〈論文〉

# Search for key factors bringing and reflecting development of rural Mozambique : Preparation of data collecting system in Sanga and Lago districts through collaboration with Lurio University

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**Summery**

The paper shows result of initial research as preparation for collaborate research between Ehime University and Lurio University. The research clearly shows variety of rural households' strategies and notions of several possible determinants for further systematic research.

## Introduction

Mozambique has attracted world's eyes for recent performance on economic development and long peace. The average of GDP growth rate between 2011-2015 reaches 7%. The resource booms by discovery of world-class deposits on coal and natural gas have been the major engines for the good economic performance. In addition, these discoveries and rush of foreign investment on these and around the areas bring expectation of continuous growth or even a bigger push to Mozambique economy to the future. On the other hand, unlike other African countries with experience of civil war, Mozambique can sustain the peace, although small sporadic conflicts have been observed especially in middle and north area, from 1992 peace pact.

In spite of good performances above, Mozambique cannot yet escape from severe underdevelopment conditions. The ranking of Human Development Index (HDI) is still 181st among 188 countries in 2016 (UNDP 2017). It means that main factors of HDI, composed with health, education, and income, have not been improved well. In fact, agricultural sector in rural area and manufacture sector, both are essential to rural development for main life source and for accepting excessed rural labor, could get a small share of expansion of foreign direct investment (FDI) and exports whose dominant portion has been occupied by extractive sectors. The export of vegetable and processed food in 1995 occupied 18% of total export and 18% in 2015. On the other hand, fuels, metals and minerals occupied 7% in 1995 and 69% in 2015[1]. Moreover the extractive industry introduces many negative factors to both agriculture and manufacture

1) My previous study Kurita (2017) shows the negative influence to sectors of agriculture and manufacture by expansion of extractive industry in Mozambique.

sectors that are often recognized as essentials to inclusive development[2].

As mentioned above, Mozambique already rode on a rout along with expansion of extractive sector. It inevitably introduces symptoms of Dutch Disease with push up of currency, which ease import and disturb export. Therefore development of both agriculture and manufacture sectors in productivities have to catch up with the expansion of extractive sector's export. It means that huge benefit from extractive industry should intentionally be re-invested or be utilized to increase productivities of both sectors for inclusive development.

In this point of view, development of Mozambique especially in rural area should be observed and be analyzed carefully with direct and indirect influence from extractive sector. However, broad social data for grasping such social signs have not yet been equipped in Mozambique. In addition, rural Mozambique including government local institutions does not have enough experience, systems, and basic data to implement systematic social research effectively. Our area, Niassa province, is not an exemption although Niassa is one of the most proper areas to our investigation for recent discovery of coal deposit (JOGMEC 2013).

The research in this paper is the first action for designing social data collecting system in Niassa through collaboration between Ehime University[3] and Lurio University (Universidade Lúrio)[4]. Since this research is the first challenge with so limited period of preparation, many unpredicted failures can be found in our data. The data might not be proper enough for showing clear analysis to grasp the rural situation on targeted area. Although such constrains of our data, we decided to publish it for our following idea. An insufficient data is better than nothing for starting discussions on rural figures and on methodologies of coping with insufficient condition of social research.

## 1. Research

### 1-1. Background of Research

Ehime University and Lurio University have been partner universities since 2009 by strong initiatives of former president of Mozambique. In 2014 both universities agreed to open satellite office of Ehime University in Lurio University to create exchange program for mutual learning of every member in both universities. Since two universities have the same mission on supporting local communities and since Mozambique is very new to Ehime University and Japan is also very new to Lurio University, understanding local communities to each other is addressed as one of the first priorities. Moreover due to data shortage on rural Mozambique, we decide to have collaboration program to know local communities around Lurio University for creating several exchange program for students' learning and academic research collaborations. This research is the initial step to design continuous and systematic field research for future collaboration as mentioned above.

2) About comprehensive negative impacts of extractive industry to development, see Kurita (2015).
3) About Ehime University, see this web-site. https://www.ehime-u.ac.jp
4) About Lurio University, see http://www.unilurio.ac.mz/unilurio/index.php/pt/

### 1-2. Design of Research

The research is designed to find and expand possible analysis on chances and constrains of rural development including direct and indirect influences of mining industry in Niassa province of Mozambique. Possible analysis, as we mentioned above, is strongly affected by limitation of our knowledge and experience with few data stocks in each households and in government agencies. Under such purposes and limitations, the research is addressed rather to find entrances of further analysis, or to find some collectable factors leading grasp of development figures for next broad and systematic research than to grasp some clear figures through this research. In addition to above purposes, the further research from our next step will include comparative study with Asian experiences since our research is done under collaboration between Lurio University and Ehime University[5].

The basic factors, entrance of further research, are selected as Table 1. For grasping development, Production (Harvest data both amount and market value) and Productivity should be the primary target. Due to differences on strategies among selected farmers in Dry and Rainy season, agriculture information is also divided into each season. From experience of development study, education, livelihood without cultivating own field, priority on both consumption and market selling, and gender deference on preference of consumption are selected as entrance factors which might contribute the primary target, production and productivities[6].

Target communities are selected around Faculty of Agriculture of Lurio University. Lurio University tries to contribute surrounding communities through fieldwork program called 'Um Estudante Uma Familia (in English 'One Student One Family') (1E1F)'. Our member decided to focus at the first on the communities along with the program 1E1F which targets communities in Sanga district and Lago district in Niassa province shown in Figure 1 and Table 2.

Table 1 Research Factors

| |
|---|
| HH (Household) Basic Information |
| Composition |
| Age |
| Education |
| Other Livelihood without Cultivation |
| Agriculture Information Dry/Rainy Season |
| Priority of Consumption/Market |
| Variety/Harvest/Land Size |
| Productivity (Harvest/Land Size) |
| Consumption Preference |
| Husband/Wife |

5) Yamamoto et al ed. (2011) is one of the best academic works bridging development experience of Asia and Africa. The article selected three factors, market access, technological innovations, and soil fertility, as key factors for development enhanced by adopting Green Revolution in Asian experience and try to clarify whether they also work East Africa or not. It concludes introduction of Green Revolution can be functionable with proper policy incentive. Mozambique shares many common characteristics with selected East African countries in the article. Therefore it might be so useful to bring their notions into our view even though some of notions there might not adopt to Mozambique.

6) Our research refers rural experience in Asian countries. One of the most fascinated articles for us is Hayami (1999) which describes rural community changes for 25 years with broad and detailed research data in the Philippines.

Figure 1　Map of research communities

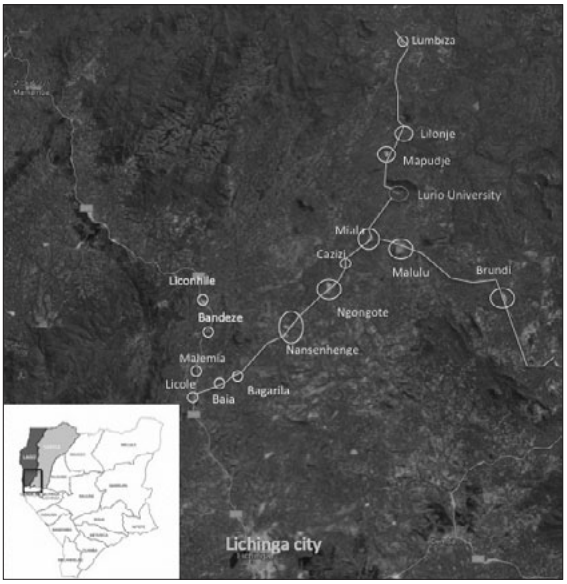


Table 2　Targeted Communities

| District | Community | Samples |
|---|---|---|
| Sanga | Lumbiza | 3 |
| | Mapudje | 12 |
| | Miala | 3 |
| | Malulu | 21 |
| | Cazizi | 19 |
| | Ngongote | 6 |
| | Nansenhenge | 24 |
| | Licole | 18 |
| | Malemia | 11 |
| Lago | Bandeze | 15 |
| | Liconhile | 3 |
| Total | | 135 |

### 1-3. Research area

The province of Niassa has an area of 12, 905, 600 km$^2$, 15% of total land area of Mozambique with 1, 213, 398 population, 0. 05% of total population of Mozambique in Census of 2007 (Provincia de Niassa 2007). Niassa is composed of 15 districts and 3 municipalities. Cultivated land is 409, 473 which occupies 3. 2% of total Niassa area.

Sanga district is located at the north of Niassa province with 12, 545 km$^2$, 65 km away from Lichinga, Niassa's capital city. Population in 2012 is about 67, 000, which occupies 5. 5% of Niassa (Ministério da Administração Estatal, 2012b).

Lago district is at the north west of Niassa province facing at Niassa Lake, internationally recognized as Malawi Lake, with 6, 580 km$^2$, and has 101, 000 population, 8. 3% of Niassa population, in 2012 (Ministério da Administração Estatal, 2012a).

Agriculture is the most dominant activities and almost all households depend on agriculture by manual ways with local varieties in both districts. The biggest deference, which might be introduced in near future, is projects of coal mining development. Discovery of feasible coal deposits in Lago districts will inevitably bring new and big influence, opportunities and risks, especially into Lago districts. It will bring a good case for analyzing micro influence of coal industry on rural development.

## 2. Rough Sketch

### 2-1. Composition of Household

Table 3 shows composition of household and education year. Average of the number of household member is 4. 78 members. Average of household leader's age is 45. 44. Plural marriages even three wives can be observed.

