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# Gender Influence on Socio-Economic of Rice Production in Guinea: Case of Promoting Gender Equity in Agriculture, Prefecture of Faranah

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**Abstract**
With the rural exodus of young males between the ages of 20 and 55, over half the agricultural workers left back in rural Guinea are women, FAO calls this the "feminization" of Guinea's agriculture. The majority (51.6%) of Guinea's agricultural population is female and 62.6% of them list farming as their principal pursuit. The study aims to assess the economic performance of men and women in terms of productivity and net income accruing from rice production in the study area. Data were collected with 270 respondents (132 men and 138 females) selected in eight rural communes and the Faranah center randomly using quantitative and qualitative methods. The finding revealed that from 2005 to 2015, the amount of rainfall fallen was about 2000 $mm^3$ in 2008 and 1800 $mm^3$ in 2013. The transect was summarized in vegetation, soil, hydrography, distance, cultures, infrastructure, animals, issues and solutions which were described following the relief. The community support network diagram shows 16 external institutions in which we found 11 from the government, 2 from the private sector, and three were NGOs institutions and 7 internal institutions from communities. Women production revealed that, the variables such as household income, capital inputs, fertilizer, labour cost and household size were significant at 1%, 5% and 10% respectively; the responding R and $R^2$ values were 0.863and 0.744, and F. Change = 39.383. We found in the men rice production that the corresponding R and $R^2$ values were 0.849 and 0.722, F change =38.61value highly significant at 1% level. The variables like household income, experience and labour cost were significant at 1% and 5% level respectively. Net income females and men were (83,857 US$) and (61,133 US$) inclusively and profitability at 1.68 > 1.54 as average of benefit cost ratio (BCR).
**Keywords:** gender equity, women rice production, community network, promoting gender. Rainfall

## 1. Introduction

Rice is one of the world's main staple crops, with nearly 2.5 billion people depending on it as their main food. Hundreds of millions of people spend more than half their incomes on rice to feed their families. At the same time, rice farming is a major source of employment, especially for the poor, and about four-fifths of the world's rice production is grown by small-scale farmers in low income, developing countries (Africa rice, 2008). All over the world, rural women have traditionally played, and continue to play, an important role in both rice production and rice post-harvest activities. In many areas, tasks related to rice planting, weeding, harvesting and processing are the domain of women. Men and women farmers have different responsibilities in agricultural production systems, including rice farming. These differences in gender roles are not always obvious, but they must be recognized if rice production is to be increased, especially among small-scale farmers. Effective, sustainable rice production that provides food security to all people depends on gender roles being fully understood and considered in policy, planning, research and extension. Gender analysis is therefore an important tool in the development of rice farming. It identifies gender roles and responsibilities, indicates how much time different household members devote to different tasks (and why) and shows how these tasks change according to the season and the time of day (Africa rice, 2009)

Women's participation in rice production, postharvest and trading operations is well recognized in Africa (Nyanteng, 1985; Akande et al., 2007; WARDA et al, 2008; Bunch, 2011). In West Africa, for example, labour supplied by women for rice cultivation varies from 3% for floating rice in Mali, to 80–100% in mangrove-swamp rice in The Gambia and Liberia, where women participate in most of the activities and undertake postharvest processing of the crop (Lotsmart N. Fonjong1 and Mbah Fongkimeh Athanasia (2007). Also a clear gender division of labour exists among crops. In The Gambia, swampland farming is solely women's duty; men cultivate cash crops and their fields are usually larger. In Mali, rice was traditionally grown only by women near rivers and wetlands (Synnevag, 1997, cited by FAO, 2004b). In many African countries, women are responsible for producing subsistence food crops for household consumption on their own plots or in communal household fields. In Côte d'Ivoire, husband and wife farm separate plots and there is some specialization by gender in the crops. Rice is considered a man's crop in some communities, and a woman's crop in others, while in many places, the gender pattern for rice cultivation is complex. In spite of the active involvement of both men and women in rice farming, processing and marketing, the overall research-for-development agenda has not always fully appreciated

or considered the gender perspective (Poats, 1991). Consequently, the technologies and knowledge generated through rice research may not have reached the women end-users. A gender perspective needs to be integrated into agriculture – specifically in rice research for development – as a strategic pathway towards sustainable and effective rice development in Africa (A. Diagne1 2012)

Guinea has just completed at National Agricultural Census from which only a small set of very preliminary and very general findings have been made available. Two of those findings show that the economic empowerment of women has not significantly progressed in rural Guinea (Jacques Berthome Pierre-Marie Bosc Christiane Dardé, 1999). The majority (51.6%) of Guinea's agricultural population is female and 62.6% of them list farming as their principal pursuit. Only another 9.4% are in school, while 20.6% of farm family males attend school instead of farming. · Less than 6% of Guinea's 840,454 farms are managed by women as "chef exploitation." Over half of those female -headed farms have less than five workers, while only 21% of the male - headed exploitations are this small. Another 26% of male -headed farms have over 10 labourers bound to them (Berthome, and *al,* 1999).

Following Alexandratos, N., Bruinsma, J. & Schmidhuber, J. (2000), this imbalance still does not capture two others weighing in on top of it: In addition to not managing 84% of the farms that most of them work on, these women spend seven additional hours a day on domestic chores: collecting over half the firewood and three quarters of the water while doing all of the cooking. With the rural exodus of young males between the ages of 20 and 55, over half the agricultural workers left back in rural Guinea are women. Temple man (FAO 2003) calls this the "feminization" of Guinea's agriculture. More and more young men are migrating out of the rural areas and out of the country looking for work, while over 30% of Guinea's GNP, agriculture, is being increasingly left to women. Yet these women are experiencing no recognized increase in authority over farm management or over agricultural land (Africa Rice, (2010).

Women, through FAO (2001a) are thus isolated into the primary sector: agriculture. Even there, they are further isolated within agriculture, as their tentative access to male -owned land compromises both their land improvement options and any ability to command the other factors of production. These are not new findings, but as loudly and often as this gender imbalance is regretted, its recommended solution always seems to be sought, not where these women are, in agriculture, but elsewhere—in small enterprise and an improvement of health, education, and civic services for women. Following (Fischer Julie E.1999), these non-agricultural efforts are reporting some important successes, although Guinean women's access to micro-credit, while improving past 20% of the total available, falls behind that level of participation enjoyed by their Malian and Senegalese neighbours. Nevertheless, neither the GOG nor the donors have even mentioned the need for a national strategy to empower women in their primary economic pursuit, agriculture. Some interesting components of Guinea's rural development efforts, particularly the NGO-led programs (e.g., CLUSA, Africare, and OICI), have targeted certain promising agricultural activities of women. Some (CENAFOD and SARA) have led to the formation of successful groupings (producer organizations) of agricultural women. Women are availing themselves of these and other PEGRN extension services than are male beneficiaries (Demnele and Dembele 2003)

## 2. Literature Review

The PEGRN project was almost alone in Guinea in trying to address women's agricultural land tenure problem. Following the recommendations of Millennium Project Gender Task Force on Education and Gender Equality (2005), PEGRN began to work on women's rights over, and appropriate inputs into, their own tapades. Now PEGRN is working out land tenure "contract mechanisms" for both landless males and women. These are mechanisms are necessary because, even though women are not excluded from owning land under the Code Foncier of 1992 (Article 19), customary practice prevents it in most of rural Guinea. (Allen, R., Pereira, L. Raes. D. & Smith, M. 1998).

