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Gendered Impact of Irrigated Rice Schemes' Governance on Farmers' Income, Productivity and Technical Efficiency in Benin

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Abstract

Collective actions groups have many advantages and are sometimes essential, yet they can reinforce or perpetuate inter-and intra-gender inequalities when their functioning is left entirely subject to internal community dynamics and they are not well managed. This is well illustrated by the case of Koussin-Lélé rice scheme in the central Benin. This paper apply inequality indices and frontier production function to data from a sample of male and women rice farmers to analyze the gender inequalities in access to land and the governance of the groups, and their gender-differentiated impacts on farmers' productivity, technical efficiency and income. The results show that women are particularly discriminated against with regards to access to land, with significant negative impacts on their productivities and incomes. However, this discrimination did not have a significant impact on technical efficiency.

Keywords: Gender, land distribution, Rice, technical efficiency, productivity, income

Introduction

Rice is becoming an important crop in Benin. It is an important source of income for producers and contributes significantly to food security and poverty reduction (Adégbola et Sodjinou, 2003). In the majority of developing countries, women play a very important role in agriculture, particularly in rice production (Carney, 1998; Quisumbing, 1996). However, they are generally excluded from decision-making and actions related to rice sector development. Many rural development programs and projects have been implemented in Benin to support rice production through the creation of irrigated schemes. That women continue to be subject to discrimination in these collective action-based rice development programs, may be partly explained by discrimination against women being part of Beninese socio-cultural heritage which allots the social role of household head to a man (Sohinto, 2001; Dijoux, 2002). The case of Koussin-Lélé rice scheme in the Central part of Benin shows that collective actions constitute valid reasons for having some form of outside influence on the creation and governance of collective action groups to ensure that they do not exacerbate or perpetuate gender inequality. The purpose of this paper is to assess the gender-differentiated impacts of irrigated scheme's governance on farmers' income, productivity and technical efficiency in Benin. After a brief description

of materials and methods, the paper presents and discusses the main results of the analysis, and concludes with a brief summary of the results and suggestions.

Materials and Methods

Koussin-Lélé irrigated scheme, the focus of this study is located in Central Benin. For its first 25 years, the rice scheme was managed as a "men-only" collective where women were used as laborers. It was only after revolts and intervention by district authorities that women had their own plots of land. Today 145 producers (including 23) omen divided into seven groups, are currently working in the scheme. The seven groups are coordinated by a management council (CA). Each farmer was allocated a rice plot, which he or she manages individually. 45 rice farmers were randomly selected within the different strata of the scheme. Twenty women and twenty five men were then formed the selected farmers. 5 women and 11 men among them are leaders. Primary and secondary data were collected for the study through structured questionnaires, semi-structured and non-structured discussions. The primary data used are for the 2003-2004 cropping season and were collected in August 2004.

Data analysis methods

The specialized program, Distributive Analysis (DAD) was used to estimate the inequality indices (Gini coefficients) and plot the Lorenz curves for the land distribution. The Statistical software STATA version 9 was used to compute the summary statistics and difference tests, and to estimate the parameters of the stochastic production frontier and the technical efficiency series. The stochastic frontier production approach was used to estimate the level of technical efficiency of rice farmers (Greene, 1997; Diagne, 2002).

Results

Inter and Intra gender inequalities in land access and equipment use

Table 1 presents the inequality indices for the studied sample and for the different social categories. The Gini coefficient for the studied sample indicates an inequality index of 0.28 in the distribution of land among the farmers of Koussin-Lélé scheme. Figure 1 presents a Lorenz curve for land distribution which is away from the 45-degree line. It confirms the inequality in land distribution in the entire studied population of rice farmers. Comparing the inequalities over sex, the Gini coefficient is higher for men (0.16), compared to women (0.015). This means that land distribution is more unequal within the male groups than within the female group. While the Lorenz curve of men groups is markedly away from the 45-degree line, that of the women almost coincides with the equality line (Figure 1). These findings are strong confirmation of what is happening within the male groups where social status of members is a very important criterion in the allocation of land. Furthermore, women are an isolated group and were given each a small piece of land. Women, members of Management Council received each 0.27 hectares and women ordinary members received each 0.24 hectares. Men members of Management Council are the most privileged, with each of them receiving at least 0.9 hectare on average. The operators of motorized plowing equipment received about 0.75 ha. The remaining land is then distributed to ordinary members based on the number of years spent with the groups, the ability to influence the decision-makers and the relationship between farmers and group leaders. A higher average productivity (statistically) was observed for men as compared to women (Table 2). This shows that men make more profit than women