**Table 3　Household (HH) Composition and Education**

| Q No. | Com Name | No of HH Member | Education Year (EY) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Age of HH Leader | EY of Leader | No of 15–39 | Ave of Edu Year | Com Ave of EY | No of 15–29 | Ave of EY | Com Ave of EY | No of 40– | Ave of EY | Com Ave of EY |
| 119 | Lumbiza | 5 | na | 0 | 3 | 5 | 5.3 | 1 | 5 | 2.1 | 0 | 0 | 0 |
| 120 | | 5 | na | 7 | 3 | 6 | | 3 | 6 | | 0 | 0 | |
| 121 | | 5 | 45 | 0 | 3 | 5 | | 2 | 5 | | 1 | 0 | |
| 79 | Mapudje | 5 | 78 | 7 | 0 | 0 | 7.9 | 0 | 0 | 8.1 | 2 | 4 | 4.8 |
| 80 | | 4 | 30 | 7 | 2 | 5 | | 1 | 3 | | 0 | 0 | |
| 81 | | 5 | 49 | 3 | 0 | 0 | | 0 | 0 | | 2 | 2 | |
| 128 | | 2 | 30 | 8 | 1 | 4 | | 1 | 4 | | 0 | 0 | |
| 129 | | 4 | na | 3 | 2 | 3 | | 2 | 3 | | 1 | 3 | |
| 130 | | 3 | na | 0 | 1 | 3 | | 1 | 3 | | 1 | 0 | |
| 131 | | 6 | 45 | 7 | 2 | 9 | | 2 | 9 | | 2 | 5 | |
| 132 | | 7 | na | 7 | 4 | 9 | | 4 | 9 | | 1 | 7 | |
| 133 | | 7 | 50 | 10 | 4 | 10 | | 4 | 10 | | 2 | 10 | |
| 134 | | 5 | 47 | 3 | 1 | 7 | | 1 | 7 | | 1 | 3 | |
| 135 | | 6 | 45 | 7 | 2 | 9 | | 2 | 9 | | 2 | 5 | |
| 136 | | 6 | na | 5 | 3 | 10 | | 3 | 10 | | 2 | 6 | |
| 1 | Miala | 7 | 37 | 5 | 3 | 6 | 5.4 | 0 | 0 | 5.0 | 0 | 0 | |
| 2 | | 4 | 26 | 12 | 3 | 5 | | 3 | 5 | | 0 | 0 | |
| 3 | | 5 | 41 | 7 | 2 | 5 | | 0 | 0 | | 0 | 0 | |
| 8 | Malulu | 10 | 75 | 3 | 3 | 6 | 9.5 | 3 | 6 | 7.0 | 3 | 2 | 3.6 |
| 9 | | 4 | 48 | 4 | 1 | 3 | | 0 | 0 | | 1 | 4 | |
| 10 | | 9 | 41 | 4 | 5 | 3.8 | | 4 | 4 | | 1 | 4 | |
| 11 | | 3 | 35 | na | 3 | na | | 2 | 8 | | 0 | 0 | |
| 12 | | 3 | 55 | na | 2 | na | | 2 | na | | 1 | na | |
| 13 | | 2 | 27 | 10 | 2 | 9 | | 2 | 9 | | 0 | 0 | |
| 14 | | 4 | 26 | 0 | 3 | 5 | | 3 | 5 | | 0 | 0 | |
| 15 | | 3 | 65 | 0 | 2 | 8 | | 2 | 8 | | 1 | 0 | |
| 16 | | 10 | 49 | 12 | 6 | 10 | | 6 | 10 | | 2 | 6 | |
| 17 | | 7 | 48 | 12 | 3 | 10 | | 3 | 10 | | 2 | 4 | |
| 18 | | 3 | 26 | 8 | 2 | 8 | | 2 | 8 | | 0 | 0 | |
| 19 | | 10 | 52 | 4 | 7 | na | | 7 | na | | 2 | 4 | |
| 94 | | 1 | 42 | 4 | 1 | 5 | | 1 | 5 | | 0 | 0 | |
| 95 | | 3 | 39 | 2 | 1 | 5 | | 1 | 5 | | 0 | 0 | |
| 96 | | 5 | 40 | 10 | 2 | 10 | | 2 | 10 | | 0 | 0 | |
| 97 | | 7 | 50 | 3 | 3 | 4 | | 2 | 6 | | 1 | 3 | |
| 98 | | 7 | 40 | 4 | 6 | 4.8 | | 5 | 5 | | 1 | 4 | |
| 99 | | 5 | 60 | 4 | 4 | 4 | | 1 | 4 | | 1 | 4 | |
| 100 | | 6 | 42 | 4 | 3 | 5.3 | | 2 | 6 | | 1 | 4 | |
| 101 | | 4 | 50 | 4 | 2 | 12 | | 1 | 12 | | 2 | 4 | |
| 102 | | 6 | 38 | 4 | 3 | 4 | | 2 | 4 | | 0 | 0 | |
| 4 | Cazizi | 5 | 35 | na | 3 | na | 2.6 | 1 | 1 | 3.5 | 0 | 0 | 0.6 |
| 5 | | 5 | 45 | na | 1 | na | | 0 | 0 | | 1 | na | |
| 6 | | 4 | 50 | 3 | 2 | 8 | | 2 | 8 | | 2 | 2 | |
| 7 | | 3 | 40 | 0 | 2 | 3 | | 2 | 3 | | 1 | 0 | |
| 103 | | 3 | na | 0 | 2 | 0 | | 2 | 0 | | 0 | 0 | |
| 104 | | na | na | na | na | na | | 0 | 0 | | 0 | 0 | |
| 105 | | na | na | na | na | na | | 0 | 0 | | 0 | 0 | |
| 106 | | na | na | 4 | 4 | 1 | | 2 | 0 | | 0 | 0 | |
| 107 | | 5 | 45 | 0 | 1 | 0 | | 0 | 0 | | 1 | 0 | |
| 108 | | 3 | na | 0 | 2 | 4 | | 1 | 8 | | 0 | 0 | |
| 110 | | 4 | na | 0 | 3 | 0 | | 2 | 0 | | 0 | 0 | |
| 111 | | na | na | na | na | na | | 0 | 0 | | 0 | 0 | |
| 112 | | na | na | na | na | na | | 0 | 0 | | 0 | 0 | |
| 113 | | 3 | na | na | 3 | 2.7 | | 2 | 4 | | 0 | 0 | |
| 114 | | 4 | na | na | 4 | 2.5 | | 2 | 5 | | 0 | 0 | |
| 115 | | 5 | 45 | 0 | 1 | 0 | | 0 | 0 | | 1 | 0 | |
| 116 | | 5 | 60 | 4 | 0 | 0 | | 0 | 0 | | 2 | 4 | |
| 117 | | 4 | 26 | 8 | 2 | 6 | | 2 | 6 | | 0 | 0 | |
| 118 | | 3 | 26 | 4 | 2 | 4 | | 2 | 4 | | 0 | 0 | |
| 73 | Ngongote | 5 | 52 | 4 | 3 | 8 | 8.7 | 3 | 8 | 8.7 | 2 | 2 | 2.3 |
| 74 | | 4 | 54 | 2 | 1 | 5 | | 1 | 5 | | 2 | 1 | |
| 75 | | 5 | 68 | 0 | 3 | 9 | | 3 | 9 | | 2 | 0 | |
| 76 | | 5 | 68 | 0 | 3 | 10 | | 3 | 10 | | 2 | 0 | |
| 77 | | 4 | 50 | 10 | 1 | 12 | | 1 | 12 | | 2 | 9 | |
| 78 | | 5 | 52 | 4 | 3 | 8 | | 3 | 8 | | 2 | 2 | |
| 20 | Nansenhenge (Continue) | 5 | 66 | 3 | 3 | 7.3 | 7.3 | 2 | 8 | 7.7 | 1 | 4 | 1.5 |
| 21 | | 6 | 40 | 10 | 2 | 7 | | 1 | 7 | | 1 | 10 | |
| 22 | | 4 | 24 | 7 | 2 | 7 | | 2 | 7 | | 0 | 0 | |
| 23 | | 4 | 80 | 0 | 2 | 5 | | 2 | 5 | | 2 | 0 | |
| 24 | | 2 | 40 | 7 | 1 | 7 | | 1 | 7 | | 1 | 7 | |
| 25 | | 2 | 42 | 5 | na | na | | 0 | 0 | | 0 | 0 | |