With the support of the Sassakawa Global 2000 project the national extension service (SNPRV) opened up (1996) a Support Unit for Rural Women (SURW) with links to the Ministry of Social Affairs, Women's Promotion and Childhood. SURW is leading the development of Gender and Agricultural Development Framework Plan (GADFP) subtext linking LPDA II to Guinea's GADFP prepared after the 1995 Beijing UN Conference on Women. SURW and Sassakawa Global 2000 together have helped some National Service for the Promotion of Rice Production and Extension (NSPRE), equipment, credit, and other inputs to be targeted upon agricultural women and led the World Bank's agricultural export project (GADFP) to support export chains for women's produce. Bank support to

NSPRE and GADFP have been terminated, and the SURW, like its LPDA II parent document, has been superseded in donor discussions by the PRSP. The PRSP, as we have seen, barely mentions agriculture or women's role in it. These oversights can be corrected as USAID joins the LPDA III analysis and dialogue (Florent, O., Paul Van, M., Edwin N., Paul C. S and Roch l. M, 2011)

Gender' is a term used to explain how society constructs the differences between women and men, whereas 'sex' identifies the biological differences between women and men. Therefore, looking at gender does not focus primarily on women or men, but rather on the relationships between their different roles, responsibilities

opportunities and needs. In sub-Saharan Africa, women, men and youth are key players in rice production, processing and trading; in this chapter, we refer to them as 'gender actor (A. Agboh-Noameshie *et al*.2013)

In Sub Africa, access to and control of resources studies show that women have even less access than men have to critical productive resources and services, including credit, farm inputs (e.g. seeds, fertilizers, pesticides), marketing facilities, extension and information (Elson, D. 2005). Even when national laws give men and women equal rights to own and control land, existing customary laws often prevent women from ever fully owning land. Furthermore, smallholder households, particularly women and other vulnerable groups may have specific needs and priorities. For example, they may decide to focus on maximizing their livelihoods by concentrating on crop diversification rather than crop intensification, or by selecting crop varieties that require low labour inputs rather than ones that produce high yields (World Development Report 2008. Real strides in poverty alleviation cannot be achieved unless women are fully included in all the benefits from improved rice-based systems. This requires greater awareness of women's work in rice farming, a corresponding increase in women's access to improved crop production techniques, and equitable national-level land and resource policies that are effectively enforced (Zossou *et al., 2*009).

For Diallo, A.M., Camara, K., Schwille, J., Dembélé, M. et Bah, T. H. (2001, October), women have even less access than men have to critical productive resources and services, including credit, farm inputs (e.g. seeds, fertilizers, and pesticides), marketing facilities, extension and information. Even when national laws give men and women equal rights to own and control land, existing customary laws often prevent women from ever fully owning land. According to Sogbossi, M., A. Diagne, G. Biaou and f. Simtowe (2008), smallholder households, particularly women and other vulnerable groups may have specific needs and priorities. For example, they may decide to focus on maximizing their livelihoods by concentrating on crop diversification rather than crop intensification, or by selecting crop varieties that require low labour inputs rather than ones that produce high yields. Real strides in poverty alleviation cannot be achieved unless women are fully included in all the benefits from improved rice-based systems. Moreover, World Bank (2008) reports that high labour costs and land scarcity concerns are especially important to women farmers with no access to assets and services, and who have specific seasonal labour-use patterns.

In African rice-farming communities, Adekambi, S.A., A. Diagne, F.P. Simtowe and G. Biaou (2009) shown that the gender division of activities has been well documented. This division of tasks can be very complex and unbalanced at the expense of women and youth who become the main labour providers. The division of tasks also depends on the rice agro ecosystem. In Sierra Leone, women are primarily in charge of planting, weeding and harvesting activities, while men carry out land preparation at the beginning of the cropping season (FAOSTAT, 2010). Similar findings are reported by Fonjong and Mbah (2007) from the rural areas of Ndop (Cameroon), with the difference that some activities such as tilling, transplanting and harvesting were performed by both men and women. In Yangambi (Democratic Republic of Congo, DRC), women are involved in rice crop establishment and weeding activities along with men; however, some tasks (such as birds scaring) are exclusively carried out by women assisted by children (Kabore and Misiko, 2011). In some farming communities, rice farming is considered as a strictly female activity (e.g. southern Senegal; World Bank, 2008). Generally, rice postharvest activities (threshing, pounding/milling, parboiling, cooking, trading, etc.) are mostly performed by the womenfolk. It has been argued that when some women's operations are mechanized (to save time, reduce the energy burdens or improve the process), they tend to be taken over by males (Stamp, 1990). However, adoption of the 'ASI' thresher–cleaner (see Rickman et al., Chapter 27, this volume) had no adverse effect on the profits of 86% of the sampled women (Africa Rice, 2009).

Gendered access to productive resources for rice farming Sustainable rice development relies on many factors. Farmers need access to key productive resources such as farmland, labour, agricultural inputs (e.g. quality seed and fertilizer), capital, and complementary rice productivity-enhancing technologies (knowledge, equipment, etc.) (International Rice Research Institute (IRRI, 2010). Men and women also need equitable control over their farm outputs. Any imbalance in the gendered access to or control of these resources slows rice development. Various studies (e.g. FAO, 2004a) have shown that women have less access than men to critical productive resources and services, including credit, farm inputs (seed, fertilizers, pesticides, etc.), marketing facilities, extension and information. Even when national laws endorse equal rights to own and control land, existing customary laws often prevent women from sustainable access to fertile farmland ( Diallo, A.M., Camara, K., Schwille, J., Dembélé, M. et Bah, T. H. 2001)

The gender-related impacts of improved varieties such as the NERICA varieties have been documented by several authors. For example, in Guinea, Diagne *et al*. (2007) found a higher impact of adoption of NERICA varieties among women (yield increase 1090 kg/ha) than among men (yield increase 442 kg/ha).