per unit of land, seeds, fertilizer and labor. These results could be explained by the small size of the land allocated to women that did not allow them to benefit from the inputs used because of lack of economies of scale. These findings are similar to earlier findings by Sharma et al. (1999) and Lundvall and Battese (2000), who reported a positive relation between average total productivity and farm size. The utilization of some production factors such as labor, for instance, often does not increase in a linear form with the farm size. The difference between net agricultural incomes of men and women is highly significant (Table 2). Men have more than four times the women's average income. These findings confirm the importance of the access to the land on the Koussin-Lélé rice scheme and reveal the negative impact of the discrimination at the level of land on the scheme. It also came out (Table 2) a highly significant difference between net agricultural incomes of men and women. Men have more than four times the women's average income. These findings confirm the importance of the access to the land on the Koussin-Lélé rice scheme and reveal the negative impact of the discrimination at the level of land on the scheme.

Table 1- Inequality indices for the distribution of land in the Koussin-Lélé scheme

Inequality index	Male	Female	Total
Gini Coefficient	0.16 (0.10)	0.015 (0.00)	0.28 (0.02)

The numbers in parenthesis indicate the standard errors

Gender differences in Technical efficiency

Table 3 indicates that all the technical efficiency coefficients are lower than 1 (0.9 and 0.86 for male and female farmers respectively) indicating that rice farmers in this study are not efficient in production factor use. The comparison of these coefficients over sex gives no significant difference between men and women. This indicates that female rice farmers are equally as technically efficient as male rice farmers. Although the women are newcomers in the scheme they had being working as laborers for long time and are equally familiar with rice production technologies and practices. This result confirms the studies of Moock (1976) and Dey Abbas (1997) who measured gender differential efficiency and found that women are equally as technically efficient as men. Thus, the lower productivity of female rice farmers is not due to a lower technical efficiency, but mainly to the

discrimination against them in resources (land and equipment) use.

Conclusion

To be more effective, more sustainable and more equitable, all human development approaches must pay particular attention to the analysis of social division of work and to inequalities within the arena concerned, and attend to the reduction of these disparities. This study showed an inequality in land distribution and equipment use between Koussin-Lélé rice farmers. Women are particularly subject to discrimination and have smaller pieces of land as compared to men. They are also delayed in plots plowing. Thus, this affects their average productivity, their marginal productivity and their income, and therefore their well-being. This does not affect their technical efficiency. It would be necessary to ensure equitable management of the scheme resources to make Koussin-Lélé rice scheme governance more efficient. The resources of the scheme should be fairly use and distributed. This could be done through the more active intervention of the communal authorities and leaders of agricultural development and more attentive monitoring by the scheme management. More equity in access to production resources, in this case access to land and unbiased management of agricultural equipment, could increase women's productivity and income, thereby increasing those of the scheme and improving their technical efficiency.

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Table 2- Average factor productivities of rice farmers in the Koussin-Lélé scheme

	Men	Women	Total (T)
Average land productivity	4.95*** (0.78)	3.90 (1.01)	4.47 (1.03)
Average productivity of seeds (kg/kg)	3.95*** (1.1)	1.81 (0.44)	2.98 (1.37)
Average productivity of fertilizers (kg/kg)	1.66** (1.13)	1.00 (0.26)	1.36 (0.90)
Average productivity of labor (kg/man.day)	5.37*** (1.12)	3.5 (1.35)	4.52 (1.54)
Net agricultural income (x 1000 F CFA)	530*** (198)	125 (39)	346 (252)
Net agric. Income per hectare (x 1000 F CFA)	773*** (143)	568 (171)	680 (186)

*** Difference between men and women significant at the 1%. ** Difference between men and women significant at 5%
The numbers in parenthesis indicate the standard errors

Source: INRAB, Koussin-Lélé Survey, 2004

Table 3- Average estimated technical efficiencies by gender and social status

	Men (M)	Women (W)	Total (T)
Technical efficiency (TE)	0.90 (0.10)	0.86 (0.14)	0.88 (0.12)

* The numbers in parenthesis indicate the standard errors