engineer can effectively carry out all forms of maintenance on automobile and earth moving equipment? (A2)	79.1	20.9
3	Do you think an Agricultural Engineer can effectively operate heavy duty and earth-moving equipment? (A3)	65.1	34.9

3.7 Ability of agricultural engineers in performing “other functions”

An average of 78% posit that Agricultural Engineers cannot perform other functions as handling or management of water treatment plants; fabrication of industrial machines especially for processing of biological materials, design and construction of drainage and irrigation facilities, carry out rural electrification and hydropower projects, Design and construction of structural projects like rural buildings, roads, bridges/

This is particularly surprising as most organizations visited are places where the authors think the Agricultural Engineering Profession can be useful. Also surprising is the fact that most of the respondents (above 82%) who believed that an agricultural engineer is not needed in their organization, (even those that are directly working on or with agricultural products and machines) opined that other fields of engineering were a lot more relevant to their various organizations. This is only attributable to an extremely low level of awareness of what kinds of training an agricultural engineer has undergone.

3.6 Ability of agricultural engineers as regards farm tractors, automobiles and earth moving equipment

Unsurprisingly, 65.1% of the respondents are of the opinion that Agricultural Engineers can operate heavy duty and earth moving equipment. 79.1% opine that Agricultural Engineers can effectively carry out all forms of maintenance on automobiles and earth moving equipment. A whopping 95.3% posit that Agricultural Engineers can operate, maintain and repair all forms of farm tractors as shown in Table 1. This is corroborated by the report of Mijinyawa (2005) and IAgRE (2012) where they both stated that many still hold the opinion that the agricultural engineer was not more than a ‘Tractor Mechanic’ despite the broad training, perspectives and multidisciplinary approaches at delivering solutions to the problems they are faced with.

culverts and storage facilities, impartation of knowledge in younger generation as professional teacher / lecturer, carry out survey and layout works, carry out computer maintenance and write computer programmes while only 22% posit that they (Agricultural Engineers) can perform these other functions as shown in Table 2. Of particular interest is the fact that even those that have worked with or are still working with agricultural engineers still hold the believe that an agricultural engineer cannot perform these other functions. However, an average of over 70%

of those that opine that an agricultural engineer can perform these other functions are respondents with more than 10 agricultural engineers in their organization. Essentially these kinds of organizations are agricultural-

based organizations who expectedly understood the kind of training the agricultural engineer has received especially in recent years (Field et al., 2007).

Table 2 Ability of the agricultural engineer to perform other functions

S/N	QUESTION	YES(%)	NO(%)
1	Do you think an Agricultural Engineer can effectively handle or manage water treatment plants? (Q1)	22.1	77.9
2	Do you think an Agricultural Engineer can design and fabricate industrial machines especially for processing of biological materials? (Q2)	8.1	91.9
3	Do you think an Agricultural Engineer can design and construct drainage facilities? (Q3)	25.6	74.4
4	Do you think an Agricultural Engineer can design and construct irrigation facilities? (Q4)	33.7	66.3
5	Do you think an Agricultural Engineer can carry out Rural Electrification projects? (Q5)	12.8	87.2
6	Do you think an Agricultural Engineer can design and construct hydropower projects? (Q6)	9.3	90.7
7	Do you think an Agricultural Engineer can handle design and construction of Structural projects like buildings, roads, bridges/ culverts and storage facilities? (Q7)	32.6	67.4
8	Do you think an Agricultural Engineer can effectively impart knowledge in younger generation as a professional teacher / lecturer? (Q8)	46.5	53.5
9	Do you think an Agricultural Engineer can carry out Survey and Layout works? (Q9)	25.6	74.4
10	Do you think an Agricultural Engineer can effectively carry out Computer-maintenance? (Q10)	19.8	80.2
11	Do you think an Agricultural Engineer can effectively Operate Computers and / or write Computer Programmes? (Q11)	39.5	60.6

3.6 Other influencing factors

Of all the questions asked, the type of the organizations and the nature of the organizations significantly ($P < 0.05$) affected the most of the responses collected from the survey. Other factors that influenced the positions of the respondents include level of education of the respondents and profession of the respondents which are most times statistically insignificant at $P < 0.05$ but are statistically significant at $P < 0.1$. The respondents who identified as engineer seem to be more aware of the capabilities of an agricultural engineer irrespective of either the work with private or government organizations. This is because most engineers receive the same training almost throughout the first three years of their studies especially in the universities in Nigeria. Also, the respondents with a second degree or a PhD seem to be more aware. This is likely because many of the respondents that work in government organizations belong to this category. Other factors such as Age, Sex and number of years already used in organization seems not to significantly affect any of the critical responses even at $P < 0.1$.

4 Conclusions

A survey to know the perspective that employers of labour have towards the Agricultural Engineering Profession was carried out and the following conclusions were reached.

(1) Employers of labour in Ilorin, Nigeria are grossly

unaware of the training agricultural engineers undergo both in the Universities and Polytechnics.

