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# FACTORS AFFECTING THE ADOPTION OF ORGANIC MAIZE FARMING IN RWANDA: Case study of Kirehe District.

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**Abstract:**
Organic farming is a type of farming which involves cultivation of crops in natural ways. It is steadily gaining momentum all over the world due to its economic, environmental and health benefits that it provides to the farmers, to the nature and to the consumers. To study the factors affecting the adoption of organic maize farming in Musaza sector is the main objective of this study. A total of 120 maize farmers were selected in the cooperative of cereals of Musaza named COACMU

in which 60 farmers cultivated organic maize and the remaining cultivated inorganic maize. A simple random sampling technique was employed to select 60 inorganic farmers. Descriptive and inferential statistics were adopted to analyze the data through which the binary logistic regression model was applied to study the factors affecting the adoption of organic maize farming in Musaza sector. The findings showed that among eight predictors four were found to affect the adoption of organic maize in the study area including education, household income, cost of seed and cost of labour. Education, household income and cost of seed were positively associated with the probability of adoption of organic farming while cost of labour was negatively associated. The main limitation that the researchers encountered was to find organic maize farmers since the majority of farmers combine both systems of farming followed by inorganic farming. Based on the findings of this study, we recommend that the farmers should be encouraged to adopt organic farming since this farming system is adopted by few farmers who are partial practitioners. Therefore understanding the perceptions of farmers towards organic farming, providing subsidies in the conversion phase for farmers who are willing to adopt and presenting market opportunities are the main conditions to develop organic farming in the study area in particular and in Rwanda in general.

**KEYWORDS:** Adoption, Organic farming, Inorganic farming, Probability, Musaza.

## INTRODUCTION

Organic farming is receiving increasing attention across the world due to its contributive importance to the Millennium Development Goals (MDGs) of improved health and food security, environmental conservation and economic development (Edwards, 2005). There is growing recognition among policy makers that organic farming has a significant role to play in addressing the pressing problems of food insecurity, poverty, land degradation and climate change in Africa. In January 2011, the executive council of the african union passed a decision on organic farming at its eighteen ordinary sessions. In particular, the decision EX.CL/DEC.631 (XVIII) requests the African Union Commission (AUC) and its New Partnership for Africa's Development (NEPAD), the planning and coordinating agency (NPCA), to initiate and provide guidance for supporting the development of sustainable organic farming systems.

Organic farming refers to a form of agriculture that relies on techniques such as crop rotation, green manure, compost and biological pest control. Organic farmers work with natural manure and pesticides, but strictly exclude the

use of manufactured inorganic fertilizers, pesticides, plant growth regulators such as hormones, livestock antibiotics, food additives and genetically modified organisms.

## INTERNATIONAL FEDERATION OF ORGANIC AGRICULTURE MOVEMENT (IFOAM)

IFOAM is the only international umbrella organization in the organic world. Goal is worldwide adoption of ecologically, socially and economically sounds systems that are based on the principles of organic agriculture.

In Africa, IFOAM is working with the African Union, the African Organic Sector and other agencies in the framework of its " Organic Alternative for Africa Initiative" to help coordinate activities, increase awareness of the multiple benefits of organic agriculture and facilitate the integration of organic agriculture solutions and opportunities into the core of african policies and development agendas.

In Rwanda, IFOAM mainly collaborates with the Rwanda Organic Agricultural Movement (ROAM) which is the national umbrella organization. It brings together producers, farmers' organizations, processors, export and import companies, NGOs and organizations that are involved in the promotion and development of organic sector in Rwanda. Established in 2007 to realize the vision of increased incomes and improved livelihoods in Rwanda through the adoption of organic agriculture, ROAM has invested in education, training, extension and research in organic agriculture, promoting local and export marketing of organic products, advocating for organic farming as well as attracting support for organic agriculture in Rwanda.

Since then, organic farming activities in Rwanda have attracted local farmers' attention and as a result the country is witnessing several emerging initiatives. One of these is the Gako organic farming center based at KABUGA. The center contributes to building capacity of low scale farmers and works with the Rwandan government and private organizations in order to promote organic farming practices.

