



# Evaluation of Cowpea Innovations Generated By Academic Institutions in Nigeria: A Case Study of University Of Ilorin, Nigeria.

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## ABSTRACT

The roles of academic institution in technology generation and transfer on cowpea have become a salient aspect of technology transfer process in Nigeria. The study therefore assessed cowpea innovations generated by academic institutions in the University of Ilorin, Nigeria. The study randomly selected 112 respondents from academic staff members in Agricultural Sciences and Engineering Faculties with few students inclusive. Descriptive statistics include: frequency counts and percentages while the inferential statistic was Pearson Product Moment Correlation. The mean annual income of the respondents' was N2, 578,125. The mean age of respondents was 47.43years. Specilized bagging and improved cowpea varieties (optimal plant population) were the most available cowpea innovations. High cost of innovation was the major constraint limiting generation of innovation. The result of Pearson Product Moment Correlation analysis revealed a significant relationship between selected socio-economic characteristics; age( $r= 0.407$ ,  $p=0.001$ ), years of experience ( $r=0.352$ ,  $p=0.006$ ), income ( $r= 0.443$ ,  $p=0.000$ ) and level of generation of cowpea innovations. Funding of research by university stakeholders was the greatest challenge militating against technology generation and therefore recommended that the Government should adequately fund academic institution in Nigeria for the uninterrupted generation and subsequently transfer of cowpea technologies to the farmers in order to combat the prevailing treats of food insecurity.

## INTRODUCTION

Agriculture involves the use of equipment and instruments to supplement human energy in operations such as tilling and preparing the land for planting. The tools (technologies) are required to avoid hand injury and to make the job easier. Hoes and cutlasses are popular instruments that vary based on the intensity of the labor and the culture of the area. For example, it is well known that yam heaps differ from maize heaps and frequently necessitate the employment of distinct types of hoes; also, hoes used in Yoruba land differ from those used in Nupeland (Bandara et al, 2007).

Technological innovations have greatly shaped agriculture throughout time. From the creation of the plow to the global positioning system (GPS) driven precision farming equipment, humans have developed new ways to make farming more efficient and grow more food. There is constantly ongoing works to find new ways to irrigate crops or breed more disease resistant varieties. These iterations are key to feeding the ever-expanding global population with the decreasing freshwater supply (National Geographic Society, 2020).

The methods of modern agriculture and agricultural operations are changing mainly due to technological advancements, including sensors, equipment, machines and information technology. Inorganic fertilizers, pesticides, and different tractors and machineries are used to enhance agricultural production. According to Adebayo (2021), sophisticated technologies such as robots, temperature and humidity sensors, aerial photos and GPS technology were also used. These advanced equipment, precise farming and robotic systems enable companies to be more profitable, more efficient, safer and more environmentally friendly. The availability of these inputs makes it necessary to use natural resources and processes to improve agricultural production and reduce costs. Farmers no longer need to apply water, fertilizer and pesticides evenly across the land. Instead, they can use the least amount and target very specific areas, or even treat different plants.

Technology generation means creation of ideas, tools or phenomenon targeted towards solving practical problem. Technology transfer is a term used to describe a formal transfer of rights to use and commercialize new discoveries and innovations resulting from scientific research to another party. University of Louisiana (2020) viewed Academic technology transfer as the transferring of University derived innovation to the commercial sector for further development and/or exploitation with the ultimate goal being societal benefit. Universities and research institutions are fertile ground for inventions that change the way we live. Association of University Technology Managers AUTM (2021) stated that universities and research institutions need help in growing and advancing discoveries to a final product or service and

that is where technology transfer fits in. Technology transfer, and the professionals who work in the field, change the world one discovery at a time. They're responsible for successful innovation management, corporate engagement, protecting and licensing inventions to companies, new venture creation and incubation, and economic development. Academic technology transfer contributes to the spawning of new businesses, creating new industries and opening new markets (Association of American Universities, 2011).