(2) The fact that the general public especially employers of labour still see the Agricultural Engineer as a mere "Tractor Engineer" who can hardly perform other functions outside driving and maintaining a Farm Tractor was established.

(3) The results also show that the level of unawareness depends on whether the organization is privately owned or government owned with the formal having the highest level of unawareness.

(4) Other factors that seem to influence the level of awareness include Level of Education and profession of the employers themselves. The existence of one or more agricultural engineers in the organization of the respondents, number of agricultural engineers in the organization and past experience working with an agricultural engineer also significantly affected many of the responses.

It is hence recommended that more sensitization and awareness should be carried out by relevant Professional Agricultural Engineering bodies to the public and especially, employers of labour, as their unawareness could lead to further unemployment for Agricultural Engineering graduates. This awareness programme could include the explanation of the approved Agricultural Engineering curriculum, exhibition of projects and researches carried out by Agricultural Engineers and showcasing of Agricultural Engineers who have made

impact in their chosen career to the general public, and employers of labour in particular amidst others.

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APPENDIX

An Appraisal of the Level of Awareness of Agricultural Engineering Profession by Employers of Labour in Ilorin, Nigeria

QUESTIONNAIRE

A study is being conducted on “An Appraisal of the Level of Awareness of Agricultural Engineering Profession by Employers of Labour in Ilorin, Nigeria” Thanks a lot for taking time to fill this questionnaire.

PLEASE FILL AND TICK AS APPROPRIATE

SECTION A

- (1) Name of Organization _____
- (2) Position/Status of Respondent in Organization _____
- (3) Age (a) 21 – 25 (b) 26 – 30 (c) 31 – 35 (d) 36 – 40 (e) 41 – 45 (f) 46 – 50 (g) above 50
- (4) Sex (a) MALE (b) FEMALE
- (5) Level of Education of respondent (a) O. Level (b) Diploma (c) First Degree (d) Second Degree (e) Ph.D. (f) Others (Specify) _____
- (6) No of years already used in the Organization (a) 1 – 5 (b) 6 – 10 (c) 11 – 15 (d) 16 – 20 (e) 21 and above
- (7) Profession of respondent (a) Engineering (b) Science-Oriented (c) Managerial (d) Others (specify) _____

SECTION B

- (1) Type of Organization (a) Government Establishment (b) Private Organization (c) Others (Specify) _____
- (2) Nature of Organization (a) Research Institute (b) Production and Manufacturing (c) Service Provider (d) Financial Institution (e) Others (Specify) _____
- (3) Number of Agricultural Engineers working in your organization (a) 0 (b) 1 – 5 (c) 6 – 10 (d) 11 – 15 (e) 16 and above
- (4) Which field of Engineering is most relevant to your organization with reasons (a) Agricultural (b) Electrical (c) Mechanical (d) Civil (d) others (Specify) _____
- (5a) Have you ever worked closely with Agricultural Engineers? (a) YES (b) NO
- (5b) If YES, how effective can you rate their performance in their chosen career (a) Very Effective (b) Effective (c) Average (d) Fair (e) Not effective
- (6) Which Job(s) (or other Jobs) can an Agricultural Engineer perform in your organization?

SECTION C

- (1) Do you think an Agricultural Engineer has valuable skills that can be useful in your establishment? (a) YES (b) NO
- (2) Do you think an Agricultural Engineer can effectively handle or manage water treatment plants? (a) YES (b) NO
- (3) Do you think an Agricultural Engineer can design and fabricate industrial machines especially for processing of biological materials? (a) YES (b) NO
- (4) Do you think an Agricultural Engineer can design and construct drainage facilities? (a) YES (b) NO
- (5) Do you think an Agricultural Engineer can design and construct irrigation facilities? (a) YES (b) NO
- (6) Do you think an Agricultural Engineer can carry out Rural Electrification projects? (a) YES (b) NO
- (7) Do you think an Agricultural Engineer can design and construct hydropower projects? (a) YES (b) NO

- (8) Do you think an Agricultural Engineer can handle design and construction of Structural projects like buildings, roads, bridges/ culverts and storage facilities? (a) YES (b) NO
- (9) Do you think an Agricultural Engineer can effectively operate heavy duty and earth-moving equipment? (a) YES (b) NO
- (10) Do you think an Agricultural Engineer can effectively carry out all forms of maintenance on automobile and earth moving equipment? (a) YES (b) NO
- (11) Do you think an Agricultural Engineer can carry out maintenance and repair of a farm tractor? (a) YES (b) NO
- (12) Do you think an Agricultural Engineer can effectively impart knowledge in younger generation as a professional teacher / lecturer? (a) YES (b) NO
- (13) Do you think an Agricultural Engineer can carry out Survey and Layout works? (a) YES (b) NO
- (14) Do you think an Agricultural Engineer can effectively carry out Computer-maintenance? (a) YES (b) NO
- (15) Do you think an Agricultural Engineer can effectively Operate Computers and / or write Computer Programmes? (a) YES (b) NO