## OBJECTIVE

The main objective of this study is to study the factors affecting the adoption of organic maize farming in Musaza sector of Kirehe district.

## METHODOLOGY

### *1. The Survey*

To achieve the objective of this study, an interview schedule technique was used to collect data on organic and inorganic maize farm in Musaza sector. The research was based on a cross-sectional survey conducted between 14 January/2016 and 16 March/2016 and the questionnaire served as the tool of data collection which was designed to capture basic information on the farm (e.g. farm size, production) and farmer characteristics (e.g. Age, Gender, experience, education).

To assess the farmers' adoption for organic farming, the sample space consisted of 120 respondents from Musaza sector include 60 organic maize farmers and 60 inorganic maize farmers and the detailed explanation on how this sample size was selected is shown in the sampling procedures section. The collected data was analyzed using a Statistical Package for Social Sciences (SPSS) software.

### *2. Sampling procedures*

The purpose of this section is to demonstrate the sampling adopted in this study. Musaza sector was selected since this sector consists of farmers' Cooperative of Cereals of Musaza (COACMU-Cooperative) and maize is the most produced crop by all the farmers of COACMU followed by beans. The list of all maize farmers which comprises of 1213 farmers was given by the president of the cooperative in which 124 farmers were inorganic farmers and 60 were organic farmers. Hence, to compare inorganic farmers with organic farmers 60 inorganic farmers were selected based on the simple random sampling technique.

### *3. Theoretical framework of the model*

The categorization of farms into "adopters" is based on the dichotomous outcome of the adoption decision, which characterizes the dependent variables (Y). In this regard, a farm is defined as an "adopter" where $Y_i$=1 or as "non-adopter" where $Y_i$= 0. To study the factors affecting the adoption of organic maize production, binary logistic regression model was estimated (see Table-5) by the maximum likelihood estimate method. We assume that the decision to adopt or not adopt is voluntary and that the differences in responses by the farmers are often due to the fact that producers have the different choices, different behavior/attitudes based on the levels of education, capacity to get the resources, cultures, constraints, farming objectives, experience in farming and other socio-economic conditions. As consequence, some farmers will adopt and others will not, depending on the livelihood conditions that they expect from the technology.

Binary logistic regression analysis was used in this study to categorize the organic farming into adoption and non-adoption. Binary logistic regression is most useful in case where we want to model the event probability for a categorical response variable with two outcomes. The logistic regression model is a type of generalized linear model that extends the linear regression model by linking the range of real numbers to the range 0-1.
For a binary response variable Yi and explanatory variable Xi is defined as:

$\pi(x)$= P(Y=1/X=x)1-P(Y=0/X=x) and the logistic regression model is shown below as:

$$\frac{exp\ (\alpha + \beta)}{1 + exp\ (\alpha + \beta)}$$

Equivalently,$\pi(x)$ the log odds, called the logit has the linear relationship

$$\text{log}it[\pi(x)] = \frac{\text{log}\pi(x)}{1 - \pi(x)}$$

This equates the logit link function to the linear predictor.

Noted that the dependent variable is dichotomous, the use of linear probability model is not appropriate because the predicted value of the regression coefficients are estimated through an iterative maximum likelihood method.

### *4. Hypothesized factors influencing the adoption of new technology*

There are several models or paradigms employed in the literature to explain the decision of smallholder farmers to adopt new technologies (Negatu and Parikh 1999, Moumouni et al. 2013). Therefore, this study seeks to estimate the factors affecting the adoption of organic maize production and binary logistic regression model was estimated. Hence, the following variables were considered due to its importance in decision making and adoption concern. Thus, demonstrating the hypothesizing relationship that exists between predictand (Yi) and predictors (Xi) which is the preliminary information that helps to understand the expected outcome.

