Special Journal of Philosophy, Sociology and Education

Socioeconomic determinants of stakeholder's participation in root-crop farming research in Abia State Nigeria

Ukeju, Udo Uka

Address: Directorate of Entrepreneurs and Enterprise, Gregory University, Uturu, Abia State, Nigeria.

Correspondence: udoukeju@gmail.com and Tel: +2348039196656

History: Submited November 2020, Accepted: March 2021, Published June: 2021

Citation:

Ukeju UU, Socioeconomic determinants of stakeholder's participation in root-crop farming research in Abia State Nigeria. Spec. j. Philos. Sociol. Educ. 2021. Vol 1, number 2: pgs 1-12

Abstract

Background: Root crop farming remains relevant to the strength of Economic and Agricultural growth of any nation. However, the attitude of farmers donors and governmental and non-governmental agencies remains a challenge to strategic development in this regard

Objectives : This study was designed to evaluate Root Crop farmers' participation in agricultural research in Abia state, Nigeria.

Materials and Methods: In this cross-section demographic survey, 192 consenting farmers answered questions on participation in research. Data analysis in this study involved multi-staged sampling technique. The mean age of participants and non-participants was 30years-49years.4

Results : This study depicts the socio-economic characteristics (age, level of education, and membership of cooperation) of farmers as strong determinants of participation in root crop farming research. About 90% of the participants had secondary and tertiary education while 68% of non-participants had primary education. The participation of 11 out of 13 farmers in this survey is high and promising. Selection of Farm sites, On-Farm Adaptive Research (OFAR), and general feedback on research finding had the highest level of participation. The output of participants was significantly (Z-cal; 2.114, Z-tab; 1.645 at 95%) dependent on number of non partricipants per unit time.

Conclusion and Recommendations

Lack of funds, unfriendly training strategies, and insufficient farm input are constraints associated with participation in farming system research. Farmers' perception showed that research participants beneficial in the general improvement to their overall farm productivity. Farmwers participatioin in the management of research farming system practices in Nigeria through government support are recommended

Keywords: Evaluation, Root-Crop, farmers' participation, agricultural research, Abia state

Introduction

Agriculture has been the mainstay of many growing economies in many countries of the world. Many food crops available in the market today are the handiwork of our forefathers. Farmers in Africa inherited land tenure systems, cultural practices, and farming systems (1). Since then, farmers have been exploring how to improve on these systems by trial and error (2). Although investments in agricultural research and agro-technology transfer have brought a spectacular increase in agricultural production in Africa, the lack of sustainability of rural development programs has been the bane of Nigeria (3, 4).

Schulz (2) suggested that research institutes should put the socio-economic characteristic of the farmers into consideration when identifying the social problems of farmers. Researchers should consider the socio-economic and agro-ecological conditions facing the farmers when formulating models for research innovations. Farming Systems Research has helped to develop technologies that are more appropriate to farmers (5) because farmers actively participate in the generation and evaluation of such technologies.

Participation in research enhances the skill and productivity of participants and this is directly related to the income of farmers (7). The approach to farmer's involvement is known as the "Farmer participatory approach to technology development", an approach found to be very effective in developing local economicallyviable technologies (7).

Rationale and Justification for the study

The Federal Government of Nigeria introduced the National Accelerated Food Production Project NAFPP (8), and the River Basin Development Authority RBDA (9) to impact agriculture, rural development, and poverty. Despite enormous investments in these programs, Nigeria still witnessed the poor

performance of agricultural production and poor sustainability of rural development programs (10). There is no justification regarding the huge spending by the Federal Government of Nigeria on training programs for the local farmers to participate in research activities. It is not well understood or clearly defined why relevant authorities continue to exclude grass root farmers from decision-making and policy formulation using the top-bottom management approach [11, 13).

It is logical to assert that there is no balanced investment in government business agenda in agriculture and food security unless they are focused on both recurrent expenses in infrastructural development, equipment acquisition, and human resources development that includes local farmers motivation and encouragements to participate in research. This underlying chasm in Government's strategic development agenda can be associated with food scarcity and starvation despite massive agricultural fertile farmlands in the country. This study is justified because it established a closer link between the local farmers and the researcher (14). Closing the gap between research findings, translation into standard operational procedures (SOPs), and implementation of developed SOPs to impact good agricultural yield is the responsibility of everyone

Objective:

To evaluate the socioeconomic determinants of stakeholder's participation in root-crop farming research in Abia State Nigeria

Hypothesis

Ho1: There is a relationship between output and income of participating and non-participating farmers in Agricultural research activities.