Following Kandiyoti, D. (2004) despite the increase in awareness and the availability of information on the existing gender disparities in agriculture, integrating a gender perspective in agricultural research for development still faces many challenges. These challenges come from the misconception of gender equality as implying that men and women become equal, while gender equality in fact means that the opportunities and life chances of men

and women are equal (Opio, 2003). In agricultural research and development, achieving gender equality will therefore not only require changes in research targeting, system mapping, and diagnosis and intervention, but also in the institutional culture of the research organization to ensure that women are given a strong voice both in shaping research and in shaping the development of their societies (Njenga et al., 2008).

According to World Bank, FAO and IFAD (2009), it is also observed that even though there are well-written genders mainstreaming strategies at country level, many research and extension institutions have not successfully addressed gender in the design and implementation of their activities. The provision of agricultural services is male dominated and little effort has been made to train men to work with women and be aware of the strategic and practical needs of women within agriculture. Also, despite the fundamental role women play in agriculture very few of them own, control or have guaranteed access to productive resources such as land, credit, technical services, market outlets and information. Furthermore, very few members of staff have been trained in gender analysis, which therefore limits the scope for promoting equity within most institutions. Members of staff lack experience in mainstreaming gender issues into their programmes. While some are willing to do so, they have no clear guidelines and cannot quite relate the relevance to their working environment (West Africa Rice Development Association (WARDA), 2004b. Strategic Plan 2003–2012).

## 3. Methodology

### 3.1 Research design

The study aims to access the economic performance of men and women in terms of productivity and net income accruing from rice production in prefecture of Faranah (republic of Guinea). Specifically the study aims to: 1. identify the part of women's capacity in terms of rice production and revenue obtained compared to the men in the local production chain; 2. Discuss with these two groups of the rice production the advantages and difficulties related to the chain of production and its added value.

### 3.2 Study areas

The prefecture of Faranah is located 482 km from the capital Conakry. It is between 10 degrees 10 of the North attitude and the 10 degrees 42 and 11 degrees 50 west longitude with an average altitude of 340 m. It covers an area of 18994 $km^2$ with a population of 280511 people, of which 136100 men and 144411 women. The average population density is 15 inhabitants per $km^2$ (Prefectural plan of Faranah, 2016).The prefecture of Faranah is one of the 8 prefectures of Upper Guinea. It is bounded to the Northwest by Dabola, Northeast by Kouroussa, and Southeast by Kissidougou, to the West by the Republic of Sierra Leone, and to the South by Kissidougou and Gueckedou. This region is the most endowed in terms of rice growing potential because of the large arable land area esteemed at 443443 ha. In spite of all this great natural attributes, the prefecture has little land under cultivation, making it as one of region with lowest per capita income in the country. According to Ministry of Agriculture, Agricultural Productivity Program in West Africa (PPAAO 1 C – Guinea, 2015), only 102469 ha of all crops were grown in 2014, the rice alone made 59055 ha., 80% of its farmland is mainly rain-fed and its multiple consequences (floods) leading to devastation of crops. It is also geographically located near the Niger River and its tributaries which could facilitate irrigation of the vast plains compared to the rest of the country.

### 3.3 Data collection and analysis

Data were collected from January to June, 2016 in the eight (8) rural communes plus Faranah center (Bagna, Beindou, Heremakono, Nialia, Passayah, Sandenia, Songoyah, Tiro and Faranah center) through interview schedule through intensive survey using a sampling composed by 132 male and 138 female respondents by the researchers' team using quantitative and qualitative methods. The data were collected from rice farmers with the aid of interview which was found to be appropriate because more than the majority of the farmers were illiterate, the agricultural offices and local offices and were checked, coded and entered into computer for analysis and interpretation using Word, Microsoft excel statistical package for the social sciences (SPSS), and origin8. Statistics like mean, standard error, were used to describe the selected characteristics of the respondents. Linear regression model was used to find out rice production factors significance. We used also the economics analysis through the gross margin to determine net income and benefit cost ratio (BCR) in the study area

### 3.4 Theoretical considerations and empirical model: regression model

The multiple regression studies involve the nature of relationship between a dependent variable and two or more explanatory variables. The techniques produce estimates of the standard error of multiple regression and coefficients of multiple determinants. In implicit form, the statement that a particular variable of interest (Y) is associated with a set of the other variables (X) is given as:

$Yi = f(X_1, X_2 ...)$ (1).

Where:

Yi is the dependent variable and $X_I$, $X_2$ ---$X_{n,}$ is a set of a k variable. The coefficients of multiple determination

measures the relative amount of variation in the dependent variable
($Y_i$) explained by the regression relationship between Y and the explanatory variables ($X_1$).
Linear regression was used because it provides the best fit. The choice of the best functional form was based on the magnitude of the $R^2$ value, the number of significant variables, the size and the sign of the regression coefficients as they are in line with the a priori expectations.
The model linear regression was adopted thus in accordance with Nwaobiala, (2010).and Hoque &Hague, (2014).
$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + ei$ (2) This equation is used for both groups of producers (boys and women) insofar as they have the same variables.
Where
Yi= Output of rice in Kg/tons; $x_1$=Gender, $X_2$=Age, $X_3$ =Household size, $X_4$=Experience, $X_5$=Farm size, $X_6$= Labor cost, $X_7$=Fertilizer in kg/ha, $X_8$= Capital inputs in US$, $X_9$=Household income, ei = error

### 3.5 Gross margin analysis

The Gross margin analysis was adopted in this research following Nwaobiala, (2010). The following expression was used for the gross margin analysis

$$GM = \Sigma p_i (Q_i - \Sigma p_j X_i) \quad (1)$$

Where:
GM = Gross Margin; $P_i$ = Unit price of output; $Q_i$ = Quantity of each output; $P_j$ = Unit of each input; $X_i$ = Quantity of each input.

$$NR = GM - TC \quad (2)$$

$$BCR = TR / TC \quad (3)$$

Where:
NR = Net Revenue; TC = Total fixed costs derived by depreciation of fixed costs;
TR = Total Revenue; TC = Total Costs.
BCR = Benefit Cost Ratio

## 4 Results and discussion

### 4.1 The regime of rainfall in the rice-growing system

In the Republic of Guinea, particularly in the prefecture of Faranah, one of the regions of the country where the rainfall is not dense each year (1750 mm3) compared to other regions such as Lower Guinea and Forest Guinea (3000 mm3 to 4000 mm3).