1) ***Age of the farmer in years:*** The relationship between farmer's age and the decision to adopt any technology is not clear in the literature. Indeed, some authors found that older farmers are more likely to adopt a technology, while others found that young people are open to adopt new technology (Rogers, 2003). In this study expect that the sign of age variable can be either positive or negative. Sodjinou and Henningsen, 2012 argued that producers might be opened to new technologies until a certain age after which they become less open until they reach old age;
2) ***Gender of the producer (Dummy variable):*** with 1 for male and 0 for female. In this study, gender variable was included in the model in order to assess the behavior of male and female farmers regarding the adoption of organic maize in the study area and understand the difference between male and female in the adoption. It is expected that male farmers will have a positive influence on the probability to adopt due to the role they play in decision making (about the management of the household resources, bank loan management) especially in rural areas. Hence, it is expected that male farmers will be more likely to adopt organic farming compare to female counterparts.
3) ***Education status (Dummy variable):*** Educated producers are able to read manuals and others extension materials. They also have easily access to information, particularly through the media and can communicate easily with extension services. Education may enhance farmers' ability to allocate efficiently inputs across competing uses and to gain more knowledge about adverse effects of inorganic maize. We expect education will have a positive effect on the probability to adopt organic maize.
4) ***Producers' experience in maize farming in years:*** Farmers' experience in maize production can allow them to appreciate the advantages and disadvantages associated with this activity. Knowledge gained over time by farmers, from working in an uncertain and uncontrolled production environment may help in adopting any technology. Consequently, some producers who spent several years in inorganic maize production can be familiar with and do not prefer to adopt organic farming. Thus, we expect that the effect of this variable on the adoption of organic maize is negative.
5) ***Farm Size in Ha:*** According to the literature, smallholder farmers are more likely to adopt organic farming because they can easily mobilize the necessary organic inputs (i.e. organic manures) and labour force for their small size operation. Therefore, we predict that farm size will have a positive effect on the likelihood to adopt organic farming.
6) ***Household income in Rwf:*** Household income is expected to affect positively the level of adoption of organic farming. This indicates that the more household income the more likelihood for the house to adopt organic farming. Hence, there is a positive relationship between household income and adoption level of organic farming.
7) ***Cost of seeds in Rwf:*** in agricultural economics, seed is a basic input in the crop production in which without it there is no crop production at all. To acquire seeds, a farmer needs to buy them and the cost incurred in buying them is named cost of seed. In this context, cost of seeds is hypothesized to influence negatively the adoption of a new technology. In another words, if the cost of organic seeds is high then it would be difficult for the farmers to receive seeds which may affect negatively the willing to adopt organic production. In this regard, we can conclude that cost of seeds affect negatively the probability of adoption.
8) ***Cost of labour in Rwf:*** Labour is an important factor in organic farming since all the related activities are manual. In this context, analyzing the cost of labour in the farming system is an important task which enables the researcher to understand whether it affects the adoption level of the farmer. If the cost of labour in organic farming is high compared to that of inorganic farming, farmers tend to disadopt organic farming. In this case, cost of labour is

expected to have a negative influence on the adoption of organic farming. Contrary, if the cost of labour is less in organic farming compared to that of inorganic, farmers adopt organic farming. In this regard, we expect positive and negative relationship between cost of labour and the probability of adoption.

### *5. Model specification*

Response to the adopt of organic farming as a type of farming that ensures sustainable use of natural and animal resources and provides economic, health and environmental benefits to the farmers, consumers and nature was recorded as a binary variables represented by 1 if Yes or 0 if No. The outcome of the binary responses can fall outside the relevant probability with range of 0 and 1. To overcome this problem, logit and probit models have been recommended (Gujarati, 1988). Logit and probit models translate the values of the independent variables (Xi), which may range from -∞ to +∞, into a probability for $Y_i$ which ranges from 0 to 1 and compel the disturbances terms to be homoscedastic. Thus, it is the choice of the researcher to apply any of the two models viz logit or probit as they provide same results only the difference exists in odds ratio displayed in logit model. However this study applies the logit model type named binary logistic regression model.