Ho2: There is a relationship between selected socio-economic characteristics (Farming experience, level of education, farmers' income; and diversification) of resource participatory farmers and level of participation in Agricultural research

Material and Methods

Study area

The study was conducted in Abia State, Nigeria, located within the tropical rainforest ecological zone of Nigeria and lies within longitude 040 45' North and latitude 060 3' East. The area is characterized by bimodal rainfall with a peak in both July and September. The population is predominantly rural (62.25%) Abia State has three Agricultural Zones, with 38 extension blocks and 274 circles (ADP, 2004). It has a population of 2,833,999, consisting of 1,234,193 males, 1,599,806 females, and population density of 578 persons per square kilometer (NPC, 2007). Agriculture is the major occupation of the people due to the abundance of rich soil

Sampling criteria

A multi-stage sampling technique (15) was used in this study involving participants from the 3 Agricultural Zones (Umuahia, Aba, and Ohafia) in Abia State. In the first stage, Umuahia Zone was purposively selected. Ohafia Zone was randomly selected from the two remaining Zones. In the second stage 2 Local Government Areas were randomly selected from each

Agricultural Zone making it a total of 4 Local Government Areas. Umuahia North and Isikwuato were selected as participants L.G. As, Ohafia, and Isiukwuato were selected as nonparticipant L.G.As. Two autonomous communities were randomly selected from the selected L.G.As making a total of 8 communities.

In the fourth stage, 2 villages were selected at random from each of the selected autonomous communities making a total of 16 villages and 12 farmers were randomly selected from each selected village. The total sample size of 96-participants and 96-non-participant made a sum of 192-farmers. Primary data was obtained through informal discussions and structured questionnaires while secondary data were obtained through reviewing program documents, the literature on participation, and perception/interview of research institute officers, internet, libraries, reports, journals, and magazines.

Data quality assessment & Statistical analysis

Data quality and intergrity (16)Simple descriptive statistics such as percentages, frequency distribution, and mean were used to analyze the results of the socio-economic characteristics of farmers in the study area. Z tests were used to analyze the results of the benefits (income and output) derived by participation and non-participation in research. Logit regression and Z-test were used to analyze the Identified problems militating against farmers' participation in research. The respondents stated their perception of the level of participation of farmers in the selected area of study using the five-point Likert-type scale (Very high, high, very fair, fair, and low) with values of 5,4,3,2, and 1 respectively.

A midpoint was obtained: 5+4+3+2+1 = 15/5 = 3.0. Variables with a mean score of 3.0 were interpreted as effective while variables with less than 3.0 depicted ineffective. The implicit form of the logit regression model is expressed thus: Log { $P(participation)$ 1 − $P(participation)$ } = $\beta°$ + $\beta 1xi$ + $\beta 2x2$ + …. + βnxn The independent variables in the logit regression model are; X1= Age (years), X2 = Sex (male = 1, female = 0), X3 = Farming experience will be measured in years, X4 = Farmers income (naira), X5 = Cost of farm inputs used in research (naira), X6 = Occupation, X7 = Education (years)

Hypothesis testing

Z-test was used to test the first hypothesis Ho1: "There is a relationship between output and income of participating and non-participating farmers in Agricultural research activities". Logit regression and Z-test were used to test the second hypothesis Ho2: There is a relationship between selected socio-economic characteristics (Farming experience, level of education, farmers' income; and diversification) of resource participatory farmers and level of participation in Agricultural research

Result and Discussion

Response Rate and Demographic Characteristics of Respondents

Socio-Economic Characteristics of Farmers Table 1 presents a distribution of socio-economic characteristics of respondents in the study area. It was found that 34.4% of participants and 67.7% of non-participating farmers were married, whereas 65.6% of the participating farmers and 32.3% of the non-participating farmers were single. This result shows that the single participated more in Agricultural research activities than

the married, supporting the view that singles welcome innovations more than the married Regarding age (table 1), 63.5% were active participants while non-participating farmers were 34.4% and the age fell within the age range of 30 – 49 years. This implies that the majority of the participating farmers are middle-aged, energetic, and can face the rigors of participating in research. This age is known as the 'working age', explaining that if the head of household is of this working age, he is likely to participate in different research reforms to achieve breakthroughs that can impact the family finances. Younger farmers tend to participate in research than older farmers because they respond to change than older ones (13).