One common challenge of transfer of technology in the academia is none or little reproducible of research result. Findings by Quinones *et al* (2020) show that time constraints, knowledge being too theoretical, high costs of managing joint research projects, complex organizational structure, institutional bureaucracy, geographic distance, and lack of national benchmark are driving challenges that influence other challenges in impeding university technology transfer. Barrier to technology transfer as cited by Landmark University (2018) include: Lack of information; Insufficient human capabilities; Political and economic barriers such as political instability and lack of capital, High transaction costs, Lack of full cost pricing, Trade and policy barriers; Lack of understanding of local needs; Business limitations, such as risk aversion in financial institutions; and Institutional limitations such as insufficient legal protection, and inadequate environmental codes and standards.

Nigerians have been conditioned to believe they cannot invent a technology that will benefit the nation, and have in turn made Nigerians lose interest in the research outputs from her universities and research institutes across the nation. Several technological inventions are lying fallow and uncultivated at universities and research institutions across the country. This attitude negates the primary aim of establishing these institutions, which is to aid technology transfer from the laboratory to the industry. Research institutes and universities in Nigeria would have played a key role in technology transfer if there had been an effective collaboration between these institutions and the industry. Financing an invention has been one of the greatest challenges to technology transfer in Nigeria since every stage of an invention from the product development to commercialization requires huge financial investment, to this end, many discoveries never saw the light of the day (Ogbaudu, 2016).

To bridge the gap of food insecurity in Nigeria technologically, leguminous crop like cowpea is has to be developed because of its importance in Nigeria diet. Cowpea is a significant grain legume in West Africa, serving as a low-cost source of protein for the underprivileged in both urban and rural areas. For sub-Saharan Africa to produce crops sustainably, cowpea must be incorporated into the cropping system. The inclusion of cowpea in the cropping system, either as the only crop or as intercrop with sorghum and millet

will go a long way to improve the fertility of those degraded soils (Olufowote and Barnes, 2013).

Several biotic and abiotic factors such as insect pests, diseases (fungal, viral and bacterial), poor soil fertility, metal toxicity, and drought contribute to the reduction of cowpea yield potential in sub-Saharan Africa. Other factors contributing to low yield in sub-Saharan Africa include lack of improved varieties that can withstand these stresses and lack of adequate production practices and inputs needed for higher productivity and profitability (Saka et al 2018). Hence, this study described the socio-economic characteristics of respondents, identified cowpea innovations generated, determined extent of generating cowpea innovations and examined the constraints limiting generation of cowpea innovations.

## METHODOLOGY

This study was carried out in University of Ilorin, Kwara State, in the Faculties of Agricultural Sciences and Engineering and Technology. The University of Ilorin also known as UNILORIN. The University of Ilorin is located in the ancient city of Ilorin, about 500 kilometres from Abuja, the Federal capital. Ilorin, the Capital of Kwara State, is strategically located at the geographical and cultural confluence of the North and South of Nigeria. University of Ilorin was one of the seven institutions of higher learning established by a decree of the Federal Military Government in August, 1975. The Main Campus currently houses the Faculties of Science, Engineering and Technology, Agriculture, Education, Law, Arts, Business and Social Sciences.

The Mini-Campus presently houses the College of Health Sciences (University of Ilorin, 2022).

The study purposively selected departments of Agronomy, Crop protection, Mechanical Engineering, Agricultural Engineering and students due to the nature of the research work. Simple random selection of 112 respondents were selected for the study. The dependent variable of the study is cowpea innovations generated by academic institutions in university of Ilorin. It was measured by listing out the cowpea innovations generated and extent of generation of these innovations was measured on a rating scale of Very often: 3; Often: 2; Sometimes: 1; Never: 0. The independent variables are the selected socio-economic characteristics such as age in years, years of experience, household size and annual income in Naira. Both descriptive and inferential statistics were used to analyze the data. Descriptive statistics include: frequency counts and percentages while the inferential statistic was Pearson Product Moment Correlation.

### Socio-economic characteristics of respondents

The data in Table 1 shows the distribution of respondents according to their age. The mean age of respondents was 47.43years. Also, 55.4% of the respondents were male and 44.6% were female, making the work force agile. The Table 1 also showed the household size of individual respondents with 48.3% having less than or equal to 5 persons, 51% of the respondents had 6-10persons while 0.9% had 11persons and above. The mean annual income of the respondents' was ₦2, 578,125.