The logit and the probit models assume the existence of a latent variable y* for which a dichotomous realization is observed (Gujarat, 1988) thus model considering the latent variable as the dependent variable is formulated as shown in (1):

$$y^* = \beta_0 + \sum_{i=1}^{j} \beta j Xij + \varepsilon_i \quad (1)$$

Where y* is not observed and commonly called a latent variable and includes desire or ability to use a technology. The observed variable is a dummy variable $Y_i$ defined by:

$$Y_i = \begin{cases} 1, Y^* > 0 \\ 0, otherwise \end{cases}$$

As mentioned logit model was used to determine factors affecting the adoption of organic farming as a livelihood strategy and the empirical general form of the logit model is shown in (2):

$$Y_i = \beta_0 + \beta_i X_i + \varepsilon_i \quad (2)$$

Where $X_i$ are the factors that affect the probability that a farmer adopts organic farming and include: farm size, socio-economic characteristics of the households (viz age, gender, education and experience), farm size, cost of labour, cost of seed.

The following model was applied to assess the factors affecting the adoption of organic farming in the study area.

$$\boldsymbol{Y_i = \alpha + \beta_1 Ag + \beta_2 Gen + \beta_3 Ed + \beta_4 Exp + \beta_5 FS + \beta_6 HI + \beta_7 CS + \beta_8 CL + e_i} \quad \textbf{(3)}$$

Where:
$Y_i$ is the observed response of the $i^{th}$ farmers' adopting organic farming
Ag: Age of the farmer
Gen: Gender of the farmer
Ed: Educational level of the farmer
Exp: Experience in farming
FS: Farm size
HI: Household income
CS: Cost of seed
CL: Cost of labour
α is the intercept and $\beta_i$ are the parameters to be estimated, $e_i$ comprises the unobserved errors.
The parameters in the model are estimated by the maximum likelihood method.

## RESULTS AND DISCUSSION

### *a. Descriptive statistics*

Results of the descriptive statistics were presented in tabular form (see Table-1) which showed age, experience, farm size, household income, cost of seed and cost of labour. The objective of this study is to identify the factors influencing the adoption of organic farming by small scale maize farmers. In order to realize this objective various socio-economic characteristics of small-scale farmers were presented and described as seen in Table-1:

**Table-1**
**Descriptive statistics for the continuous variables**

| Variables | Organic farmers | | | | Inorganic farmers | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std.dev. | Min | Max | Mean | Std.dev. | Min | Max |
| Age | 37.58 | 12.78 | 20 | 66 | 40.65 | 13.53 | 18 | 78 |
| Experience | 1.9 | 0.67 | 1 | 3 | 2.1 | 0.71 | 1 | 3 |
| Farm size | 0.64 | 0.38 | 0.01 | 1.54 | 0.56 | 0.32 | 0.05 | 1.5 |
| Cost of seed | 5281.5 | 5605.74 | 750 | 24000 | 3262.5 | 3713.9 | 600 | 18500 |
| Cost of labour | 6840 | 12360.23 | 4300 | 88200 | 4906.7 | 3691.67 | 5600 | 21000 |
| Household income | 285100 | 194110 | 20000 | 950000 | 359330 | 237700 | 50000 | 900000 |

**Source: Survey, 2016**

The characteristics of the sampled respondents are shown in the Table-1. The mean age of the farmers who were practicing organic farming was 37.58 years while that of inorganic farming was 40.65. Average year of experience in organic maize production was 1.9 years and 2.1 years in inorganic maize production. Mean farm size was 0.64 ha in organic maize and 1.54 in inorganic maize. Mean cost of seed was high in organic compared to that of inorganic as shown in the above table. Mean cost of labor was high in organic maize compare to that of inorganic maize. Contrary, to the mean of household income which was found to be high in inorganic maize than in organic maize.