Ninety percent (90%) of participants and 31.2% of the non-participants completed their secondary and tertiary education (Table 1). Fifty-one percent (51%) of participants were males and 49% of the participants were females. The observed high number of participants who completed their secondary and tertiary education indicates that education impacted the participation of respondents in research. Most farmers who had secondary and tertiary education responded positively to Operation Feed the Nation (OFN) than those who had primary and no formal education. Therefore, the more the farmers are educated the more the Research Participating Farmers make positive changes in the overall Farming System. It was recorded that 51% of participants were males and 49% of the participants were females (Table 1).

The reason for the research participation of males being relatively more than females is associated with the fact that women are left at home as a housewife to handle housekeeping more than men, while men have more chance to embrace change as they associate more with others. The level of female involvement in agricultural research is on the increase. Published surveys show that females can get involved in practicing agriculture in Nigeria like their male counterparts (17). Table 2 shows the distribution of farmers according to household size.

Fifty-one (51%) of participants and 55% of non-participants farmers had between 6 - 10 household memberships. A relatively larger household size of the 6 – 10 range enables the farmers to maximize benefits. The inclusion of a large household size in research may mean more availability of hands in the farm labor and large socio-economic responsibility. This is in line with other reports that a relatively large household size of 6–10 enables the farmers to maximize farm benefits (18). The occupational distribution of participants indicates that 61.4% of farmers were full-time farmers whereas 39.6% operated on a part-time basis (Table 2). Full-time farmers dedicate more time to participate in farming activities than part-time farmers.

Full-time farmers concentrate better and are amendable to change that will enhance their productivity than part-time farmers (19). Table 2, depicts farming experience indicating that 52.1% of the participating farmers had 5 – 10 years of farming experience while the nonparticipant farmers accounted for only 38.5%. The majority of the farmers had 5-10 years of experience. Those with lower years of farming experience participated more than those with higher years of experience. The inclusion of more farmers with 5-10 years of experience in participation in research could be the fact that less experienced farmers could take more risk than older counterparts who are usually more conservative to change. In Table 3, farmers belonging to the cooperative association

were 68.8% participants and 37.5% for non-participants.

Membership of cooperative association enables farmers to have wider agricultural information which encourages participation and helps participants to embrace changes as the need arises. The higher cost of transportation to meeting places, lack of farm inputs, and difficulty in understanding innovations are low for farmers belonging to Associations than non-members. This finding is in line with the fact that membership of the association encourages participation in agricultural activities (20). In Table 3, regarding income, 62% of the respondents that are participants and 15.6% nonparticipants had at least N100,000 and at most N199,000 income range. Conversely, the majority of about 78,1% of the non-participants and 22.9% of participants had income ranges within N1 to N99,000. This implies that participants are better income earners when compared with non-participants in this same range.

Participation in research may have enhanced the skill and productivity of participants. The more skilled and productive the participants, the better their income. This supports the suggestion that people within the same income range tend to reason alike and have the same pattern of behaviors while those from different income ranges are not likely to behave in a similar way (21). It is expected that the lower the income of a farmer, the less their participation, and the more the income the more their participation. This implies that the more the annual income of the farmer increases, the more likely they would participate in research activities (22).

Table 1a: Socio-Economic Characteristics of Farmers

	Participants		Non-participants			
Marital Status	**Frequencies**	**Percentages**	**Frequencies**	**percentages**	**Total**	**Mean**
Married	33	34.4	65	67.7	98	49
Single	63	65.6	31	32.3	94	47
TOTAL	96	100	96	100	192	96
Distribution of farmers According to Age						
20-29	7	7.3	10	10.4	17	8.5
30-39	20	20.8	15	15.6	35	17.5[3]
40-49	41	42.7[1]	18	18.8	59	29.5[2]
50-59	21	21.9	46	47.9[1]	67	33.5[1]
60-69	7	7.3	7	7.3	14	7
TOTAL	96	100	96	100	192	96
Distribution of farmers According to Level of Education						
Non-formal	4	4.2	31	32.3	35	17.5
Primary	6	6.3	35	36.5	41	20.5
Secondary	47	48.9	18	18.7	65	32.5
Tertiary	39	40.6	12	12.5	51	25.5
TOTAL	96	100	96	100	192	96
Distribution of farmers According to Sex						
Male	49	51	59	61.5	108	54
Female	47	49	37	38.5	84	42
TOTAL	96	100	96	100	192	96