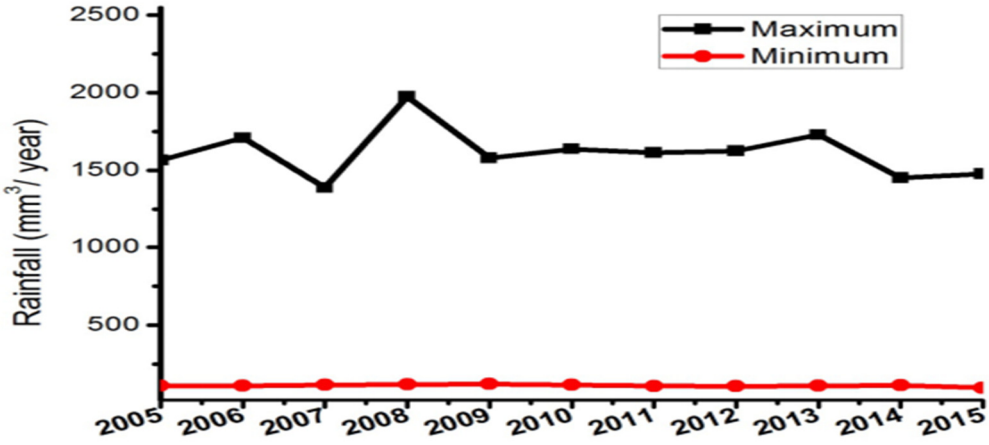



**Figure 1: Rainfall from 2005 to 2015**

It was revealed that in Faranah prefecture, from 2005 to 2015, the amount of rainfall fallen was about 2000 $mm^3$ in 2008 and 1800 $mm^3$ in 2013 which means that rainfall has decreased considerably in the last 7 years due to the climatic change issues. This result shows that for all these ten years, the rainfall was higher between 2008 and 2013 with respectively 2000 $mm^3$ and 1700 $mm^3$ and has continued to fall until 2015 with only 1500 $mm^3$, while it was estimated at 1600 mm3 in 2014. On the other hand, 2007 was the lowest level of all rainfall recorded over the 10 years estimated at 1300 $mm^3$. It was then very important to see that in the study area, rice production system is based to 90 % on rainfall fallen each year and that can give an idea on the level of r agricultural production in the study areas. In addition, the minimum rainfall has been recorded in the order of 90 to 120 mm3, which proves that rice growing has agricultural deficiencies and deserves special attention from the authorities to initiate struggles against deforestation and prolonged drought and developing all farmland.

### 4.2 Area (ha) according to the sexes of person responsible for the plot

**Table 1: Area (ha) according to the sex of the person responsible for the plot**

| Production area | Category of land used | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Lowlands | | | | Plains | | | | Hillsides | | | |
| | Male | % | Female | % | Male | % | Female | % | Male | % | Female | % |
| Bagna | 5 | 17 | 3 | 10 | 7 | 23 | 4 | 13 | 6 | 20 | 7 | 23 |
| Beindou | 5 | 17 | 3 | 10 | 6 | 20 | 6 | 20 | 4 | 13 | 7 | 23 |
| Urban commune | 6 | 20 | 4 | 13 | 3 | 10 | 3 | 10 | 4 | 13 | 7 | 23 |
| Heremakono | 3 | 10 | 3 | 10 | 5 | 17 | 4 | 13 | 5 | 17 | 8 | 27 |
| Nialia | 6 | 20 | 2 | 7 | 5 | 17 | 5 | 17 | 4 | 13 | 9 | 31 |
| Passayah | 4 | 13 | 5 | 17 | 6 | 20 | 4 | 13 | 3 | 10 | 7 | 23 |
| Sandenia | 4 | 13 | 4 | 13 | 5 | 17 | 5 | 17 | 4 | 13 | 8 | 27 |
| Songoyah | 6 | 20 | 3 | 10 | 5 | 17 | 5 | 17 | 4 | 13 | 7 | 23 |
| Tiro | 5 | 17 | 3 | 10 | 7 | 23 | 5 | 17 | 5 | 10 | 7 | 23 |
| **Total** | **44** | **16** | **30** | **11** | **49** | **18** | **41** | 15 | **39** | **14** | **67** | **26** |

**Computed from survey data, 2016**

In the Table 1, it was identified that three categories of land (lowlands, plains and hillsides) are used according to the availability and the mode of accessing. For example, we found that, on the whole, the lowlands and plains are not easily accessible to women because those types of lands are owned by the heads of families who inherited them from their parents; but also because cultures do not accord land management to women within the family. This is the reason why they are always on foot to find some land with the men to cultivate, and if they do not find it, they go directly to the hillsides where it is easy to find land. In this table1, 44 (16%) men were working on the lowlands compared to the women with 30 (11%). Plains lands were also more used by the men for 49 (18%) of the producers; women already were struggling to work seriously and had a score of 41 (15 %). It should be clear that on the hillsides, women had totally dominated with a large score of 67 (26%). In the comparison, we found that 74 (27%) of the respondents work in the lowlands, while in the plains, 90 (34%) of the respondents are working while in the hill lands, 102 (40%) of the respondents are actively operate.

### 4.3 Diagram network in study

**Table 2: The Transect of community network**

| Characteristics | Homogeneous problems area | | | | | | |
|---|---|---|---|---|---|---|---|
| | Plains | Hillsides | Lowlands | Hillsides | Plains | Hillside | Plains |
| Vegetation | Grass land | woodland | Adventive | Fruit trees | Grass land | woodland | Adventive |
| Soils | Sandy clay Ferrallitic | Clay - gravelly leached | Sandy clay Hydromorphic | Stony clay Clay - gravelly | Ferrallitic Silty clay | Ferrallitic leached Clay - gravelly | Ferrallitic Sandy clay |
| Hydrography | Niger river | Rain | Water throat | Rain | Creek | Rain | River |
| Distances | 500 m | 700 m | 300 m | 800 m | 360 m | 450 m | 600 m |
| Culture | Rice | Rice | Rice | Rice | Rice | Rice | Rice |
| | Maize | Cassava | Maize | plantings | Cassava | Cassava | Bean |
| | Peanut | Sweet potato | Leguminous plants | Yam, Fonio | Leguminous plants | Peanut | Sweet potato |
| Infrastructure | Bridge | Schools, House | Scupper, bridge | Dwelling | Bridge | Schools | Small bridge |
| Animals | Agoutis Mice | Goats Sheep | Agoutis Mice | Pets wild animals | Agoutis Mice | wild animals Tame birds | Mice Agoutis |
| | Rodents | Cow | | | Rodents | Pets | Mice |
| Issues | No improved | Only rainfall | little improvement | Few drilling | stray animals | Few tap | Non improved |
| | Adventive | Few drilling | Water throat | Insufficient tap | Non improved | rainfall | Adventive |
| | stray animals | Insufficient tap | adventive | rainfall | Adventive | stray animals | stray animals |
| Solutions | Improving | Mechanize | Improving more | Make fences | Technical support | Water supply | Improving |
| | Pesticides adoption | Make fences | Drainage | Water supply | Chemical support | Collecting rainwater | Pesticides adoption |
| | Building parks | Parks | Pesticides | Collecting rainwater | Modernize livestock | Parks | Parks |