| Q No. | Com Name | No of HH Member | Education Year (EY) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Age of HH Leader | EY of Leader | No of 15–39 | Ave of Edu Year | Com Ave of EY | No of 15–29 | Ave of EY | Com Ave of EY | No of 40– | Ave of EY | Com Ave of EY |
| 26 | Nansenhenge (Continue) | na | na | 0 | na | na | 7.3 | 0 | 0 | 7.7 | 0 | 0 | 1.5 |
| 27 | | 5 | 53 | 0 | 0 | 0 | | 0 | 0 | | 1 | 0 | |
| 28 | | 7 | 30 | na | 2 | 0 | | 1 | na | | 2 | na | |
| 29 | | 4 | 35 | 6 | 2 | 5 | | 0 | 0 | | 0 | 0 | |
| 30 | | 7 | 44 | 8 | 4 | 8.5 | | 2 | 9 | | 1 | 8 | |
| 31 | | 5 | 54 | 4 | 3 | 7.3 | | 2 | 8 | | 1 | 4 | |
| 32 | | 5 | 62 | na | 2 | 0 | | 2 | na | | 3 | na | |
| 33 | | 3 | 42 | na | 1 | na | | 0 | 0 | | 1 | na | |
| 34 | | 3 | 42 | na | 1 | na | | 1 | na | | 1 | na | |
| 67 | | 6 | 84 | 0 | 2 | 9 | | 2 | 9 | | 2 | 3 | |
| 68 | | 2 | 25 | 12 | 2 | 9 | | 2 | 9 | | 0 | 0 | |
| 69 | | 3 | 26 | 12 | 2 | 11 | | 2 | 11 | | 0 | 0 | |
| 70 | | 3 | 37 | 7 | 2 | 6.5 | | 1 | 6 | | 0 | 0 | |
| 71 | | 2 | 24 | 10 | 2 | 8 | | 2 | 8 | | 0 | 0 | |
| 72 | | 4 | 21 | 7 | 2 | 5 | | 2 | 5 | | 0 | 0 | |
| 125 | | 6 | 40 | 4 | 2 | 5 | | 1 | 6 | | 1 | 4 | |
| 126 | | 4 | 47 | 0 | 0 | 0 | | 0 | 0 | | 2 | 0 | |
| 127 | | 5 | 76 | 7 | 0 | 0 | | 0 | 0 | | 2 | 4 | |
| 35 | Licole | 2 | 25 | 10 | 2 | 8 | 6.7 | 2 | 8 | 6.8 | 0 | 0 | 2.4 |
| 36 | | 5 | 25 | 0 | 2 | 0 | | 2 | 0 | | 0 | 0 | |
| 37 | | 6 | 25 | 12 | 2 | 6 | | 2 | 6 | | 2 | 3 | |
| 38 | | 7 | 60 | 5 | 2 | 5 | | 2 | 5 | | 2 | 3 | |
| 39 | | 6 | 50 | 0 | 3 | 6 | | 2 | 9 | | 1 | 0 | |
| 40 | | 4 | 28 | 9 | 2 | 8 | | 2 | 8 | | 0 | 0 | |
| 41 | | 2 | 50 | 0 | 1 | na | | 0 | 0 | | 1 | 0 | |
| 42 | | na | na | 1 | na | na | | 0 | 0 | | 0 | na | |
| 43 | | na | na | 0 | na | na | | 0 | 0 | | 0 | na | |
| 44 | | 3 | 53 | 4 | 2 | 7 | | 2 | 7 | | 1 | 4 | |
| 45 | | 5 | 45 | na | 3 | na | | 1 | na | | 1 | na | |
| 46 | | 4 | 30 | na | 2 | na | | 1 | na | | 0 | na | |
| 47 | | 6 | 64 | na | 1 | na | | 1 | na | | 2 | na | |
| 48 | | 4 | 28 | na | 2 | na | | 2 | 0 | | 0 | na | |
| 49 | | 5 | 26 | na | 2 | na | | 1 | 0 | | 0 | na | |
| 91 | | 9 | 55 | 0 | 4 | 10 | | 3 | 10 | | 2 | 0 | |
| 92 | | 6 | 54 | 0 | 5 | na | | 2 | na | | 1 | na | |
| 93 | | 2 | 57 | 8 | 1 | 8 | | 0 | 0 | | 1 | 8 | |
| 59 | Malemia | 5 | 57 | 7 | 2 | 10 | 5.7 | 2 | 10 | 5.9 | 2 | 3.5 | 3.2 |
| 60 | | 5 | 48 | 0 | 4 | 0 | | 2 | 0 | | 1 | 0 | |
| 61 | | 4 | 60 | 3 | 3 | 0 | | 3 | 0 | | 1 | 3 | |
| 62 | | 5 | 80 | 0 | 3 | 6 | | 3 | 6 | | 2 | 0 | |
| 63 | | 4 | 45 | 10 | 1 | 10 | | 0 | 0 | | 1 | 10 | |
| 85 | | 3 | 63 | 4 | 1 | 6 | | 1 | 6 | | 2 | 4 | |
| 86 | | 6 | 22 | 10 | 6 | 7 | | 5 | 7 | | 0 | 0 | |
| 87 | | 7 | 53 | 3 | 4 | 6 | | 4 | 6 | | 2 | 3 | |
| 88 | | 4 | 61 | 3 | 1 | 6 | | 1 | 6 | | 1 | 3 | |
| 89 | | 6 | 43 | 4 | 3 | 9 | | 2 | 10 | | 1 | 4 | |
| 90 | | 4 | 25 | 12 | 2 | 9 | | 2 | 9 | | 0 | 0 | |
| 50 | Bandege | 2 | 53 | 2 | 0 | 0 | 4.2 | 0 | 0 | 4.1 | 2 | 2 | 2.3 |
| 51 | | 2 | 25 | 0 | 2 | 0 | | 2 | 0 | | 0 | 0 | |
| 52 | | 3 | 39 | 5 | 3 | 7 | | 1 | 7 | | 0 | 0 | |
| 53 | | 4 | 53 | 0 | 1 | 7 | | 0 | 0 | | 1 | 1 | |
| 54 | | 6 | 49 | 7 | 3 | 8 | | 3 | 8 | | 2 | 7 | |
| 55 | | 4 | 28 | 6 | 2 | 3 | | 2 | 3 | | 0 | 0 | |
| 56 | | 6 | 35 | 6 | 4 | 2.3 | | 3 | 1 | | 0 | 0 | |
| 57 | | 4 | 26 | 0 | 2 | 0 | | 2 | 0 | | 0 | 0 | |
| 58 | | 6 | 55 | 0 | 3 | 4 | | 3 | 4 | | 2 | 2.5 | |
| 82 | | 7 | 59 | 4 | 3 | 9 | | 3 | 9 | | 2 | 5 | |
| 83 | | 5 | 60 | 0 | 1 | 4 | | 1 | 4 | | 2 | 0 | |
| 84 | | 6 | 47 | 0 | 1 | 3 | | 0 | 0 | | 1 | 4 | |
| 122 | | 8 | 73 | 0 | 3 | 4 | | 3 | 4 | | 2 | 0 | |
| 123 | | 6 | na | 0 | 2 | 0 | | 2 | 0 | | 0 | 0 | |
| 124 | | 6 | 77 | 0 | 2 | 4 | | 2 | 4 | | 2 | 0 | |
| 64 | Liconhile | 5 | 35 | 0 | 2 | 0 | 3.3 | 1 | 0 | 2.5 | 0 | 0 | |
| 65 | | 6 | 28 | 5 | 2 | 4 | | 2 | 4 | | 0 | 0 | |
| 66 | | 8 | 31 | 8 | 2 | 5 | | 1 | 2 | | 0 | 0 | |
| Average | | 4.78 | 45.44 | 4.45 | | 2.51 | | | 2.22 | | | 2.99 | |

Note : Colored spaces of the line 'Age of HH Leader' indicate woman leader
Source : Research done in 2016

## 2-2. Education

Education has variable roles for development in rural area especially for accessing to opportunities such as introduction of new method and new varieties to their agriculture, gaining employment opportunities, using public services, and organizing effective organization[7].

Primary school, at least one, is equipped in each research community. Only Malulu, center of Sanga, has a secondary school in research communities. This paper prepare four categories of age range on education year to check relations among education and with development related factors. About average of education year, household leader is 4.45, range of 15-39 years is 2.25, range of 15-29 years is 2.22, and over 40 years is 2.99.

Average in education year in each community shows a big range. Age range 15-39 varies from 2.6 years in Cazizi to 9.5 years in Malulu, 15-29 varies from 2.1 in Lumbiza to 8.7 in Ngongote, and over 40 from 0 in Lumbiza or 0.6 in Cazizi to 4.8 in Mapudje.

### 2-3. Other livelihood without cultivating own farm

Development study shows a critical role of additional income opportunity out of agriculture in rural initial development. In rural development experience in Asia, disappearance of frontier, feasible agricultural land, was the strong incentive for transforming from land expansion oriented into productivity oriented structure to feed increasing population and to compete with other developing sectors in urban industry or importing sectors. However, modernization of agriculture cannot catch up with decrease of per capita farm land so that expansion of income opportunity through non-farming sectors are necessary[8]. Or rural area will remain unproductive, uncompetitive, and underdeveloped.

Primary livelihood of all households is agriculture. In addition, almost half of households have another income opportunities. (Small) Business such as small shop or vendering around, Carpenter, Teacher, Hunting, Fishing, Charcoal making, Conductor of chapa (van transport), Milling, and Employees are observed. In the research communities, logging company, Green Resource, is the only opportunity as private employment.

It is noteworthy that no households taking care of cows and pigs are observed[9]. Such big livestocks are recognized as efficient livelihood not only for consumption and sale but also for soil improvement by their manure and for emergent spending.

Moreover, we cannot see any agricultural labor unlike Asia where agricultural labor has been common and important factor for analysing rural development.

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7) The notions of Schulz's "Transforming Traditional Agriculture" (Schulz, 1964) which emphasized role of education to traditional farmers (and children) through his research results on Japan and German is still applicable to areas where traditional agriculture is dominant. Although some of his theories and concepts have been challenged and modified or denied, still so many academic researches strongly support his primary notion on importance of education. There are still strong disputes in effectiveness of education such as priority of education, degree of effectiveness, effective area, and strategy of introducing education for rural development.

8) Hayami and Ruttan (1985) and Hayami (1999) emphasize importance of education for accessing to nonfarm sector job to overcome this trend of modernization.

9) Same east coast Kenya and Tanzania countries' research recognizes big livelihood especially cows as one of key farmers' asset to escape from traditional agriculture since farmers can use manure of cows for improvement of soil for constructing sustainable agriculture or for next step toward Green Revolution. However, especially in northern part of Mozambique farmers seems having obstacles to own cows. During discussion with some staffs in Nampula office of department of agriculture, they told the experience of sleeping diseases as a big obstacle of farmers to own cows.

### 2-4. Agriculture

All farmers have their own strategies in dry season of April－October and rainy season of November－March by conditions such as land size, soil fertility, market, and accessibility to water and other input materials. Information on agriculture, number of crop varieties, land size, harvest of main crops, total value of main crops in market price, and productivity of maize (milho) in rainy season, is shown in table 5. Since almost all farmers have different strategies in dry season and rainy season, information is also divided into these two seasons. About value of harvest crops, we use the price in March for rainy season and December for dry season of local market in Lichinga published by World Food Programme (2016a)(2016b). Our purpose here is not to grasp real value of harvest but to make comparison among farmers so that using the price of Lichinga, even though the price of Lichinga is higher than local market in Sanga and Lago, is not a problem.

About priority of crops for consumption and sale, we can see a common strategy among farmers especially in rainy season. Since maize and kieney-beans (feijão-manteiga) are the main staple food in Mozambique and local market is isolated from international market, maize and kidney-beans are the most important crops for all farmers as their own consumption especially for chima, main food for most of Mozambicans made by maize flour, and sale to local market especially in rainy season with higher price.