Table 1b: Socio-Economic Characteristics of Farmers

	Participants		Non-participants			
Marital Status	**Frequencies**	**Percentages**	**Frequencies**	**percentages**	**Total**	**Mean**
Distribution of farmers According to Household Size						
1-5	38	39.6	35	36.5	73	36.5
6-10	49	51.0	53	55.2	102	51
11-15	9	9.4	8	8.3	17	8.5
TOTAL	96	100	96	100	192	96
Distribution of farmers According to Occupation						
FTF	59	61.5	38	39.6	97	48.5
PTF	37	38.5	58	60.4	95	47.5
TOTAL	96	100	96	100	192	96
Distribution Of Farmers According to Farming Experience (Years)						
5-10	50	52.1	37	38.5	87	43.5
11-15	12	12.5	24	25	36	18
16-20	13	13.5	14	14.6	27	13.5
21-25	9	9.4	10	10.4	19	9.5
26-30	6	6.3	5	5.2	11	5.5
>31 & above	6	6.3	6	6.3	12	6
TOTAL	96	100	96	100	192	96
Distribution Of Farmers According to Membership of Cooperative Society						
Membership	66	68.8	36	37.5	102	51
Non-Membership	30	31.2	60	62.5	90	45
TOTAL	96	100	96	100	192	96
Distribution Of Farmers According to Income(N)						
1-99T	22	22.9	75	78.1	97	48.5
100T-199T	60	62.5	15	15.6	75	37.5
200T-299T	10	10.4	5	5.1	15	7.5
300T-399T	4	4.1	1	1.0	5	2.5
TOTAL	96	100	96	100	192	96

Source: Field Survey, 2011

Distribution of Respondents According to Their Level of Participation in Research From table 3, items 2-12 had means above 2.4 indicating high participation in research while items 1 and item 13 had means 2.4, which indicates low participation in research.

Distribution of Respondents According to their Perception of benefits of Participation in Research. According to the results shown in Tables 4 and 5, participation improved farmers' stock of root crop varieties, improved farmers' knowledge of agronomic practices for roots and tubers crop production and farmers learned of better methods of processing and storage methods of root and tuber. Farmers also learned better utilization of technology for roots and tubers and farmers had facilitated access to farm input. Entries of items 1-6 (agreed) imply that the respondents perceived their participation in research as having a positive effect.

Table 2: Distribution of Respondents According to Their Level of Participation in Research

Item	Total response	Mean	Decision Rule
1. Pre-Diagnostic survey	231	2.4	Disagree
2. Participatory rural/situational analysis	257	2.7	Agree
3. Prioritization of fields problem	265	2.6	Agree
4. Design of research trial	253	2.6	Agree
5. On-farm of adaptive research	283	2.9	Agree
6. Validating of research output	260	2.7	Agree
7. Establishment of SPAT	255	2.7	Agree
8. General feedback on research findings	283	2.9	Agree
9. Selection of sites and inputs required for research	278	2.9	Agree
10. Research field days	268	2.8	Agree
11. Discussion of research output	273	2.8	Agree
12. Research workshop planning	244	2.5	Agree
13. On-farm research	232	2.4	Disagree
Total		**37.5**	
Clustered mean ($c\bar{x}$)		**2.6**	

Source: Field Survey, 2011

Table 3: Distribution of Respondents According to their Perception of benefits of Participation in Research.

Item	Total respondent	Mean	Decision rule
1). My participation improved my stock of root-crop varieties	325	3.4	Agree
2). My participation enhanced my training	315	3.3	Agree
3). My participation in different technologies improved my knowledge of agronomic practices for tuber crop production	331	3.4	Agree
4). My participation helped me learn better methods of processing and storage of roots and tubers	322	3.4	Agree
5). My participation helped me learn better technologies for the utilization of roots and tubers	279	2.9	Agree
6). My participation helped me facilitate access to farm input	317	3.3	Agree
Total	**1889**	**18.7**	
Clustered Mean ($c\bar{x}$)		**3.2**	

Source: Field Survey, 2011

Effect of participation on farm output and income

Participants' output and income (N251,953.00) were higher than those of non-participants' output and income (N115,355.00) as shown in table 5. More so, the Z-calculated 2.114 is greater than Ztabulated 1.645 at 5%, indicating the rejection of the null hypothesis and acceptance of the alternative hypothesis that there is a significant difference between the output of participants and non-participants.