**Computed from survey data, 2016**

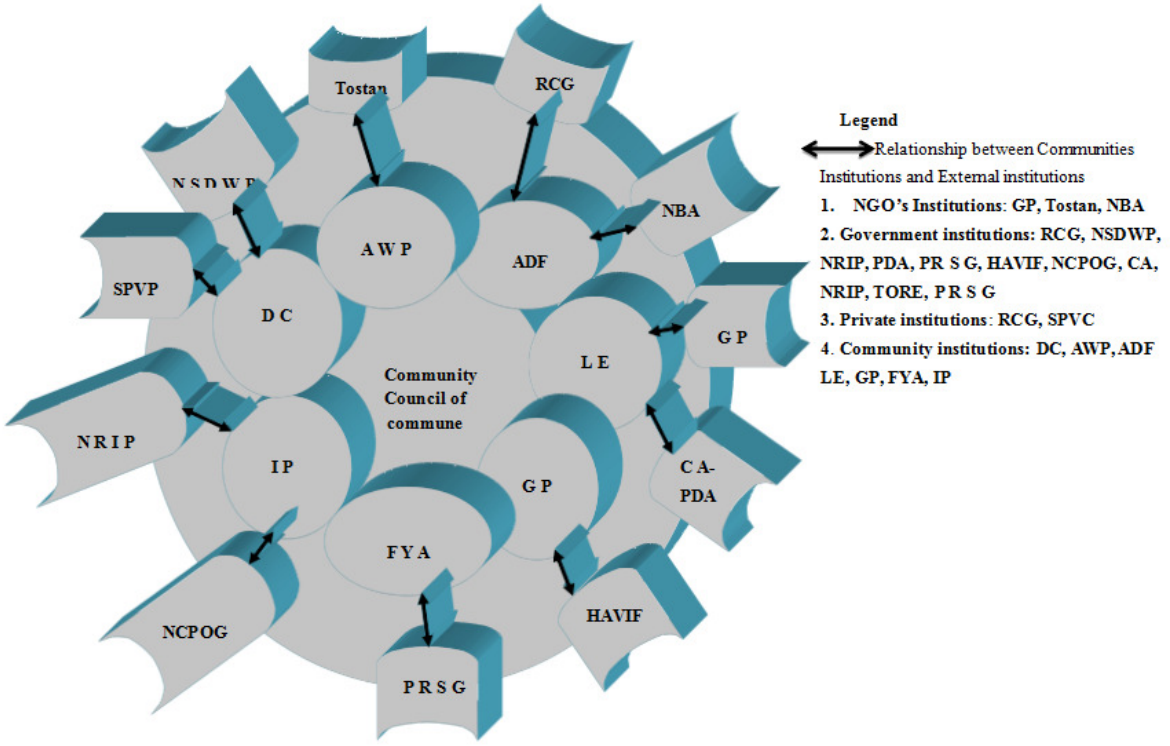



**Figure 2: Community support network diagram of Faranah**

In order to understand more the study area, it was elaborate the transect of community network (table 2) where it's observed nine characteristics factors (vegetation, soil, hydrographic, distance, cultures, infrastructure, animals, issues and solutions) through which the relief crossed is explained step by step. Thus, for the vegetation, it was noted that in the plain and lowlands area the type of vegetation was the grass land and adventive and in the hillsides, woodlands and fruit trees. In terms of soil, it should be noted that there was two kind of soil for each type of land crossed. So, in the plains, it was seen the presence of sandy clay and ferrallitic leached; in the hillside, clay gravelly and ferrallitic leached which is completed in the lowland with stony clay and water throat in the most part.

The finding shows that lowland and plains has truly some water opportunities such as water throat, River bank and Niger River with its tributaries followed by hillsides where water is generally scarce but in the presence of rainfall that falls for 6 to 7 months over the entire study area, the cultures cannot suffers..

The distance determines the space traveled in plains, lowlands, and plateaus. Thus in our case, it was indicated that each of these parts does not necessarily have the same distance, so, we found that the plateaus occupy the great distances ranging from 450 to 800 m, followed by the plains with 360 m to 600 m and the lowland, with only 300 m.

It has been found that rice grows on all the terroirs which have been the subject of this transect, following these lists the situation was: cassava, fruit trees, beans and fonio on the hillsides; corn, peanuts, sweet potatoes and yams on the plains; while on the lowlands, we observed plants such as corn and legumes. In terms of infrastructure, a bridge and a small bridge were built in the plain and the school on the hill.

This table 2 shows that many animals had been exist in these tree kind of lands where agoutis, mice, rodents were found in the plain and lowland; goats, cow, sheep, wild animals, pets and tame bird were frequently identified in the hillsides; Of all these soils in this transect, it has been identified several issues such as weeds, stray animals (oxen) in the plains; little improvement, full of water and weeds in the lowlands while in the hillsides, there were three problems such as rainfall, little drilling and insufficient tap.

The following solutions were proposed for the problems mentioned above by type of land: in the lowland improve more, drainage, and pesticides adoption. It was indicated in the hillsides to collect water rainfall, mechanizing the system, water supply and making fences; irrigation, inputs use, construct fences, in the plains.

Through the figure 2 it was realized community support network diagram which allowed us to identify community institutions (internal) interacting with those supports communities' development (external). The arrow was the symbol of the interaction between the community institutions (internal) and those called governmental, NGOs and private institutions (external) that support the development actions of the communes and districts. It was identified seven (7) major community institutions such as D C (District council), AWP (Association of women producers) A D F (Association for the Development of Faranah), L E (Local Entailment); G P (Groups Producers; I P (Isolate Producers); FYA (Faranah Youth Association)

The external institutions are composed by tree groups (.NGO's institutions: GP, Tostan, NBA; Government institutions were GP (Guinea Plan); Tostan; NBA (Niger Basin Authority); HAVIF (Higher Agricultural and Veterinary of Faranah; NCPOG (National Confederation of Peasant Organization of Guinea); C A (Chamber of Agriculture); NRIP (National Rural Of Infrastructure Program); TORE (Technical Office of Rural Engineering) ; NSWP D (National Service of Water points development; PDA (Prefectural Directorate of Agriculture); P R S G (Poverty Reduction Strategy of Guinea); Private Institutions: RCG,(rural credit of Guinea); SPVC (Support Program for Village Communities).

It has been concluded that the effectiveness of each external institution depends on its position on the circle that determines the lives of rural communities. This is how we can identify that institutions like NCPOG, GP, RCG, and Tostan are not deeply inside in the circle and would simply mean that these institutions were almost at the end of their development agenda and that they were not more for a long time in this area compared to the others who still have programs to execute in the framework of the improvement of the living conditions of the communities.