However, strategy of dry season shows large varieties. 46% of data-available farmers cannot harvest any crops in dry season due to lack of water availability. Most of them, especially with small land and lack of another livelihood, seem to be suffered severely by shortage of livelihood.

On the other hand, farmers who cultivate enough available land in dry season enjoy a big benefit with better market price than rainy season. Some farmers focus on maize and kidney-beans[10] same as rainy season, some focus on another crops such as potato (batata), sweet potato (batata doce), rice (arroz), and groundnuts (amendoim).

Many farmers also cultivate vegetables such as cabbage, onion, tomato, and lettuce mostly in dry season but most farmers cannot answer exact amount of harvest and land size for them. In addition, most farmers does not depend so much on such vegetables than above main crops. In such reason, we do not include vegetables into calculation of total value.

Total value in individual base, 397,500 meticas (mzn) of no. 76 in Ngongote is the highest, 8,200 mzn of no. 13 in Malulu is the lowest or 1,800＋small amount of maize of no. 115 in Cazizi, and average harvest value is 111,848 mzn.

For community average, Ngongote of 278,375 is the highest and Liconhile of 40,583 is the lowest harvest value.

For comparing productivity among farmers, we choose maize (milho) harvest and its land size. The highest productivity is 60,000 mzn/ha of no. 75 and 76 in Ngongote, the lowest is 375 mzn/ha of no. 99 in Malulu, and average is 15,6565 mzn/ha. The highest community on productivity is Ngongote of 29,000 mzn/ha and the lowest is Malemia's 6,311 mzn/ha.

10) Many farmers plant maize and beans within the same area.

## Table 4　Job without Cultivating Own Land

| Q No. | Com Name | Job |
|---|---|---|
| 119 | | |
| 120 | Lumbiza | Conductor |
| 121 | | |
| 79 | | Regulo |
| 80 | | Fishing |
| 81 | | Budiness, Charcoal |
| 128 | | |
| 129 | | |
| 130 | Mapudje | |
| 131 | | |
| 132 | | Charcoal, Teacher |
| 133 | | Teacher |
| 134 | | |
| 135 | | Charcoal |
| 136 | | Teacher |
| 1 | | Business, Hunting, Teacher |
| 2 | Miala | Business, Hunting |
| 3 | | |
| 8 | | Hunting, Regulo |
| 9 | | Hunting |
| 10 | | Gurdman, Hunting, Tailor |
| 11 | | |
| 12 | | |
| 13 | | Carpenter |
| 14 | | |
| 15 | | Hunting |
| 16 | | |
| 17 | | |
| 18 | Malulu | |
| 19 | | Government employee |
| 94 | | |
| 95 | | Hunting |
| 96 | | |
| 97 | | Sherman |
| 98 | | Charcoal |
| 99 | | Business |
| 100 | | |
| 101 | | |
| 102 | | |
| 4 | | Hunting |
| 5 | | Hunting, Regulo |
| 6 | | Businessman, Hunting |
| 7 | | |
| 103 | | |
| 104 | | |
| 105 | | |
| 106 | | Business, Milling |
| 107 | | |
| 108 | Cazizi | Charcoal |
| 110 | | |
| 111 | | |
| 112 | | |
| 113 | | |
| 114 | | Business, Milling |
| 115 | | |
| 116 | | Business |
| 117 | | Company employee |
| 118 | | |
| 73 | | Business, Charcoal |
| 74 | | Carpenter |
| 75 | Ngongote | Motor driver |
| 76 | | Business, Conductor |
| 77 | | |
| 78 | | |
| 20 | | |
| 21 | | Teacher |
| 22 | Nansenhenge | |
| 23 | (Continue) | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | | Busines,s Hunting |
| 29 | | |
| 30 | | Teacher, Tailor |
| 31 | | |
| 32 | | Business, Teacher |
| 33 | | |
| 34 | (Continue) | Carpenter, Charcoal |
| 67 | Nansenhenge | Tax collector |
| 68 | | |
| 69 | | |
| 70 | | Regulo |
| 71 | | Carpenter |
| 72 | | |
| 125 | | Business |
| 126 | | |
| 127 | | |
| 35 | | Company employee |
| 36 | | Business, Np |
| 37 | | |
| 38 | | |
| 39 | | |
| 40 | | |
| 41 | | |
| 42 | | |
| 43 | Licole | |
| 44 | | |
| 45 | | |
| 46 | | |
| 47 | | |
| 48 | | Business |
| 49 | | |
| 91 | | Teacher |
| 92 | | Teacher |
| 93 | | |
| 59 | | Business |
| 60 | | |
| 61 | | Business |
| 62 | | |
| 63 | | |
| 85 | Malemia | Regulo |
| 86 | | Carpenter |
| 87 | | Fishing |
| 88 | | |
| 89 | | Business |
| 90 | | Mechanic |
| 50 | | |
| 51 | | |
| 52 | | |
| 53 | | |
| 54 | | |
| 55 | | |
| 56 | | |
| 57 | Bandege | |
| 58 | | |
| 82 | | Business |
| 83 | | |
| 84 | | |
| 122 | | |
| 123 | | |
| 124 | | |
| 64 | | Business |
| 65 | Liconhile | |
| 66 | | Charcoal |

## 3. Analysis

### 3-1. Geological Condition

From Table 5, it is obvious that land condition of communities is not distributed equal. On total value of agricultural products, no households that produce more than average of total value and productivity is observed in Lumbiza, Licole, and Liconhile. On the other hand, Ngongote seems to have good agricultural conditions for both total value and productivity. It seems that there is big geological difference, advantage and disadvantage, for agriculture.

### 3-2. Statistical Analysis

To find correction factors to Production and Productivities, critical factors for development, we try backward elimination as an entrance for further research.

The selected factors in our research are 1) Age of House Head, 2) Education Year of House Head, 3) Average of Education Year of over 15 years which means average education year of farmer, 4) Size of Rainy Season's Farming Land, 5) Size of Dry Season's Land, 6) Number of Variety of Agricultural Products, and 7) Number of Household members over 15 years.

Age of House Head might increase both productivity and total production by accumulation of knowledge, land, and better opportunity to gain better land than young generation and new comers. Education is one of general factors to check for Productivity and Production. We prepare two factors on education, 2) Education Year of House Head and 3) Average of Education Year of over 15 years old. Most of farmers in Lago and Sanga district seem to remain traditional agriculture with low productivity but previous analysis shows broad range of productivity difference. From Asian experience, we can expect education of farmers as one of defining factors. Also it is natural to expect larger Size of Land leads larger total production value. If not, there are some special reasons we have to extract. Since Number of Variety of Production might be the result of seeking more benefit or stability, there is possibility to have regression of Number of Varieties to Total Production Value and Productivity.

At the first process, multicolinearity diagnosis among independent variables by examining Variance inflation factor (VIF) is done (ANNEX). Then, backward regression analysis is conducted to select the variables which best fit on the model that explain the changes for both total production value (Table 6) and productivity (Table 7). Akaike information criterion (AIC) is used to select the best and appropriate model. First, we began with the full model (multiple interaction of the all scope of variables) and then we used the backwards directions, eliminating one independent variable at a time. The AIC of the models was also computed and the model that yields the lowest AIC is retained for the next iteration. After selecting the appropriate model, multiple linear regression analysis is done to test the significance of the coefficients (Table 8 and Table 9).

The multiple regressions on Total Production Value (Table 8) show significant positive effect from Productivity of Maize, Education Year of age over 15, and Education Year of Household Leader and negative effect from Number of Household Members over 15 years. On Productivity (of Maize) in Table 9, only Age of Household Leader shows positive effect and Education Year of Household Leader and Land Size of Rainy Season show negative effect.