**Table 1: Socio-economic characteristics of respondents**

| Socio-economic characteristics | n=112     |            |           |
|--------------------------------|-----------|------------|-----------|
|                                | Frequency | Percentage | Mean      |
| Age                            |           |            |           |
| ≤30                            | 8         | 7.2        | 47.43     |
| 31-40                          | 24        | 21.6       |           |
| 41-50                          | 39        | 35         |           |
| 51-60                          | 23        | 53.1       |           |
| 61-70                          | 18        | 16.1       |           |
| Sex                            |           |            |           |
| Male                           | 62        | 55.4       |           |
| Female                         | 50        | 44.6       |           |
| Marital Status                 |           |            |           |
| Single                         | 11        | 9.8        |           |
| Separated                      | 11        | 9.8        |           |
| Divorced                       | 7         | 6.3        |           |
| Widow/widower                  | 6         | 5.4        |           |
| Married                        | 77        | 68.8       |           |
| Household size (persons)       |           |            |           |
| ≤5                             | 54        | 48.1       |           |
| 6-10                           | 57        | 51         |           |
| 11 and above                   | 1         | 0.9        |           |
| Annual income (Naira)          |           |            |           |
| ≤2,000,000                     | 51        | 45.6       | 2,578,125 |
| 2,000,000 – 4,000,000          | 39        | 34.8       |           |
| 4,000,001 – and above          | 22        | 19.6       |           |
| Secondary occupation           |           |            |           |
| Farming                        | 27        | 24.1       |           |
| Farming and trading            | 37        | 33         |           |
| Artisan                        | 8         | 7.1        |           |
| Transporting                   | 10        | 8.9        |           |
| Trading                        | 30        | 26.8       |           |

Source: Field survey, 2021.

### Cowpea innovations generated

Table 2 revealed that 93.8% claimed generation of specialized bagging storage facility, 92% of the respondents claimed the availability of improved cowpea varieties (optimal plant population), 87.5% claimed availability of organic pesticide, 84.8% agreed to availability of synthetic pesticide, 25.9% of the

respondents claimed the availability of pot, 25.9% of the respondents agreed to the availability of crib (open aerated cage having a stand for storing newly harvested cowpea). The result means that respondents were greatly involved in boosting food production in the country through production of cowpea innovations.

**Table 2: Distribution of respondents according to available Cowpea innovations**

| Cowpea innovations generated*                        | Frequency | Percentage (%) |
|--|-----------|----------------|
| Improved cowpea varieties (Optimal Plant population) | 103       | 92.0           |
| Organic pesticide (botanicals)                       | 98        | 87.5           |
| Synthetic pesticide(Optimal use)                     | 95        | 84.8           |
| Specialized bagging                                  | 105       | 93.8           |
| Silo (for storing grains)                            | 52        | 46.4           |
| Pot (For storing grains)                             | 29        | 25.9           |
| Crib (for newly harvested cowpea)                    | 29        | 25.9           |
| Thresher (for threshing)                             | 78        | 69.9           |

**Field Survey, 2021****\* Multiple responses****Frequency of transfer of cowpea innovations**

Table 3 indicates the frequency to which the available cowpea technology innovations are being generated by respondents. The result revealed that specialised bagging was ranked first with Weighted Mean Score (WMS) of

3.4. Synthetic pesticide was ranked second with WMS of 2.9, improved cowpea varieties (optimal plant population) ranked third with WMS of 2.8. The result implies that academic institutions created several innovations to boost cowpea production in the area.