Constraints Farmers Faced in Participation

In Table 6, Some of the constraints identified by farmers in participation in research are lack of access to credit (97.9%), Unfriendly Training Strategies/materials (79.2%), lack of input for work (75%). Others are Farmer lived long-distance from research sites (69.8%), Poor result of past programs (63%), and literacy/difficulty Item Total respondent Mean Decision rule 1) My participation improved my stock of root-crop varieties 325 3.4 Agree 2) My participation enhanced my training 315 3.3 Agree 3) My participation in different technologies improved my knowledge of agronomic practices for tuber crop production 331 3.4 Agree 4) My participation helped me learn better methods of processing and storage of roots and tubers 322 3.4 Agree 5)
My participation helped me learn better technologies for the utilization of roots and tubers 279 2.9 Agree 6) My participation helped me facilitate access to farm input 317 3.3 Agree Total 1889 18.7 Clustered Mean (c x) 3.213 understanding the process (61.5%). The rests are overcrowded programs and training (56.3%), high-frequency meetings (55.2%), and language barriers (53.1%). This finding is in agreement with published facts that constraints identified by farmers when improved can better their participation in research (23).

Table 5: Constraints farmers faced in participation

Constraints Farmers Faced in Participation	Freq.	Percentage
1. Language barrier	51	53.1
2. High frequency of meeting	53	55.2
3. The poor result of past programs	61	63.5
4. lack of access to credit	94	*97.9*[1]
5. Literacy/difficult in understanding the process	59	61.5
6. Lack of input to work	72	*75*[3]
7. Unfriendly Training Strategies/materials	76	*79.2*[2]
8. Overcrowded program/training	54	56.3
9. Farmer lived Long distance from research sites	67	69.8

Contribution to sustainable development

Root crop farming and indeed all forms of farming involving collective engagement by stakeholders and community dwellers guarantees food security which in turn assures nutritional sufficiency for us today and for our children tomorrow. The need for dynamics of change to innovative ways of improving routine business plans is invaluable and guarantees sustainability. Walking away or keeping quiet with no actions is riskier for us today and for our children tomorrow. Collective engagement by all stakeholders to ensure Community based farmers participation in agricultural research emphasized for the ultimate of achieving sustainable development (24) in the long run

Limitation

Use of more discriminative research design and multivariate analysis of data may research more undisclosed information that may impact stakeholder's participation in rural agricultural research that is more likely to have profound policy implications

Conclusions

Constraints Farmers Faced in Participation Freq. Percentage 1. Language barrier 51 53.1 2. High frequency of meeting 53 55.2 3. The poor result of past programs 4. lack of access to credit 61 94 63.5 97.91 5. Literacy/difficulty in understanding the process 59 61.5 6. Lack of input to work 72 753 7. Unfriendly Training Strategies/materials 76 79.22 8. Overcrowded program/training 54 56.3 9. A farmer lived a Long distance from research sites 67 69.814 Socio-economic characteristics of farmers were found to have played a prominent role in influencing the participation of farmers in agricultural research according to and the level of farmers' participation in agricultural research in this study was seen to be high and has enhanced the skill and productivity of participants. The farmers' perception suggested that there is danger in developing research innovation that does not center on the need of farmers.

Recommendations

Stakeholders in National Agriculture should be involved in all stages of research and technology development, from problem identification through technology generation to field evaluation of the new technology using existing local skills and knowledge. Support for demand-led research is highly recommended.

References

1. Obasi GOP. "Emerging Sustainability Science, the Challenge for Africa". Environment 44:8-19. 2002

2. Shulz S. "Farmers participation in research and development: the problem census and solving techniques". IITA Research Guide, IITA Ibadan, Nigeria, 2000, No. 57, Pg. 22.

3. Anthott CH. "Getting ready for the twenty-first Century". Technical Change and Institutional Modernization in Agriculture World Bank, Washington D.C. U.S.A, 1993

4. CTA (Technical Centre for Agricultural and Rural Cooperation). "Review and Assessment of Rural Development Programmes in Africa". Proceedings of an International Workshop, 17 - 21, January 1994, AICC, Arusha – Tanzania. A joint publication of The Technical Centre for Agricultural and Rural Cooperation (ACP –

EU) and The Centre on Rural Integrated Rural Development for Africa (CIRDAFRICA). 126p. 1996

5. Unamma RPA, Odurukwe SO, Okereke HE, Ene ISO and Okoli OO (Eds). “Farming systems in Nigeria. A report of the bendmark survey of the farming systems of the eastern agricultural zone of Nigeria”. Published by Agricultural Extension and Research Liaison Services, National Root Crops Research Institute Umudike, Umuahia, Nigeria. 1983

6. OECD/ILO, Better Use of Skills in the Workplace: Why It Matters for Productivity and Local Jobs, OECD Publishing, Paris. 2017. http://dx.doi.org/10.1787/9789264281394-en

7. Chambers R. “Participatory Rural Appraisal (PRA): Challenges, Potentials and Paradigms”. World Development 1994, 22(10).