## Table 5　Information on Agricultural Outcome

| Q No. | Community | No of crop varieties & area | | | | Rainy Season Main Crop & Income value | | | | | | Other Main Crop | | Total Value | | Milho Productivity of Rainy Season | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Dry | | Rainy | | Milho | | | Feojao | | | | | HH | Community | | |
| | | No | Ha | No | Ha | Area Ha | Harvest Sacks | Value Mzn | Area Ha | Harvest Sacks | Value Mzn | Product & Harvest (sacks) | Value Mzn | Mzn | Average Mzn | Mzn/ha | Com Ave Mzn/ha |
| 119 | Lumbiza | 2 | na | 9 | 1 | 1 | | 8,400 | | | 12,000 | | | 20,400 | 55,200 | 8,400 | 11,700 |
| 120 | | 1 | na | 8 | 2 | 2 | na | | 2 | na | na | | | na | | na | |
| 121 | | 0 | 0 | 8 | 2 | 2 | 40 | 30,000 | 2 | 20 | 60,000 | | | 90,000 | | 15,000 | |
| 79 | Mapudje | 6 | 2 | 6 | 2 | 1.5 | 40 | 30,000 | 1 | 30 | 90,000 | WAm10, DAm5, DM30, DF20 | 240,000 | 360,000 | 140,398 | 20,000 | 18,021 |
| 80 | | 5 | 1 | 4 | 2 | 1 | 30 | 22,500 | 1 | 20 | 60,000 | DM20, DF10, DB5 | 118,750 | 201,250 | | 22,500 | |
| 81 | | 5 | 3 | 5 | 3 | 1 | 45 | 33,750 | 0.5 | 15 | 45,000 | WAm5, DAm2, DM40, DF10 | 135,420 | 214,170 | | 33,750 | |
| 128 | | 0 | 0 | 3 | 4.5 | 4 | 100 | 75,000 | 0.5 | 15 | 45,000 | WA15 | 30,000 | 150,000 | | 18,750 | |
| 129 | | 0 | 0 | 2 | 3 | 3 | 30 | 22,500 | 3 | 10 | 30,000 | | | 52,500 | | 7,500 | |
| 130 | | 0 | 0 | 3 | 4.5 | 4 | 80 | 60,000 | 1 | 40 | 120,000 | WA15 | 30,000 | 210,000 | | 15,000 | |
| 131 | | 0 | 0 | 9 | 4.5 | 2 | 45 | 33,750 | 1.5 | 20 | 60,000 | WA3 | 6,000 | 99,750 | | 16,875 | |
| 132 | | 0 | 0 | 6 | 3 | 1.5 | 35 | 26,250 | 1 | 1 | 3,000 | WA2, WAm4 | 360 | 29,610 | | 17,500 | |
| 133 | | 0 | 0 | 6 | 2.5 | 1.5 | 30 | 22,500 | 1 | 16 | 48,000 | WA15 | 30,000 | 100,500 | | 15,000 | |
| 134 | | 0 | 0 | 4 | 2.5 | 2 | 40 | 30,000 | 0.5 | 15 | 45,000 | WA10 | 20,000 | 95,000 | | 15,000 | |
| 135 | | 0 | 0 | 3 | 4 | 2 | 45 | 33,750 | 1.5 | 20 | 60,000 | WA3 | 6,000 | 99,750 | | 16,875 | |
| 136 | | 0 | 0 | 5 | 2.5 | 1.5 | 35 | 26,250 | 1 | 10 | 30,000 | WA2, WAm4 | 16,000 | 72,250 | | 17,500 | |
| 1 | Miala | 4 | 1.4 | 3 | 7 | 4 | 40 | 30,000 | 2.5 | 8 | 24,000 | | | 54,000 | 44,500 | 7,500 | 13,333 |
| 2 | | 0 | 0 | 3 | 2.3 | 1 | 30 | 22,500 | 1 | 4 | 12,000 | | | 34,500 | | 22,500 | |
| 3 | | 3 | 0.6 | 8 | 7.6 | 1.5 | 20 | 15,000 | 1.5 | 10 | 30,000 | | | 45,000 | | 10,000 | |
| 8 | Malulu | 6 | 1.5 | 7 | 4.5 | 1 | 55 | 41,250 | 1 | 30 | 90,000 | | | 131,250 | 76,619 | 41,250 | 14,346 |
| 9 | | 1 | 1.5 | 5 | 2 | 0.8 | 40 | 30,000 | 0.5 | 25 | 75,000 | DM50 | 75,000 | 180,000 | | 37,500 | |
| 10 | | 5 | 2 | 7 | 2.3 | 0.6 | 30 | 22,500 | 0.2 | 5 | 15,000 | | | 37,500 | | 37,500 | |
| 11 | | 0 | 0 | 3 | 1 | 1 | 20 | 15,000 | 1 | 8 | 24,000 | | | 39,000 | | 15,000 | |
| 12 | | 0 | 0 | 6 | 2 | 2 | 15 | 11,250 | 2 | 10 | 30,000 | | | 41,250 | | 5,625 | |
| 13 | | 0 | 0 | 4 | 2 | 1 | 7 | 5,250 | 1 | 1 | 3,000 | | | 8,250 | | 5,250 | |
| 14 | | 0 | 0 | 3 | 3 | 5 | 70 | 52,500 | 5 | 22 | 66,000 | | | 118,500 | | 10,500 | |
| 15 | | 0 | 0 | 2 | 4 | 4 | 23 | 17,250 | 4 | 25 | 75,000 | | | 92,250 | | 4,313 | |
| 16 | | 0 | 0 | 2 | 3 | 8 | 100 | 75,000 | 3 | 20 | 60,000 | | | 135,000 | | 9,375 | |
| 17 | | 0 | 0 | 4 | 2 | 2 | 24 | 18,000 | 2 | 8 | 24,000 | WAm8 | 24,000 | 66,000 | | 9,000 | |
| 18 | | 0 | 0 | 2 | 3 | na | 30 | 22,500 | na | 3 | 9,000 | | | 31,500 | | na | |
| 19 | | 0 | 0 | 5 | 2.5 | 2.5 | 55 | 41,250 | 2.5 | 23 | 69,000 | | | 110,250 | | 16,500 | |
| 94 | | 13 | 2 | 9 | 4.5 | 3.5 | 35 | 26,250 | 3.5 | 15 | 45,000 | WB6, DM10, DF5 | 61,250 | 132,500 | | 7,500 | |
| 95 | | 4 | 0.5 | 4 | 2 | 2 | 15 | 11,250 | 2 | 5 | 15,000 | WB4 | 8,750 | 35,000 | | 5,625 | |
| 96 | | 0 | 0 | 4 | 0.5 | 0.5 | 15 | 11,250 | 0.5 | 5 | 15,000 | WB25, WAm2 | 49,750 | 76,000 | | 22,500 | |
| 97 | | 1 | 3 | 8 | na | na | na | na | na | 9 | 27,000 | | | 27,000 | | na | |
| 98 | | 1 | 1 | 9 | 1.5 | 1.5 | na | na | 1.5 | 8 | 24,000 | DB5 | 8,750 | 24,000 | | na | |
| 99 | | 1 | 0.5 | 6 | 2 | 2 | 1 | 750 | 2 | 30 | 90,000 | WAm3, DB1 | 11,750 | 102,500 | | 375 | |
| 100 | | 0 | 0 | 11 | 5.5 | 4.5 | 100 | 75,000 | 1 | 15 | 45,000 | | | 120,000 | | 16,667 | |
| 101 | | 0 | 0 | 2 | 3 | 3 | 25 | 18,750 | 3 | 20 | 60,000 | | | 78,750 | | 6,250 | |
| 102 | | 0 | 0 | 2 | 1 | 1 | 10 | 7,500 | 1 | 5 | 15,000 | | | 22,500 | | 7,500 | |
| 4 | Cazizi | 0 | 0 | 5 | 3.3 | 2 | na | na | 2 | na | na | | | na | 69,780 | na | 14,484 |
| 5 | | 0 | 0 | 1 | na | 2 | na | na | 1 | 30 | 90,000 | | | 90,000 | | na | |
| 6 | | 2 | 3 | 6 | 6 | 2 | g | na | 2 | I | na | | | na | | na | |
| 7 | | 0 | 0 | 3 | 3 | 1.5 | 37 | 27,750 | 1.5 | s | na | | | na | | 18,500 | |
| 103 | | 0 | 0 | 4 | na | na | 7 | 5,250 | na | 4 | 12,000 | | | 17,250 | | na | |
| 104 | | 0 | 0 | 3 | na | | | 0 | | | 0 | | | na | | na | |
| 105 | | 0 | 0 | 3 | na | na | na | na | na | na | na | | | na | | na | |
| 106 | | 2 | 2 | 6 | 3.5 | 2 | 16 | 12,000 | 2 | 10 | 30,000 | WAm2, DM10, DF5 | 58,500 | 100,500 | | 6,000 | |
| 107 | | 0 | 0 | 6 | 1 | 1 | s | na | 1 | L | na | | | na | | | |
| 108 | | 0 | 0 | 3 | 1.5 | 1.5 | 37 | 27,750 | 1.5 | 7 | 21,000 | WAm3 | 9,000 | 57,750 | | 18,500 | |
| 110 | | 0 | 0 | 4 | na | na | na | na | na | na | na | | | na | | na | |
| 111 | | na | na | na | na | na | na | na | na | na | na | | | na | | na | |
| 112 | | na | na | na | na | na | na | na | na | na | na | | | na | | na | |
| 113 | | 0 | 0 | 3 | 1.5 | 1.5 | 37 | 27,750 | 1.5 | 7 | 21,000 | WAm3 | 9,000 | 57,750 | | 18,500 | |
| 114 | | 0 | 0 | 6 | 3.5 | 2 | 16 | 12,000 | 2 | 10 | 30,000 | WAm2 | 6,000 | 48,000 | | 6,000 | |
| 115 | | 0 | 0 | 6 | na | na | s | na | na | 0.6 | 1,800 | | | 1,800 | | na | |
| 116 | | 0 | 0 | 6 | 2 | 2 | 15 | 11,250 | 2 | 7 | 21,000 | | | 32,250 | | 5,625 | |
| 117 | | 0 | 0 | 6 | 2.5 | 2 | 50 | 37,500 | 2 | 25 | 75,000 | | | 112,500 | | 18,750 | |
| 118 | | 0 | 0 | 3 | 2.5 | 2.5 | 80 | 60,000 | 2.5 | 40 | 120,000 | | | 180,000 | | 24,000 | |
| 73 | Ngongote | 5 | 0.5 | 3 | 10 | 10 | 140 | 105,000 | na | 70 | 210,000 | | | 315,000 | 278,375 | 10,500 | 29,000 |
| 74 | | 4 | 1 | 5 | 5 | 5 | 45 | 33,750 | 5 | 55 | 165,000 | | | 198,750 | | 6,750 | |
| 75 | | 5 | 0.5 | 4 | 1.5 | 1 | 80 | 60,000 | 0.5 | 10 | 30,000 | WA5,WBd10 | 15,000 | 105,000 | | 60,000 | |
| 76 | | 4 | 1.5 | 4 | 1.5 | 1 | 80 | 60,000 | 0.3 | 10 | 30,000 | WA50, DM35, DF19, DA25 | 307,500 | 397,500 | | 60,000 | |
| 77 | | 3 | 2 | 4 | 2 | 2 | 70 | 52,500 | 0.5 | 30 | 90,000 | WAm18, DM35, DF12 | 196,500 | 339,000 | | 26,250 | |
| 78 | | 5 | 0.5 | 2 | 10 | 10 | 140 | 105,000 | 10 | 70 | 210,000 | | | 315,000 | | 10,500 | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | | 0 | 0 | 5 | 3 | na | 35 | 26,250 | na | 7 | 21,000 | | | 47,250 | | na | |
| 21 | | 7 | na | 9 | 3.2 | 2.5 | 30 | 22,500 | 0.5 | 5 | 15,000 | | | 37,500 | | 9,000 | |
| 22 | | 0 | 0 | 6 | na | s | 16 | 12,000 | s | 5 | 15,000 | | | 27,000 | | na | |
| 23 | | 6 | 0.5 | 9 | 3 | 1.5 | 60 | 45,000 | 1.5 | 20 | 60,000 | DM5, DF3 | 30,000 | 135,000 | | 30,000 | |
| 24 | | 9 | 0.5 | 8 | 2 | 2 | 70 | 52,500 | 2 | 25 | 75,000 | DM3, DF1 | 12,000 | 139,500 | | 26,250 | |
| 25 | | 6 | 0.5 | 9 | 1.5 | 1.5 | 33 | 24,750 | 1.5 | 4 | 12,000 | DM2 | 3,000 | 39,750 | | 16,500 | |
| 26 | | 3 | na | 3 | na | 3 | na | na | 3 | na | na | | | na | | na | |
| 27 | | 7 | 0.5 | 4 | 3 | 3 | 50 | 37,500 | 3 | 20 | 60,000 | | | 97,500 | | 12,500 | |
| 28 | | 2 | na | 2 | 0.5 | na | na | na | na | na | na | | | na | | na | |
| 29 | | 2 | 0.5 | 3 | 1.5 | 0.5 | 12 | 9,000 | 0.5 | 7 | 21,000 | | | 30,000 | | 18,000 | |
| 30 | | 4 | 2 | 3 | 2.5 | na | na | na | 2 | 50 | 150,000 | | | 150,000 | | na | |
| 31 | Nansenhenge | 0 | 0 | 5 | 3 | 1 | 50 | 37,500 | 0.5 | na | na | | | na | 105,143 | 37,500 | 16,309 |
| 32 | | 3 | 3 | 4 | 4 | 3 | 72 | 54,000 | 3 | 15 | 45,000 | DM50, DF8 | 135,000 | 234,000 | | 18,000 | |
| 33 | | 2 | 2 | 4 | 2 | 2 | 42 | 31,500 | 2 | 13 | 39,000 | DM30, DF9 | 112,500 | 183,000 | | 15,750 | |
| 34 | | 2 | 1 | 4 | 3 | 3 | 18 | 13,500 | 3 | 60 | 180,000 | DM10, DF5 | 52,500 | 246,000 | | 4,500 | |
| 67 | | 0 | 0 | 2 | 3 | 3 | 80 | 60,000 | 2 | 20 | 60,000 | | | 120,000 | | 20,000 | |
| 68 | | 0 | 0 | 3 | 1.5 | 1.5 | 30 | 22,500 | 1.5 | 15 | 45,000 | | | 67,500 | | 15,000 | |
| 69 | | 0 | 0 | 2 | 5 | 5 | 130 | 97,500 | 5 | 20 | 60,000 | | | 157,500 | | 19,500 | |
| 70 | | 0 | 0 | 7 | 1 | 1 | 15 | 11,250 | 1 | 14 | 42,000 | | | 53,250 | | 11,250 | |
| 71 | | 0 | 0 | 2 | 1 | 1 | 15 | 11,250 | 1 | 7 | 21,000 | | | 32,250 | | 11,250 | |
| 72 | | 0 | 0 | 4 | 1 | 1 | 15 | 11,250 | 1 | 7 | 21,000 | | | 32,250 | | 11,250 | |
| 125 | | 0 | 0 | 5 | 1.5 | 1.5 | 20 | 15,000 | 1.5 | 16 | 48,000 | | | 63,000 | | 10,000 | |
| 126 | | 0 | 0 | 5 | 2 | 2 | 30 | 22,500 | 2 | 10 | 30,000 | | | 52,500 | | 11,250 | |
| 127 | | 5 | na | 4 | 2 | 2 | 33 | 24,750 | 2 | 12 | 36,000 | DF27 | 202,500 | 263,250 | | 12,375 | |
| 35 | | 7 | 2 | 4 | 2 | 2 | na | na | 2 | na | na | | | na | | na | |
| 36 | | 5 | 5 | 4 | 5 | 5 | na | na | 5 | na | na | | | na | | na | |
| 37 | | 5 | 3 | 2 | 3 | 3 | na | na | 3 | na | na | | | na | | na | |
| 38 | | 3 | na | 6 | 2 | na | na | na | na | na | na | | | na | | na | |
| 39 | | 3 | na | 6 | ? | na | na | na | na | na | na | | | na | | na | |
| 40 | | 4 | na | 6 | ? | na | na | na | na | na | na | | | na | | na | |
| 41 | | 3 | 0.6 | 7 | 2 | 2 | 20 | 15,000 | 2 | 10 | 30,000 | | | 45,000 | | 7,500 | |
| 42 | | 3 | 0.5 | 6 | 6 | 4 | 30 | 22,500 | 2 | 20 | 60,000 | WAm1 | 3,000 | 85,500 | | 5,625 | |
| 43 | | 6 | 0.5 | 5 | na | na | na | na | na | na | na | | | na | | na | |
| 44 | Licole | 4 | 1 | 9 | 1 | 1 | 15 | 11,250 | 1 | 11 | 33,000 | | | 44,250 | 47,906 | 11,250 | 8,925 |
| 45 | | 3 | na | 7 | 1 | 1 | 12 | 9,000 | 1 | 13 | 39,000 | | | 48,000 | | 9,000 | |
| 46 | | 0 | 0 | 5 | 1 | 1 | 15 | 11,250 | 1 | 12 | 36,000 | | | 47,250 | | 11,250 | |
| 47 | | 0 | 0 | 5 | na | na | 30 | 22,500 | na | 3 | 9,000 | | | 31,500 | | na | |
| 48 | | 0 | 0 | 4 | na | na | 52 | 39,000 | na | 7 | 21,000 | | | 60,000 | | na | |
| 49 | | 0 | 0 | 7 | na | na | 17 | 12,750 | na | 3 | 9,000 | | | 21,750 | | na | |
| 91 | | 2 | na | 4 | na | na | na | na | na | na | na | | | na | | na | |
| 92 | | na | na | 2 | na | na | na | na | na | na | na | | | na | | na | |
| 93 | | na | na | 3 | na | na | na | na | na | na | na | | | na | | na | |
| 59 | | 2 | 1 | 3 | 10 | 10 | 60 | 45,000 | 10 | 50 | 150,000 | WB4ton | 140,000 | 335,000 | | 4,500 | |
| 60 | | 2 | na | 4 | 16 | na | na | na | na | na | na | WB56 | 98,000 | 98,000 | | na | |
| 61 | | 1 | 0.5 | 2 | 5 | 2 | na | na | 3 | na | na | | | na | | na | |
| 62 | | 0 | 0 | 5 | 9.5 | 3 | 30 | 22,500 | 3 | 15 | 45,000 | WB8 | 14,000 | 81,500 | | 7,500 | |
| 63 | | 3 | 1.5 | 4 | 9 | 6 | 45 | 33,750 | 6 | 30 | 90,000 | WB3, WAm10 | 35,250 | 159,000 | | 5,625 | |
| 85 | Malemia | 0 | 0 | 9 | 10 | 6 | na | na | 2 | na | na | | | na | 152,821 | na | 6,311 |
| 86 | | 0 | 0 | 9 | 2 | 2 | 28 | 21,000 | 2 | 11 | 33,000 | WB105 | 183,750 | 237,750 | | 10,500 | |
| 87 | | 0 | 0 | 11 | 4 | 3 | 60 | 45,000 | 1 | 20 | 60,000 | WB17, WAm1 | 32,750 | 137,750 | | 15,000 | |
| 88 | | 0 | 0 | 3 | 5 | 5 | 7 | 5,250 | 5 | 4 | 12,000 | WB2 | 3,500 | 20,750 | | 1,050 | |
| 89 | | 3 | 1 | 8 | 10 | 10 | na | na | 5 | na | na | | | na | | na | |
| 90 | | 0 | 0 | 4 | 0.5 | 0.5 | na | na | 0.5 | na | na | | | na | | na | |
| 50 | | 6 | s | 6 | 2.5 | 2.5 | 22.5 | 16,875 | 2.5 | 98 | 294,000 | WB25 | 43,750 | 354,625 | | 6,750 | |
| 51 | | 7 | 0.5 | 8 | 2 | 2 | 26 | 19,500 | 2 | 7 | 21,000 | WB25 | 43,750 | 84,250 | | 9,750 | |
| 52 | | 3 | 0.5 | 4 | 1 | 1 | 20 | 15,000 | 1 | 4 | 12,000 | WB3 | 5,250 | 32,250 | | 15,000 | |
| 53 | | 4 | 1 | 4 | 3 | 2 | 45 | 33,750 | 1 | 8 | 24,000 | | | 57,750 | | 16,875 | |
| 54 | | 4 | 1 | 3 | 3 | 2 | 65 | 48,750 | 1 | 8 | 24,000 | WB18 | 31,500 | 104,250 | | 24,375 | |
| 55 | | 2 | 2 | 4 | 6 | 3 | 102.5 | 76,875 | 1 | 45 | 135,000 | DB50, WB50 | 225,000 | 436,875 | | 25,625 | |
| 56 | | 2 | s | 4 | 2.6 | 2 | 10 | 7,500 | 0.3 | 17 | 51,000 | WB5, DB3 | 17,000 | 75,500 | | 3,750 | |
| 57 | Bandege | 1 | 0.2 | 3 | 1.5 | 0.5 | 25 | 18,750 | 0.5 | 10 | 30,000 | WB4, DB7 | 26,250 | 75,000 | 178,792 | 37,500 | 19,240 |
| 58 | | 4 | 1.7 | 4 | 2.7 | 2 | 70 | 52,500 | 0.5 | 5 | 15,000 | WAm5, DB20, DF10 | 145,000 | 212,500 | | 26,250 | |
| 82 | | 6 | 0.25 | 9 | 1.5 | 1.5 | 100 | 75,000 | 1.5 | 20 | 60,000 | WB100,WBd50 | 200,000 | 335,000 | | 50,000 | |
| 83 | | 3 | 5 | 5 | 3 | 3 | 10 | 7,500 | 3 | 30 | 90,000 | WB10 | 17,500 | 115,000 | | 2,500 | |
| 84 | | 3 | 3 | 4 | 3 | 3 | 50 | 37,500 | 1 | 5 | 15,000 | WB120 | 210,000 | 262,500 | | 12,500 | |
| 122 | | 0 | 0 | 7 | 2 | 2 | na | na | 2 | na | na | | | na | | na | |
| 123 | | 6 | 0.5 | 4 | 1 | na | na | na | na | na | na | | | na | | na | |
| 124 | | 5 | 2 | 3 | na | na | na | na | na | na | na | | | na | | na | |
| 64 | | 2 | s | 8 | 1 | 0.5 | 10 | 7,500 | 0.5 | 5 | 15,000 | WB9 | 15,750 | 38,250 | | 15,000 | |
| 65 | Liconhile | 4 | 1.5 | 10 | 1.5 | 1.5 | 10 | 7,500 | 1.5 | 10 | 30,000 | | | 37,500 | 40,583 | 5,000 | 10,000 |
| 66 | | 4 | 0.3 | 6 | 1.5 | 1.5 | 20 | 15,000 | s | 1 | 3,000 | WB10, WAm3,5 | 28,000 | 46,000 | | 10,000 | |
| | | | | | | | | | | | | | | | 111,848 | 15,656 | |