**Table-2**
**Gender wise distribution of the respondents**

| Gender | Organic farmers | Inorganic farmers |
|---|---|---|
| Male | 25<br>(41.6) | 24<br>(40) |
| Female | 35<br>(58.4) | 36<br>(60) |
| **Total** | 60<br>(100) | 60<br>(100) |

**Source: Survey, 2016**
**Note:** Figures in brackets indicate percentages

The above table shows gender wise distribution of the respondents. It is observed that gender distribution between male and female was not similar distributed. The majority (58.4%) of female farmers was identified in organic maize production same to inorganic maize in which the majority observed was female and accounts 60%. This trend is explained by the fact that in the study area the majority of women was found to be engaged in crop production compared to male another reason that confirms this statement is that during the time of data collection, majority of women were found available in their farms and even at their homes and therefore interviewed. Most of men were engaging in other non/off farm income generating activities including running small shops in the area, working as hired labour for other farms, bicyclist riders (as occupation) and many others.

**Table-3**
**Educational level of the farmers**

| Level | Organic farmers | Inorganic farmers |
|---|---|---|
| **Literate** | 33<br>(43.4) | 43<br>(56.6)) |
| **Illiterate** | 27<br>(61.4) | 17<br>(38.6) |
| **Total** | 60<br>(50) | 60<br>(50) |

**Source: Survey 2016**
**Note:** Figures in brackets indicate percentages

Table-3 lists out the distribution of organic and inorganic farmers based on the category (literate or illiterate) of education they belong. It can be seen that the level of literacy for inorganic farmers is high compare to that of organic which is 56.6% and 43.4 % respectively. Contrary to the level of illiteracy in which high illiteracy rate is found among organic farmers accounting 61.4%. Thus, it is advised to organize training at local level to enable farmers to be able to read and write as it is beneficial to the farmers for active participation in the extension services extended to them. Consequently, increase the level of literacy through vocational training, farmers' school and NGO, s and encourage organic farmers as well as inorganic to attend different extension services organized by the different agencies in question. For instance, before delivering the planned services there should be preliminary sessions on the alphabetic and numbers teaching for those who don't know to read and write.

### *b. Inferential statistics*

This study seeks to investigate the factors affecting the adoption of organic maize farming. To this end, binary logistic regression model was estimated by the maximum likelihood method. Log likelihood ratio was 152.43 and the chi-square statistic for the goodness of fit of the model is 13.92 which is significant at 10% level. The Negelkerke R square is 0.146. Hence, the overall model is significant and the independent variables in the model are collectively able to explain the farmers' adoption.

After applying the MLE, the estimated results of the model are shown in the following tables:

Table-4 reveals the distribution of the dependent variable in the sample. Dependent variable is coded 1 if a farmer adopts and 0 if not. Dependent variable is defined in two categories viz adopters of organic farming and non adopters. Thus, the sample size of adopters and non adopters was equal.

**Table-4**
**Categorization of the dependent variable**

| Organic farming | y codes | Percent frequency |
|---|---|---|
| **Yes** | 1 | 50 |
| **No** | 0 | 50 |

**Source:** Computed

Table-5 shows the predicted values of the dependent variable based on the full logistic regression model and reveals the observed values versus their predicted probabilities as the measure of goodness of fit. It is seen from the table that there are four cases in which two are true predictions and other 2 are wrong predictions. Results shows that 33% of organic farmers was observed as adopters and predicted to be adopters this is a true case. 42% of inorganic farmers (non adopters) was observed as non adopters and predicted to be non adopters which is also a true case. 18% was observed as inorganic farmers and predicted to be organic which is defined as the wrong case and 27% was observed as organic farmers and predicted to be inorganic farmers which implies the wrong case.

The reason of this table is to define the overall percent correctly predicted which is the proportion of the true predictions to total observations (i.e. $\frac{33\times100}{60} = 55$ and $\frac{42\times100}{60} = 70$). The overall percentage which gives the overall percent of cases that are correctly predicted by the model is 62.5. It could be seen that, this percentage has increased from 50.0 for the null model to 62.5 for the full model.