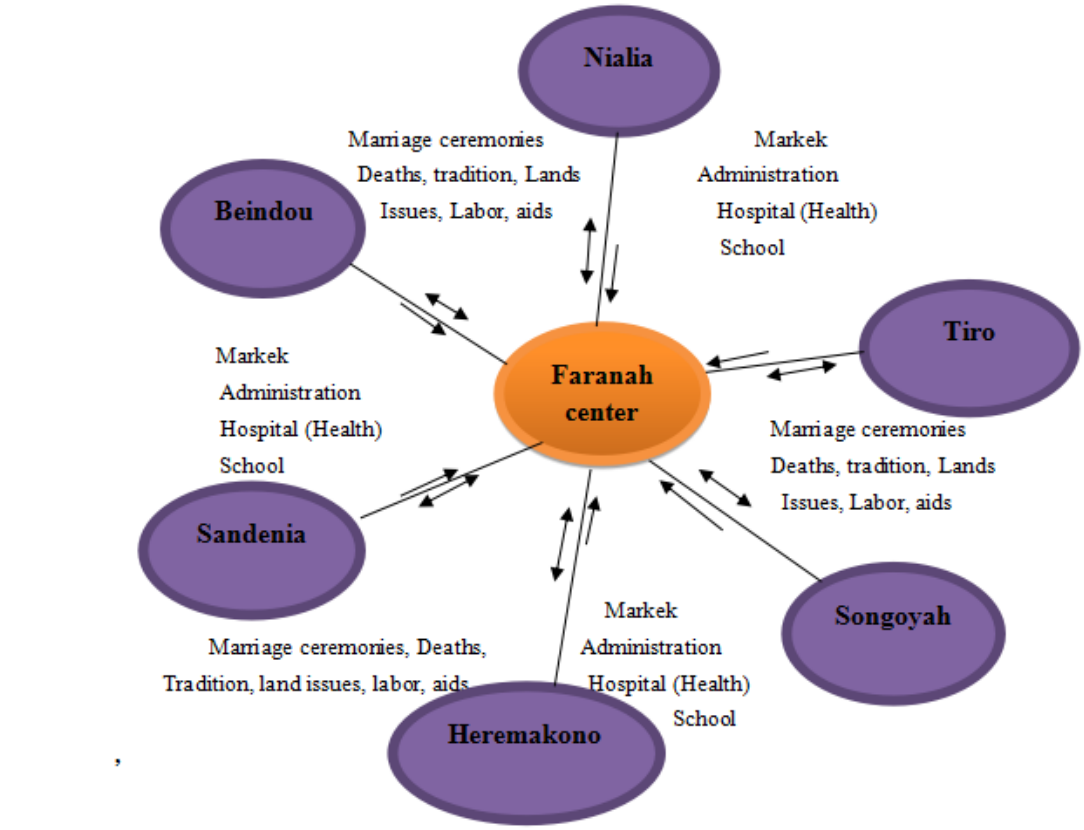
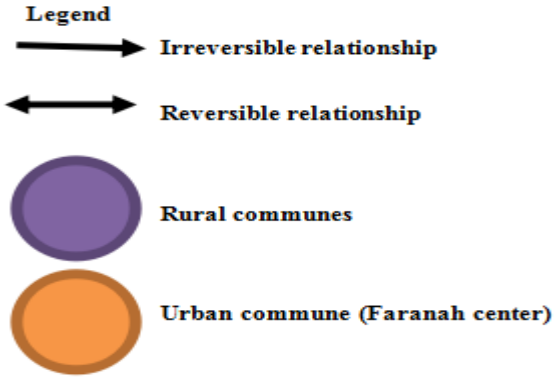



**Figure 3: Polarization Diagram of Faranah prefecture**




In this (Figure 3) the diagram of polarization indicated that Faranah center is surrounded by the rural communes who maintain dynamic relationships with the urban commune. These relations were of two types, including the reversible ones, which include the marriages ceremonies, deaths, traditional ceremonies, land issues, aids. The second type is said to be irreversible where it was listed: market, administration, hospital (health), school.

It should be conclude that through these two type relationships, the relations are irreversible when the household are moving from rural communes to the urban commune for some services which are not sufficient in their place. The relationships are also reversible when the households are moving on the two senses from both of the communes (rural and urban) to solve some of their difficulties such as marriage ceremonies and lands issues.

### 4.4 Gender measuring in study area

**Table 3: Gender of Households by production area**

| Village | Gender of the Households interviewed | | | | | | Household number |
|---|---|---|---|---|---|---|---|
| | Male | | Female | | Overall | | |
| | Number | % | Number | % | Effective | % | |
| Bagna | 16 | 53.3 | 14 | 46.7 | 30 | 100 | 4403 |
| Beindou | 14 | 46.7 | 16 | 53.3 | 30 | 100 | 2031 |
| Urban commune | 16 | 53.3 | 14 | 46.7 | 30 | 100 | 9107 |
| Heremakono | 15 | 50 | 15 | 50 | 30 | 100 | 1745 |
| Nialia | 14 | 46.7 | 16 | 53.3 | 30 | 100 | 1655 |
| Passayah | 14 | 46.7 | 16 | 53.3 | 30 | 100 | 2954 |
| Sandenia | 13 | 43.3 | 17 | 56.7 | 30 | 100 | 2121 |
| Songoyah | 15 | 50 | 15 | 50 | 30 | 100 | 1756 |
| Tiro | 15 | 50 | 15 | 50 | 30 | 100 | 1956 |
| **Total** | **132** | **48** | **138** | **52** | **270** | **100** | **27728** |

**Source: calculated from survey data, 2016**

Rice production by genus is a very interesting study that can be used to assess the degree of profitability and income between the two sexes in the study area. For example, in Table 3, it was identified that the men interviewed were 132 (48%), while women were estimated at 138 (52%) for a total of 270 respondents in the study area. In terms of household number, it was found that urban commune has higher with 9107 followed by bagan and Passayah (4403, 2954) ompared to Nialia, Heremakono and Songoya (1655, 1745, and 1756) inclusively. It should note that Women are numerous than men in rural areas, because many men leave during the cultivation period to fetch money from the gold and diamond mines leaving their parents alone in the fields.

### 4.5 Linear regression analysis on socio economics characteristic

**Table4: Regression analysis showing socio-economics factors influencing women's rice production profitability**

| SI No | Independents variables | Regression coefficients (β value) | Std. Error | t value | Level of significance (P value) |
|---|---|---|---|---|---|
| 1 | Gender | .187 | 4.830 | 0.039 | 0.969 |
| 2 | Age | -8.869 | 9.839 | 0-.901 | 0.369 |
| 3 | Household size | 75.105 | 34.493 | 2.177 | 0.031* |
| 4 | Experience | 14.914 | 17.985 | 0.829 | 0.409 |
| 5 | Farm size | 25.989 | 30.388 | 0.855 | 0.394 |
| 6 | Labor cost | -1.092 | 0.633 | -1.726 | 0.087* |
| 7 | Fertilizer | .875 | 0.417 | 2.102 | 0.038* |
| 8 | Capital inputs | 1.466 | 0.416 | 3.528 | 0.001** |
| 9 | Household income | .432 | 0.109 | 3.962 | 0.000*** |

Source: calculated from survey data, 2016. R = 0.863, $R^2$ = 0.744, F. Change = 39.383; *= Significant at 10%, ** = Significant at 5%, ***=Significant at 1%.