Note 1 : For caluculation of value Mzn, we assume price of crops as followings. Milho in rainy season 15 mzn/kg, in dry season 30 mzn/kg, Feijao (beans) in rainy season 60 mzn/kg, in dry season 150 mzn/kg, Arroz (rice) in rainy season 40 mzn, in dry season 65 mzn/kg, Amendoim (grandnuts) in rainy season 60 mzn/kg, in dry season 60 mzn/kg, Batata Doce (Sweatpotato) in rainy season 10 mzn/kg, dry season 25 mzn/kg, Batata (Potato) in rainy season 35 mzn/kg, in dry season 55 mzn/kg
Note 2 : Some farmers could not give us exact harvest but gave us 'large', 'good', 'small'. The 's''g''l' shows such responses
Note 3 : In line of 'Other Main Crop', W and D means rainy and dry season. A is arros (rice), Am is amendoim (grandnuts), B is batata (Potato), Bd is batata doce (Sweatpotato), F is feijao manteiga (kidney beans), and M is milho (com), 'WA', conbination W and A, means arroz in rainy season.
Note 4 : For calculation, 1 sack = 50 kg = 3 late
Note 5 : Colored space of 'Total Value' and 'Milho Procuctivity…' are Households and Community adove average
Source : Field Research in 2016