8. Njoku JE, Mijindadi NB, The national accelerated food production project as a strategy for increased food production in Nigeria: A review of problems and prospects with particular reference to sorghum, millet, and wheat, Agricultural Administration, Vol 18, Issue 3,1985, Pages 175-185,

9. Adeduro J. Adegeye, Establishing river basin development authorities as a strategy for Nigerian rural development, Agricultural Administration, Volume 9, Issue 4, 1982, Pages 301-311,

10. Idachaba FS. “Desirable and workable Agricultural Policies for Nigeria Tropical Issues”. University of Ibadan, Ibadan. 2000

11. Havercort, B., J.van der Kamp and A. Waters-Bayer (eds). “Joining farmers Experiments”. Intermediate Technology Publications, London, UK. 1991

12. Hiemstra, W., Reijntjes, C. and Van der Werf (eds). “Let farmers Judge". Intermediate Technology Publications, London, UK. 199215

13. Peter Quartey. "Financial Sector Development, Savings Mobilization and Poverty Reduction in Ghana," WIDER Working Paper Series RP2005-71, World Institute for Development Economics Research (UNUWIDER). 2005

14. Scientific and Technical Advisory Council (STAC) of the Special Journals Publisher (SJP): Conceptual framework in Philosophy Sociology and Education Research. Special Journal of Philosophy Sociology and Education, [SJ-PSE], 2020; 1 (1):1-18

15. Scientific and Technical Advisory Council (STAC) of the Special Journals Publisher (SJP): Research design innovations in Philosophy, Sociology, and Education Investigations. Special Journal of Philosophy, Sociology, and Education [SJ-PSE], 2020; 1 (1):1-21

16. Scientific and Technical Advisory Council (STAC) of the Special Journals Publisher (SJP): Data Integrity in Philosophy, Sociology, and Education Research. Special Journal of Philosophy, Sociology, and Education, [SJ-PSE], 2020; 1 (1):1-7

17. Oseni, Gbemisola; Goldstein, Markus; Utah, Amarachi. Gender Dimensions in Nigerian Agriculture. Africa Region Gender Practice Policy Brief; No. 6. World Bank, Washington, DC. © World Bank. 2013

18. Sarah K. Lowder, Jakob Skoet, Terri Raney, The Number, Size, and Distribution of Farms, Smallholder Farms, and Family Farms Worldwide, World Development, Volume 87,2016, Pages 16-29,

19. Social and Economic Effects of the U.S. Food System." Institute of Medicine and

National Research Council. 2015. A Framework for Assessing Effects of the Food System. Washington, DC: The National Academies Press.

20. United Nations. Gender dimensions of agricultural and rural employment: Differentiated pathways out of poverty. The Food and Agricultural Organization of the United Nations, the International Fund for Agricultural Development, and the International Labour Office, Rome. 2010

21. Verme, Paolo, Branko Milanovic, Sherine Al-Shawarby, Sahar El Tawila, May Gadallah, and Enas Ali A.El-Majeed. Inside Inequality in the Arab Republic of Egypt: Facts and Perceptions across People, Time, and Space. World Bank Studies. Washington, DC: World Bank. doi:10.1596/978-1-4648-0198-3. License: Creative Commons Attribution CC BY 3.0 IGO, 2014

22. Brodt, S., Six, J., Feenstra, G., Ingels, C. & Campbell, D. Sustainable Agriculture. Nature Education Knowledge 2011, 3(10):1

23. Jha S, Kaechele H, Lana M, Amjath-Babu TS, Sieber S. Exploring Farmers' Perceptions of Agricultural Technologies: A Case Study from Tanzania. Sustainability. 2020; 12(3):998. https://doi.org/10.3390/su12030998

24. Scientific and Technical Advisory Council (STAC) of the Special Journals Publisher (SJP): Development and Sustainability: the role of Philosophy, Sociology, and Education research. Special Journal of Philosophy, Sociology, and Education [SJ-PSE], 2020; 1 (1):1-21