**Table-5**
**Predicted probabilities**

| | Predicted | | |
|---|---|---|---|
| Observed/Actual | Organic farmers | Inorganic farmers | Percentage Correctly predicted |
| **Organic farmers** | 33 | 27 | 55 |
| **Inorganic farmers** | 18 | 42 | 70 |
| **Overall Percentage** | | | 62.5 |

Table-6 shows the estimated coefficients of the binary logistic regression model, their standard errors, the Wald statistics, their respective p-values and the exponentiated coefficient (also known as odds ratio). Coefficients of the logit model are the expected amount of change in the logit for each one unit change in the predictor. Results of the maximum likelihood indicated that the coefficients for education, household income and cost of seed are more likely to influence the adoption of organic farming. Only the cost of labour was found to be less likely to affect the adoption of organic farming.

Table-6 also presents the results of the binary logistic regression model which serve to achieve the main objective of the study. It is observed that education, household income, cost of seed and cost of labour were the factors determining the adoption of organic maize in the study area.

***Education:*** was considered as dummy variable (literate and illiterate) and for a dummy variable, the marginal effect is expressed in comparison to the base category (x=0). In this context education variable is interpreted based on the base category (illiterate) and the sign of the coefficient. Hence, literate farmers are 84 percent more likely to adopt organic maize farming (in comparison with illiterate). This finding is in line with the finding of Okon and Idiong, 2016 who reported that education status of the household head increases the probability of adopting organic farming by 4.5 percent.

***Household income:*** the estimated coefficient of household income was significant at 5 percent level indicating that for each additional amount in household income, farmers are 78 percent more likely to adopt organic farming or simply a 1 unit increase in household income is associated with being 78% more likely to be in the category of adopters. The implication of this finding is that households with high income were more likely to adopt organic farming. This findings is in consistency with that of Okon and Idiong, 2016 who reported that household income was positive and statistically significant therefore considered it to be the determinant of organic vegetables in south region of Nigeria and Prasanth, 2016 who found that the household income was more likely to influence the adoption of organic farming by the farmers of Andaman and Nicobar Islands.

***Cost of seed:*** cost of seed was positively associated with probability of adoption of organic. the estimated coefficient of cost of seed was significant at 10 percent level implying that for each additional amount in cost of seed, farmers are 25,4% more likely to adopt organic farming. The result of this study is in line with that of Singh and Grover, 2011 who concluded that cost of seed explained the probability of adoption of organic wheat cultivation in Punjab at 10 percent level of significance.

***Cost of labour:*** the coefficient of cost of labour was significant at 10 percent level implying that for each additional amount in cost of labour, farmers are 0,3% less likely to adopt organic farming. who revealed that the cost of labour was insignificant in the production of improved cassava in Ekiti state of Nigeria.

**Table-6**
**Marginal effects of the binary logistic regression**

| Explanatory variables | Coeff. | S.E. | Wald | p-value | Exp(B) |
|---|---|---|---|---|---|
| Age | 0.008 | 0.021 | 0.158 | 0.69 | 1.008 |
| Gender (1) | -0.044 | 0.403 | 0.01 | 0.921 | 1.044 |
| Education (1) | 0.84 | 0.436 | 3.705 | 0.054* | 2.317 |
| Experience | -0.077 | 0.386 | 0.040 | 0.842 | 0.926 |
| Farm Size | -0.406 | 0.692 | 0.344 | 0.557 | 0.666 |
| Household income | 0.753 | 0.234 | 5.184 | 0.023** | 1 |
| Cost of Seed | 0.254 | 0.156 | 3.246 | 0.072* | 1 |
| Cost of labour | -.003 | .309 | 0.204 | 0.052* | 1 |
| Constant | -0.789 | 0.786 | 1.009 | 0.315 | 0.454 |
| Nagarkelke $R^2$ | 0.16 | - | - | - | - |
| -2 Log likelihood | 152.433 | - | - | - | - |
| Correct Predictions | 62.5% | - | - | - | - |
| Observations | 120 | - | - | - | - |

**Source: Computed**
* indicates the significance level of 10 percent
** indicates the significance level of 5 percent

## CONCLUSION AND RECOMMENDATIONS

Organic farming is a type of farming which involves cultivation of crops in natural ways. It is steadily gaining momentum all over the world due to its economic, environmental and health benefits that it provides to the farmers, to the nature and to the consumers.