**Table 6　Backward Analysis for Total Production Value**

| Variable | Initial Model (AIC=-454.41) | | | Model 2 (AIC=-456.16) | | | Model 3 (AIC=-457.91) | | | Final Model (AIC=-459.33) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | sum of square | RSS | AIC | sum of square | RSS | AIC | sum of square | RSS | AIC | sum of square | RSS | AIC | Coefficients |
| LSD | 0 | 0.07 | -456.16 | | | | | | | | | | |
| LSD+LSR | 0 | 0.07 | -455.94 | 0 | 0.07 | -457.91 | | | | | | | |
| NCVR | 0 | 0.07 | -455.69 | 0 | 0.07 | -457.44 | 0 | 0.07 | -459.33 | | | | |
| Age HH Leader | 0 | 0.07 | -455.22 | 0 | 0.07 | -456.25 | 0 | 0.07 | -457.72 | 0 | 0.07 | -458.87 | 0 |
| <none> | | 0.07 | -454.41 | | 0.07 | -456.16 | | 0.07 | -457.91 | | 0.07 | -459.33 | |
| NCVD | 0 | 0.07 | -454.14 | 0 | 0.07 | -454.51 | 0 | 0.07 | -456.5 | 0 | 0.07 | -458.47 | 0 |
| EY40- | 0 | 0.07 | -453.11 | 0 | 0.07 | -454.97 | 0 | 0.07 | -456.92 | 0 | 0.07 | -458.71 | 0.01 |
| LSR | 0.01 | 0.08 | -446.21 | 0.01 | 0.08 | -448.01 | 0.01 | 0.08 | -449.91 | 0.01 | 0.08 | -451.56 | 0.02 |
| EY HH Leader | 0.01 | 0.08 | -446.09 | 0.01 | 0.08 | -446.6 | 0.01 | 0.08 | -447.92 | 0.01 | 0.08 | -449.31 | 0.02 |
| NP15- | 0.02 | 0.09 | -438 | 0.02 | 0.09 | -439.7 | 0.02 | 0.09 | -441.68 | 0.02 | 0.09 | -441.59 | -0.04 |
| EY15- | 0.03 | 0.09 | -432.9 | 0.03 | 0.09 | -434.8 | 0.03 | 0.1 | -436.56 | 0.03 | 0.1 | -437.73 | 0.03 |
| Produtivity | 0.17 | 0.23 | -370.43 | 0.17 | 0.23 | -372.42 | 0.17 | 0.24 | -373.79 | 0.17 | 0.24 | -375.2 | 0.46 |
| | | | | | | | | | | Intercept | | | 2.54 |

**Table 7　Backward Analysis for Productivity**

| Variables | Initial Model (AIC=-283.36) | | | Model 2 (AIC=-285.13) | | | Model 3 (AIC=-286.25) | | | Model 4 (AIC=-287.69) | | | Final Model (AIC=-288.91) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sum of Square | RSS | AIC | Sum of Square | RSS | AIC | Sum of Square | RSS | AIC | Sum of Square | RSS | AIC | Sum of Square | RSS | AIC | Coefficients: |
| NCVD | 0 | 0.85 | -285.13 | | | | | | | | | | | | | |
| EY40- | 0.01 | 0.86 | -284.45 | 0.01 | 0.86 | -286.25 | | | | | | | | | | |
| LSR | 0.02 | 0.87 | -284.02 | 0.02 | 0.87 | -285.8 | 0.01 | 0.87 | -287.69 | | | | | | | |
| NCVR | 0.02 | 0.87 | -283.78 | 0.02 | 0.88 | -285.31 | 0.01 | 0.88 | -287.07 | 0.01 | 0.88 | -288.91 | | | | |
| <none> | | 0.85 | -283.36 | | 0.85 | -285.13 | | 0.86 | -286.25 | | 0.87 | -287.69 | | 0.88 | -288.91 | |
| NP15- | 0.04 | 0.89 | -282.43 | 0.04 | 0.89 | -284.34 | 0.03 | 0.9 | -285.63 | 0.03 | 0.9 | -287.62 | 0.03 | 0.92 | -288.25 | 0.07 |
| EY15- | 0.05 | 0.9 | -281.25 | 0.05 | 0.91 | -283.04 | 0.07 | 0.94 | -282.6 | 0.19 | 1.06 | -276.4 | 0.21 | 1.09 | -275.96 | 0.06 |
| Age HH Leader | 0.06 | 0.91 | -280.51 | 0.06 | 0.91 | -282.32 | 0.06 | 0.92 | -283.66 | 0.07 | 0.94 | -284.56 | 0.06 | 0.94 | -286.51 | 0.01 |
| EY HH Leader | 0.06 | 0.91 | -280.47 | 0.06 | 0.92 | -282.08 | 0.07 | 0.93 | -283.1 | 0.06 | 0.93 | -285.1 | 0.06 | 0.94 | -286.53 | -0.04 |
| LSD | 0.11 | 0.96 | -276.77 | 0.12 | 0.97 | -278.37 | 0.12 | 0.98 | -279.4 | 0.12 | 0.99 | -280.62 | 0.12 | 1 | -282.35 | -0.15 |
| | | | | | | | | | | | | | | | Intercept | 3.00531 |

**Table 8　Regression Analysis of the Final Model on Total Production Value**

| Variables | Estimate | Std.Error | t value | Pr(>\|t\|) | |
|---|---|---|---|---|---|
| (Intercept) | 2.54055 | 0.155978 | 16.288 | 2.00E-16 | *** |
| Age HH Leader | 0.002888 | 0.00196 | 1.474 | 0.14576 | |
| EY HH Leader | 0.020132 | 0.005958 | 3.379 | 0.00128 | ** |
| EY 40- | 0.012174 | 0.007992 | 1.523 | 0.13295 | |
| NCVD | 0.002384 | 0.001496 | 1.593 | 0.11635 | |
| LSR | 0.018387 | 0.006086 | 3.021 | 0.0037 | ** |
| Produtivity | 0.462967 | 0.037921 | 12.209 | 2.00E-16 | *** |
| NP 15- | -0.04494 | 0.010083 | -4.457 | 3.69E-05 | *** |
| EY 15- | 0.032864 | 0.006645 | 4.946 | 6.44E-06 | *** |

Signif. codes : 0 '***' 0. 001 '**' 0. 01 '*' 0. 05 '.' 0. 1 ' ' 1.　Residual standard error : 0. 03374 on 60 degrees of freedom
Multiple R-squared : 0. 9922, Adjusted R-spuared : 0. 9911, F-statistic : 948. 6 on 8 and 60 DF, p-value : ＜2. 2e-16

**Table 9　Regression Analysis of the Final Model on Productivity**

| Variables | Estimate | Std.Error | t value | Pr(>\|t\|) | |
|---|---|---|---|---|---|
| (Intercept) | 3.005306 | 0.14378 | 20.902 | 2.00E-16 | *** |
| Age HH Leader | 0.012275 | 0.006022 | 2.038 | 0.045722 | * |
| EY HH Leader | -0.03521 | 0.017317 | -2.034 | 0.046218 | * |
| LSR | -0.14786 | 0.051251 | -2.885 | 0.005353 | ** |
| NP 15- | 0.070069 | 0.044478 | 1.575 | 0.120177 | |

Signif. codes : 0 '***' 0. 001 '**' 0. 01 '*' 0. 05 '.' 0. 1 ' ' 1.　Residual standard error : 0. 1182 on 63 degrees of freedom
Multiple R-squared : 0. 9044, Adjusted R-spuared : 0. 8968, F-statistic : 119. 2 on 5 and 63 DF, p-value : ＜2. 2e-16

It is very difficult for us to prepare logical explanation between result on Total Production Value and result on Productivity. One of the possible reasons is that research area does not have enough changes from expansion or constant oriented with rough cultivation into efficiency oriented with skilled cultivation.