The study shows through regression model that, among all socio economic characteristics, the Household income, capital inputs, fertilizer, labour cost and household size were significant at 1%, 5% and 10% respectively. The responding R and $R^2$ values are 0.863 and 0.744, where, F. Change = 39.383. The above facts indicated that all the selected socio-economic factors have a joint correlation value with the profitability of rice production when R= 0.849 and the corresponding $R^2$ was 0.744, which means all the socio-economic factors have combinedly explained 74.4% of the total variance of productivity. It was concluded that F Change highly significant at 1% level should explains that women rice production was significant and provided to producers a good profitability. Gender, Age, Experience and farm size were not significant Taken together and it would be reliable to note that their combination with other factors had to influence their significance in a positive w

**Table 5: Regression analysis showing socio-economics factors influencing men's rice production profitability**

| SI NO | Independents variables | Regression coefficients (β value) | Std. Error | t Value | level of significance (P value) |
|---|---|---|---|---|---|
| 1 | Gender | 4.369 | 0.050 | 0.970 | 0.334 |
| 2 | Age | 10.766 | 0.025 | 0.474 | 0.637 |
| 3 | Education | 37.877 | 0.058 | 1.156 | 0.250 |
| 4 | Household size | 19.511 | -.015 | -.307 | 0.759 |
| 5 | Experience | 41.956 | 0.409 | 4.524 | 0.000*** |
| 6 | Labor cost | 0.676 | -.330 | -2.887 | 0.005** |
| 7 | Fertilizer | 0.529 | 0.149 | 1.312 | 0.192 |
| 8 | Capital inputs | 0.390 | 0.166 | 1.489 | 0.139 |
| 9 | Household income | 0.125 | 0.486 | 4.661 | 0.000*** |

Source: calculated from survey data, 2016. R = 0.849, $R^2$ = 0.722, F. Change =36.861;** = Significant at 5%, ***= Significant at 1%.

Men rice production is explained in this table 5 using regression model where it was indicated that the corresponding R and $R^2$ values were 0.849 and 0.722 which determine F change = 36.861value highly significant. The corresponding $R^2$ was 0.722, which means all the socio-economic factors have combinedly explained 72.2 % of the total variance of productivity. It was concluded that F Change, highly significant at 1% level, should explains that men rice production was significant and provided to the producers a good profitability. The variables like household income labor cost and experience were significant at 5% and 1 % respectively.

Photo 1: survey session at Nialia commune

Photo 2: survey session with Tiro's women

Photo 3: Survey session at Heremakon

Photo 4: Mr. Condé, leader of Tiro's producer

**Figure 4: Some photos illustrating the activities of the survey with producers in the field**

### 4.6 The gross margin analysis to gender's income and productivity in US

**Table 6: Economic performance by Gender in US$**

| Item | Men | Women |
|---|---|---|
| **A. Variable cost** | | |
| Labor cost | 39,573 | 40,267.5 |
| Capital input | 48,710 | 53,644.3 |
| Variable inputs | 21,455 | 26,493 |
| **Total variable cost** | **109,738** | **120,405** |
| **B. Fixed cost** | | |
| Rent of land | 189 | 357 |
| Interest on loan | 317 | 358 |
| Depreciated farm tools | 1040 | 898 |
| **C. Total cost** | **111,284** | **122,018** |
| D. Gross Margin | 172,417 | 205,872 |
| **E. Net income** | **61,133** | **83,857** |
| Benefit cost ratio | 1.54 | 1.68 |

**Source: calculated from survey data, 2016.**

From this table 6, using gross margin analysis, the variables were divided into five great groups through them we has calculate the Benefit cost ratio. These groups were: A (variable cost) which was composed in labour cost, capital inputs. The second group B (the Fixed cost) where it was identified the rent of land, interest of loan and depreciation of farm tools; the group C (total cost), D (gross margin) and E (net income).

After explaining these groups, it should be revealed that the women had highly spent in variable cost whit an average of 120,405 US$ compared to the men (109,738 US$) due the fact of the statute of women, they need more labour workers to their fields and them self, certain are not married and have to take on hands their life cost. In terms of total cost, women average is also high, i.e. 122,018 US$ comparted to the men's average estimated at (111,284 US$).

In order to show other comparison between these two actors, it can an opportunity to see why women's gross margin is high (205,872 US$) and men (172,417 US$), due to the large number of women in rice production. This gross income has positively influenced net income because it has been assumed that the higher gross income had provided higher net income (83,857 US$) and (61,133 US$) respectively**.** These results shown that women were getting more net income than men and profitability were higher compared to the men's 'income 1.68 > 1.54 as average of benefit cost ratio.

**Table 7: Gender economic performance values descriptive**

| Items | Descriptive | | | |
|---|---|---|---|---|
| | Mean | Standard Error | Minimum | Maximum |
| **1. Men** | | | | |
| Variable cost | 36579.33 | 8008.95 | 21455 | 48710 |
| Fixed cost | 515.33 | 264.92 | 189 | 1040 |
| Gross income | 85708.5 | 16130.5 | 69578 | 101839 |
| Net income | 30568.5 | 1870.5 | 28698 | 32439 |
| **2. Women** | | | | |
| Variable cost | 40134.93 | 7838.18 | 26493 | 53644 |
| Fixed cost | 537.66 | 180.16 | 357 | 898 |
| Gross income | 102936 | 13277 | 89659 | 12621 |
| Net income | 41928.5 | 2364.5 | 39564 | 44293 |

**Source: calculated from survey data, 2016.**

The economic performance of rice production has been favoured to further explain the profitability problems and could further help to understand the term net income generated by the producers. In this study, by descriptive analysis we identified mean, standard error, minimum and maximum of all main economic factors (variable cost, fixed cost, Gross margin and net income) from both actors (men and women). Through table7 it was indicated that men's variable cost mean was 36,579.33±8008.95 for 85,708.5±16130.5 as gross margin; net income status was defined by the relation 30,568.5±1870.5 respectively.

Pursuing our logic, it has been observed that women who produce rice are numerically superior to men despite the fact that they do not have the same advantage in land availability. Thus, it should note that women's variable cost was 40134.93±7838.18 where the fixed cost was about 537.66±180.16, however, gross margin and net income were comprise between 102,936±13,277 and 41,928.5±2364.5 inclusively.