**Table 3: Distribution of respondents according to frequency of generation of cowpea innovations**

| Cowpea innovations *                                 | Frequency of generation |          |           |          | WMS | Rank             |
|--|-------------------------|----------|-----------|----------|-----|------------------|
|  | Very often              | Often    | Sometimes | Never    |     |                  |
| Improved cowpea varieties (Optimal Plant population) | 16(14.3)                | 60(53.6) | 24(21.4)  | 12(10.7) | 2.8 | 3rd              |
| Organic pesticide (botanicals)                       | 20(17.9)                | 27(24.1) | 50(44.6)  | 15(13.4) | 2.5 | 4 <sup>th</sup>  |
| Synthetic pesticide(Optimal use)                     | 42(37.5)                | 30(26.8) | 21(18.8)  | 19(17.0) | 2.9 | 2 <sup>nd</sup>  |
| Specialized bagging                                  | 73(65.2)                | 15(13.4) | 10(8.9)   | 14(12.5) | 3.4 | 1 <sup>st</sup>  |
| Silo (for storing grains)                            | 3(2.7)                  | 4(3.6)   | 15(13.4)  | 90(80.4) | 1.3 | 11 <sup>th</sup> |
| Pot (For storing grains)                             | -                       | 4(3.6)   | 18(16.1)  | 90(80.4) | 1.1 | 6 <sup>th</sup>  |
| Crib (for newly harvested cowpea)                    | -                       | 2(1.8)   | 23(20.5)  | 87(77.7) | 1.1 | 6 <sup>th</sup>  |
| Thresher (for threshing)                             | 7(6.3)                  | 32(28.6) | 40(35.7)  | 33(29.5) | 1.9 | 5 <sup>th</sup>  |

**Field Survey, 2021.****Constraints limiting generation of cowpea innovations**

Table 4 shows that high Cost of innovation ranked first with Weighted Mean of Score (WMS) of 2.6, Inadequate Funding and Lack of sustainability of research result were jointly

ranked second with WMS of 2.5, while Lack of Motivation by the university agency and Inadequate researchers jointly ranked fourth with WMS of 2.2. The result implies that several bottlenecks were limiting technology generation of cowpea innovations.

**Table 4: Distribution of respondents according to constraints limiting generation of cowpea innovations**

| Constraints*                                | Serious  | Mild     | Not a problem | WMS | Rank            |
|---|----------|----------|---------------|-----|-----------------|
| Inadequate Funding                          | 71(63.4) | 35(31.3) | 6(5.4)        | 2.5 | 2 <sup>nd</sup> |
| Lack of Motivation by the university agency | 20(17.9) | 84(75.0) | 8(7.1)        | 2.2 | 4 <sup>th</sup> |
| Inadequate researchers                      | 45(40.2) | 39(34.8) | 28(25.0)      | 2.2 | 4 <sup>th</sup> |
| Lack of sustainability of research result   | 44(39.3) | 50(44.6) | 18(16.1)      | 2.5 | 2 <sup>nd</sup> |
| Low level of farmer's experience            | 27(24.1) | 46(41.1) | 39(34.8)      | 1.9 | 7 <sup>th</sup> |
| High Cost of innovation                     | 70(62.5) | 28(25.0) | 14(12.5)      | 2.6 | 1 <sup>st</sup> |
| Gap between researchers goal and farmer     | 33(29.5) | 60(53.6) | 19(17.0)      | 2.1 | 6 <sup>th</sup> |

**Field Survey, 2021****\* Multiple response, ( ) represent percentage**

### Pearson Correlation analysis showing the relationship between selected socio economic characteristics and level of generation of cowpea innovations.

The result of Pearson Correlation analysis in Table 5 revealed a significant relationship between selected

socio-economic characteristics; age( $r= 0.407$ ,  $p=0.001$ ), Years of experience ( $r=0.352$ ,  $p=0.006$ ), income( $r= 0.443$ ,  $p=0.000$ ) and level of generation of cowpea innovations. This implies that the significant variables positively influenced the level of generation of cowpea innovations to the farmers.

**Table 5. Pearson Correlation analysis showing the relationship between selected socio economic characteristics and level of generation of cowpea innovations.**

| Variables           | Correlation coefficient (r) | P-value | Remark      |
|---------------------|-----------------------------|---------|-------------|
| Age                 | 0.407*                      | 0.001   | Significant |
| Years of Experience | 0.352*                      | 0.006   | Significant |
| Income              | 0.443*                      | 0.000   | Significant |
| Household size      | 0.314                       | 0.715   | Significant |

Source: field survey, 2020

\* correlation is significant at 1%

### CONCLUSION AND RECOMMENDATION

Specialized bagging and improved cowpea varieties (optimal plant population) were the most available cowpea innovation. The cost of innovation and funding research for technology generation were the greatest challenge militating against technology generation in academic institution and therefore recommended that the Government should adequately fund the institution for the uninterrupted generation of cowpea innovations in order to combat the prevailing treats of food insecurity.

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### Disclosure Statement

No potential conflict of interest.

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