The study was undertaken to assess the factors affecting the adoption of organic maize farming in Musaza sector. Findings of the binary logistic model revealed that education, household income, cost of seed and cost of labour were statistically significant and associated with the probability of adoption of organic farming in the study area. It is hoped that these factors will guide policy makers, MINAGRI, agricultural research institutions and farmers to initiate policies that will develop organic farming as this could help in the achievement of sustainable development goals. Based on the findings of the study, we recommend that the farmers should be encouraged to adopt organic farming since this farming system is adopted by few farmers who are partial practitioners. Therefore understanding the perceptions of farmers towards organic farming, providing subsidies in the conversion phase for farmers who are willing to adopt and presenting market opportunities for organically produced crops are the essential conditions to develop organic farming in Musaza sector in particular and in Rwanda in general.

## REFERENCES


1. Ahmed Abu Shaban, (2015). Factors influencing farmers' decision to shift to organic farming: The case of Gaza strip. *British Journal of Economics, Management & Trade*, 5(1), 78-87.
2. Alan Agresti (2007). *An introduction to categorical data analysis.* Second edition, Hoboken, New Jersey, USA, 99-109.
3. Cox and E.J.Snell. (1989). *Analysis of binary data.* Second edition. Champan & Hall.
4. Damodar N.Gujarati. (1988). *Basic econometrics* (2nd edition), Blacklick publisher, Ohio, USA.
5. Edwards S. (2005). *Organic agriculture for food security in Africa.* international federation of organic agriculture movement.
6. Karen Klonsky (2005). Widespread adoption of organic agriculture in the US: Are market-driven policies enough? Department of Agricultural and Resources Economics, University of California-Davis, Pp 1-25. Presented at the American agricultural economics association annual meeting.
7. Kuepper G (1998), "Manuring": National sustainable agriculture information services, Punjab Agriculture University, Punjab, India.
8. Inder Pal Singh and Grover D.K. (2011). Economic viability of organic farming: An empirical experience of wheat cultivation in Punjab. *Agricultural economics research review*, Vol.24, 275-281.
9. Mouminou et al. (2013). What happens between techno-institutional support and adoption of organic farming? A case study from Benin. Organic agriculture. *Springer*, 3(1), 1-8. DOI.10.1007/s13165-013-0039-x.
10. Nagelkerke, N.J.D. (1991). *A note on a general definition of the coefficient of the coefficient of determination*, Biometrika, 691-692.
11. Negatu W. and Parikh A. (1999). The impact of perception and other factors on the adoption of agricultural technology in the Moret and Jiru Woreda district of Ethiopia. *Elsevier*, Vol.21, 205-216.
12. Okon U.E.and Idiong C. (2016). Factors influencing adoption of organic vegetables farming among farm households in south-region of Nigeria. *American-Eurasian Journal of Agriculture and Environment Sciences*, 16(5), 852-859.
13. Parrot N. and Marsden T. (2002). The real green Revolution: Organic and agro-ecological farming in the south. London, Greenpeace.
14. Parrot N. and van Elzakker B. (2003): *organic and like-Minded movements in Africa; Development and status*. Bonn: IFOAM.
15. Prasanth S. 2016. A study on adoption of organic farming by the farmers of Andaman and Nicobar islands. A thesis, Agriculture University, department of Agricultural extension, Hyderabad.
16. Rogers, 2003. *Diffusion innovations*, 5th edition. New York: Free Press.
17. Sodjinou E. and Henningsen (2012). Community-based management and interrelations between different technology adoption decisions: innovations in villages poultry farming in western africa. Working paper, institute of food and resource economics, Copenhagen. Retrieved from http://okonomi.foi.dk/workingpapers/WPpdf/WP2012/WP_2012_11_village_poultry_farming.pdf


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