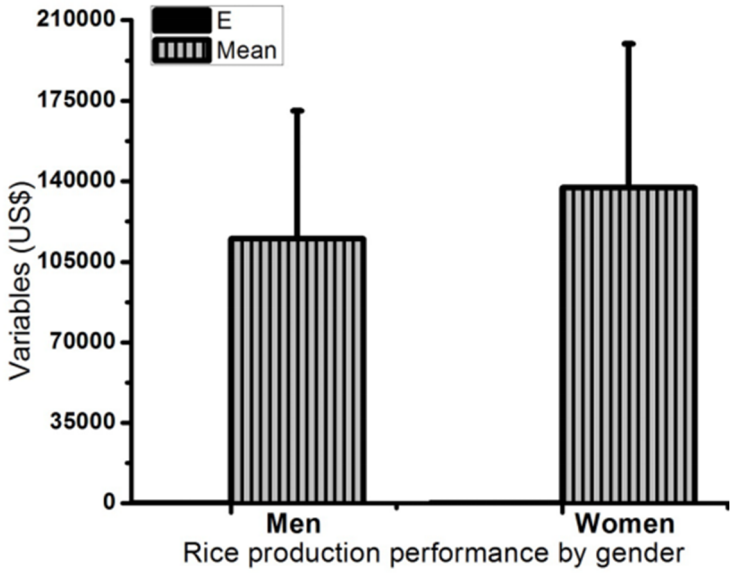



**Figure 5: LSD test from Gender economic performance**

It was observed that this figure 5 is explaining LSD test applied in our study to see exactly the correlation between all characteristic socio economics in terms of significance. The results shown that there was a significant difference between men and women values and which support that in terms of performance, both have several issues and which must be resolved to give the expecting significance of rice production in Faranah prefecture despite the best performance obtained by women. It was revealed that men performance variable mean average was 114,945± 55,732 compared to the women 137249±62417.

**5 Conclusions and Discussion**

This research has been conducted in eight rural communes plus urban commune of Faranah (Bagna, Beindou, Heremakono, Nialia, Passayah, Sandenia, Songoya, Tiro and urban commune of Faranah) using regression model and gross margin analysis. To better be understandable, the study has used nine socio-economics characteristics factors, where it was indicated in the list: gender, age, education, household size, experience, labor cost, fertilizer, capital inputs and household income. The findings shown that from 2005 to 2015, the higher amount of rainfall were about 2000 $mm^3$ in 2008 and 1800 $mm^3$ in 2013. However, 2007 was the lowest level of all rainfall recorded over the 10 years estimated at 1300 $mm^3$.

In table 1, 44 (16%) men were working in the lowlands compared to the women with 30 (11%) due to the facts of the inheritance of land and the traditional weight that does not allow land management to women. Plains lands are also more used by the men for 49 (18%) of the producers while the women already are struggling to work seriously and had a score of 41 (15 %). It should be clear that on the hillsides, women have totally dominated with a large number of 67 (26%). In comprising status, we found that 74 (27%) of the respondents work in the lowlands, while in the plains, 90 (34%) of were working. For the hill lands, 102 (40%) of the respondents were actively working. It should be conclude that lowlands and plains were not easily accessible to women because those types of lands are owned by the heads of families who inherited them from their parents; but also because the cultures do not allowed land management to women within the family.

The results of the transect (table 2) were summarized as follow: vegetation, soil, hydrography distance, crops, infrastructure, animals, issues and solutions; which were described on the relief based on the spaces of the commune of Faranah in order to make comparison between the types of lands used ( plain, hillsides, and lowlands). This transect has help more understanding our study area in terms of agriculture opportunities and issues and solutions proposed. It should be reasonable in the lowland and plains to improve more, make drainage to reduce the amount of water and pesticides adoption, in the hillsides, we resolved by the collecting water rainfall to be used after, mechanizing the system, water supply and making fences

The figure 2 has revealed that community support network diagram allowed us to identify community institutions (internal) interacting with those supports the development (external).The arrow is the symbol of the interaction between the community institutions (internal) and those called governmental, NGOs and private institutions (external) that support the development actions of the communes and villages. It was identified through this community support network diagram of Faranah eleven (16) external institutions including 11 from the government, two from the private sector, and three are NGOs institutions. The results shown that communities are not alone in development processes because of sharing many experiences with those come from outside (external institutions); it was also found seven (7) internal institutions from communities which were the focal points for all

development lines in their locality in collaboration with external ones.

In the diagram of polarization, was observed that Faranah center is surrounded by rural communes who maintain dynamic relationships with the urban commune. These relations were two types including the reversible ones, which include the ceremonies of marriages, deaths, traditional ceremonies, land issues, aids. The second type was said to be irreversible with administration, hospital (health), school.

It was conclude in the Table 3 that rice production by genus is a very interesting study that can be used to assess the degree of profitability and income between these two sexes in the study area. So, it was identified that men interviewed were 132 (48%), while women were estimated at 138 (52%) for a total of 270 respondents in the study area. In terms of household number, it was found that urban commune has higher with 9107 followed by bagan and Passayah (4403, 2954) ompared to Nialia, Heremakono and Songoya (1655, 1745, and 1756) inclusively. It should be noted that Women were numerous than men in rural areas, because many men leave during the cultivation period to fetch money from the mines jobs (gold and diamond) leaving their parents alone in the fields.

Among all socio economic characteristics in the Table 4, the Household income, capital inputs, fertilizer, labour cost and household size where significant at 1%, 5% and 10% respectively. The corresponding values R = 0.863, $R^2$ = 0.744 and F. Change = 39.383 were highly significant. The above facts indicated that all the selected socio-economic factors have a joint correlation value with the profitability of rice production when R= 0.849 and the corresponding $R^2$ was 0.744, which means all the socio-economic factors have combinedly explained 74.4% of the total variance of productivity. It was concluded that F Change was highly significant at 1% level and should explains that women rice production is significant and is provided to producers a good profitability.

Men rice production is explained in this table 5 using regression model where it was indicated that the corresponding =, F. Change =and $R^2$ values were 0.849and 0.722 which determine F change =36.861 highly significant at 1% level. We found that only the variables such as household income, experience and labour cost are highly significant at a level of 1% and 5% respectively.

Through gross margin analysis, it was observed that the higher gross revenue were realised by the women at (205,872 US$) to men (172,417 US$) respectively, due to the large number of women in rice production and also from their determining in production management. This gross income has positively influenced net income because it has been covered the production cost and provided higher net income as (83,857 US$) and (61,133 US$) respectively**.** These results show that women were getting more net income than men and profitability were still high 1.68 > 1.54 as average of benefit cost ratio.

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Siba Kolin Koivogui

China, Beijing, 28 November, 2017

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