### 3-3. Preference of Additional Consumption

Intentional development often focuses on women as key mediation with family well-being especially children. We tried to check its tendency and role division of husband and wife by asking to both husband and wife following same question, 'What you want to buy if you get additional money ?'.

Table 10 shows the preference of consumption of husband and wife with additional money. We can see clear difference between husband and wife. Samples are both 77 and we accept plural answers in free writing space.

The first and important characteristic on the table is clear tendency of women on spending for well-being of family and children. Item of 'well-being' is a sum of 'Food', 'Family', and 'Education'. It means women's additional income can be expected to lead better conditions for food, family, and education. On the other hand, husband has strong tendency to spend additional money into expanding income. The areas of income expansion in their idea are followings. The most common idea is small business as vendering fish, vegetable, and cakes, and managing small shop. Rather bigger opportunities are expansion of agricultural land and buy mill equipment to start or expand milling service business.

Second characteristic is about improvement and expansion of house building. The biggest number of husband, 22 husbands, selected it and wife's answers are about 'prepare inside equipment', 'help husband to expand buildings'. It means to think and prepare building of house is one of the most important role and concerns of husband and seems lasting purpose because of continuous increase of family and low durability of buildings.

Motorbike is one of popular desire for additional consumption. Many farmers own far agricultural land

Table 10 Consumption Preference

| | Husband | Wife |
|---|---|---|
| House | 22 | 14 |
| Transportation | 14 | 2 |
| Agriculture land | 6 | 3 |
| Business | 7 | 10 |
| Clothes | 11 | 24 |
| Food | 7 | 20 |
| Family | 2 | 11 |
| Education | 10 | 23 |
| Mill | 6 | 0 |
| Live City | 1 | 0 |
| Animal | 1 | 0 |
| Electricity | 1 | 1 |
| Income | 20 | 13 |
| Well-being | 19 | 54 |
| Sample | 77 | 77 |

especially in dry season with distance of several hours by walk. Motorbike definitely ease transportation difficulty especially of men. In addition, motorbike will enable them to own better condition land far from their house. In the same way, two women choose ‘bicycle’.

‘Clothes’ or ‘Capulana（common fabric for making clothes）’ is the most fascinated consumption for wife. Most of wife’s answers do not mention about them to whom but we can easily imagine they include for her own and her children but sometimes exclude her husband.

It should be noted that only one household selected animals and no one selected any way of productivity improvement such as fertilizers, pesticides, and other chemical inputs. In the experience in Asia, critical turning point was the period when many farmers turned from expansion of land into increase of productivity with introducing new tools, inputs, and methods. From the research we cannot find any sings of such turning points but intention to expand by transportation.

## 4. Implications

Our initial research gives us many notions for direction of further research. The first important notion is variety of farmer’s strategy in dry and rainy season. We can see farmers’ intentional varieties on planting crop numbers, emphasizing crops, and productivity. From productivity data, some of selected farmers might introduce chemical inputs or other methods. It is important to make clear variety of productive method and conditions of introducing such methods. Also the determinants of above differences should be discovered to figure out traditional strategy and strategy on changing.

We try to find multiple regressions on Production and Productivity. Since we cannot find any appropriate explanation between two regressions, it is necessary to try better dataset by proper sample selection, improved training to research assistants, and adding other data such as input information and detail descriptions of eminent farmers.

From interview on consumption by additional income we can find many clear differences on preference consumption and their role between husband and wife. As many research and experience of development project in the world, the research follows women’s important roles for improving basic family conditions such as education, nutrition and food.

We have to be careful to grasp farmers’ strategy. It might be necessary to introduce productive method to almost all farmers in Mozambique but we also have to be careful legitimacy of traditional way and thinking. We should approach from two deferent directions altogether to grasp and evaluate rural Mozambique. One direction is what we call radicalization or modernization that Popkins（1979）tried to figure out. At the same time, we also need a kind of moral economy as Scott（1977）tried to legitimate.

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## ANNEX VIF check

| | Produtivity | | Age HH leader | | EY HH | | EY 15-19 | | EY 15-69 | | EY 40- | | NOVD | | LSD | | NOVR | | LSR | | LSD+LSR | | NP 15- | | EY 15- | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variables | Tolerance | VIF | Tolerance | VIF | Tolerance | VIF | Tolerance | VIF | Tolerance | VIF | Tolerance | VIF | Tolerance | VIF | Tolerance | VIF | Tolerance | VIF | Tolerance | VIF | Tolerance | VIF | Tolerance | VIF | Tolerance | VIF |
| Age HH leader | 0,474 | 2,11 | | | 0,603 | 1,66 | 0,652 | 1,53 | 0,479 | 2,09 | 0,485 | 2,06 | 0,478 | 2,09 | 0,478 | 2,09 | 0,475 | 2,1 | 0,476 | 2,1 | 0,475 | 2,1 | 0,474 | 2,11 | 0,474 | 2,11 |
| EY of HH | 0,283 | 3,54 | 0,353 | 2,83 | | | 0,388 | 2,58 | 0,292 | 3,43 | 0,363 | 2,76 | 0,278 | 3,6 | 0,279 | 3,59 | 0,278 | 3,59 | 0,279 | 3,59 | 0,279 | 3,59 | 0,279 | 3,58 | 0,277 | 3,6 |
| EY 15-19 | 0,278 | 3,6 | 0,356 | 2,81 | 0,363 | 2,76 | | | 0,355 | 2,82 | 0,259 | 3,86 | 0,264 | 3,79 | 0,264 | 3,79 | 0,261 | 3,83 | 0,261 | 3,83 | 0,262 | 3,81 | 0,259 | 3,86 | 0,26 | 3,84 |
| EY 15-69 | 0,413 | 2,42 | 0,414 | 2,41 | 0,431 | 2,32 | 0,562 | 1,78 | | | 0,462 | 2,16 | 0,41 | 2,44 | 0,419 | 2,38 | 0,411 | 2,43 | 0,425 | 2,35 | 0,426 | 2,35 | 0,411 | 2,43 | 0,412 | 2,43 |
| EY 40- | 0,339 | 2,95 | 0,347 | 2,88 | 0,443 | 2,26 | 0,339 | 2,95 | 0,382 | 2,62 | | | 0,345 | 2,9 | 0,345 | 2,9 | 0,339 | 2,95 | 0,341 | 2,93 | 0,342 | 2,93 | 0,339 | 2,95 | 0,345 | 2,9 |
| No of Crop Variety in Dry Season (NOVD) | 0,611 | 1,64 | 0,573 | 1,74 | 0,569 | 1,76 | 0,58 | 1,72 | 0,569 | 1,76 | 0,579 | 1,73 | | | 0,597 | 1,67 | 0,624 | 1,6 | 0,578 | 1,73 | 0,575 | 1,74 | 0,577 | 1,73 | 0,575 | 1,74 |
| Land Size of Dry Season (LSD) | 0,0527 | 19 | 0,053 | 18,9 | 0,0527 | 19 | 0,0534 | 18,7 | 0,0537 | 18,6 | 0,0535 | 18,7 | 0,0551 | 18,1 | | | 0,0531 | 18,8 | 0,525 | 1,9 | 0,589 | 1,7 | 0,053 | 18,9 | 0,0532 | 18,8 |
| No of Crop Variety in Rainy Season (NOVR) | 0,788 | 1,27 | 0,789 | 1,27 | 0,789 | 1,27 | 0,791 | 1,26 | 0,788 | 1,27 | 0,786 | 1,27 | 0,862 | 1,16 | 0,796 | 1,26 | | | 0,804 | 1,24 | 0,806 | 1,24 | 0,808 | 1,24 | 0,8 | 1,25 |
| Land size of Rainy Season (LSR) | 0,862 | 1,16 | 0,862 | 1,16 | 0,862 | 1,16 | 0,00865 | 116 | 0,00891 | 112 | 0,863 | 1,16 | 0,871 | 1,15 | 0,0858 | 11,7 | 0,00877 | 114 | | | 0,61 | 1,64 | 0,859 | 1,16 | 0,859 | 1,16 |
| Land size Rainy+Dry season | 0,688 | 1,45 | 0,69 | 1,45 | 0,692 | 1,45 | 0,00696 | 144 | 0,00715 | 140 | 0,694 | 1,44 | 0,696 | 1,44 | 0,0773 | 12,9 | 0,00705 | 142 | 0,489 | 2,05 | | | 0,69 | 1,45 | 0,689 | 1,45 |
| Produtivity | | | 0,509 | 1,97 | 0,519 | 1,93 | 0,545 | 1,83 | 0,512 | 1,95 | 0,509 | 1,96 | 0,546 | 1,83 | 0,51 | 1,96 | 0,51 | 1,96 | 0,511 | 1,96 | 0,508 | 1,97 | 0,548 | 1,83 | 0,583 | 1,72 |
| Number of people over 15Years (NP 15-) | 0,493 | 2,03 | 0,458 | 2,18 | 0,461 | 2,17 | 0,458 | 2,18 | 0,46 | 2,18 | 0,458 | 2,18 | 0,465 | 2,15 | 0,463 | 2,16 | 0,471 | 2,12 | 0,459 | 2,18 | 0,459 | 2,18 | | | 0,909 | 1,1 |
| EY 15- | 0,464 | 2,16 | 0,405 | 2,47 | 0,405 | 2,47 | 0,407 | 2,46 | 0,407 | 2,46 | 0,411 | 2,43 | 0,409 | 2,44 | 0,41 | 2,44 | 0,412 | 2,43 | 0,405 | 2,47 | 0,406 | 2,47 | 0,803 | 1,24 | | |

Note : Colored spaces insicate VIF score over 10