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## **Policy and Institutional effects on market participation by smallholder rice farmers: case studies in Burkina Faso, Mali and Niger**

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### **Abstract**

Rice sector contributes significantly to secure households with regard to their food needs but also to the creation of employments and income generation. The sector development and its evolution over the years have been marked by various policies and approaches. These development stages of the sector constitute nothing but the impact of the number of factors such as the rice policies put in place. A collaborative multi-country pilot study on policy and institutional arrangements effects on irrigated rice production and commercialization was conducted by WARDA and its country partners of Burkina Faso, Mali, and Niger. In-depth surveys were carried out at both village and household levels to collect qualitative and quantitative data on irrigated rice production, commercialization, and irrigated schemes governance. A common critical constrain cited by the producers in these countries is the commercialization of their product and their inability to take advantage of the market opportunities. Using village and household levels survey data on irrigated rice production and commercialization, this paper attempts to examine the impact of policy and institutional factors in market participation by smallholder rice producers. A farm level supply is estimated using the quantity of rice marketed as the dependant variable and factors such as output and inputs price, and policy and institutional variables as independent ones. The preliminary results indicate that most significant explanatory variable is the average irrigated rice plot (Mali and Niger) and total area of other crops grown by the producer.

### **Introduction**

With 10% of total cereal land occupation and 15 percent of total cereal production in Sub Saharan Africa (WARDA, 2006), rice is the fastest growing cereal in Africa. Rice now holds a strategic status for many African countries (AU-NEPAD/CAAPD). In rural areas, rice sector contributes significantly to secure households with regard to food needs but also with employments and income. Strong effective demand for rice to satisfy the consumption needs of urban population has often justify why the high priority is given to irrigated rice development by many African governments. This is particularly true in the Sahel where vagary and high exposure to severe rainfall shock prompted public investment in irrigation facilities. Irrigated rice in the Sahel is cultivated on about 200,000 ha with a potential yield of 8-9 t/ha and average farmers' yields of 4-5 t/ha significantly higher than yield of 1.0 t/ha obtained with the predominant upland rainfed rice production system (WARDA, 1995). Even if the only 2% of the 212 million hectares under rice cultivation is irrigated, public investment program to transform agriculture often targeted the construction of irrigation facilities for mainly rice production.

Irrigated rice schemes being relatively capital intensive, entry and participation in market activities was required to generate the necessary income need to cover production cost including water and the irrigation facility usage fees. Moreover, examining factors that affects smallholders' participation is important in so far that markets represent a channel for several policies that aim to improve the economic conditions of farmers (Zaibet and Dunn, 1998).

Investment in irrigated agriculture by governments and aid agencies has been very substantial in recent decades, and has been seen as an essential element in the "modernisation" of agriculture and these irrigation schemes have relied mainly on family-based farms (Belières et al., 2002). The irrigated rice schemes, being a capital intensive system, to efficiently remunerate the resource used, need to generate some income through markets activities. In other words, these small scale producers need to have some linkages with the markets to fulfill their functions of income generating activity and food security.

In Burkina Faso, interviews show that major constrains faced by the cooperatives in charge of the irrigated schemes are lack of financial support,

organizational problem in rice marketing, insufficient fertilizers supply and problem in collecting users' fees. However, the most urgent ones for which solutions are required in the short term are rice commercialization, inputs accessibility problems, credit problem, and quality of fertilizers. While in Niger, the common issues identified at the producers' level are the input delivery problem and its accessibility, high costs of production and paddy rice commercialization. At the cooperative level, mostly, all the farmers' cooperatives visited were experiencing some organizational problems in terms of fee collection, availability of revolving funds, poor planning of cropping season. Due to the problem of revolving fund, the cooperatives are unable to provide sufficient quantity of inputs. Hence, the productivity declines and the overall scheme performance also decline. In Mali, the Office du Niger created in 1930, is the oldest and largest irrigation schemes of the West Africa region. The ON was controlled by the state in the 1970's and in the 1980's, it underwent significant reform including privatization of many functions and price liberalization (Mariko et al., 2001). According to these authors, in the 1980's the reforms implemented did not have much impact on productivity with yields remaining below 2.5 t/ha but in the 1990's efforts to restore the irrigation infrastructure, coupled with macroeconomic reforms such as market liberalization, tax reforms and the 1994 devaluation of the CFA franc stimulated productivity gains with average yields reaching 4 to 5 t/ha.

### **Materials and Methods**

#### *Data*

Surveys were carried out at both village and household levels to collect qualitative and quantitative data on irrigated rice activities. The field surveys involved discussion with key informants but also the administration of semi-structured group and household questionnaires. The research sites selection were made in close collaboration with country partners. Prior to the field data collection, exploratory field visits were made to identify the various sites where the study will be implemented, meeting with potential rice sector stakeholders, and field testing of the questionnaires. Major criteria put forward to discriminate among schemes are inter alia secondary data availability, farm size, relative accessibility and distance to major town. Data were thus collected in Burkina, Mali and Niger. The specific irrigation schemes selected were Daibéri

and Say II in Niger, N'Débougou, N'Béwani, and Niono in Office du Niger areas of Mali and Sourou valley, Kou valley and Bagré in Burkina-Faso. In Niger, 11 villages were selected with 10 households per village. Thus total 110 households interviewed in Niger. In Burkina Faso, 15 villages were selected and 10 households per village totaling a sample of 150. In Mali, due to the large size of the irrigated area and the high concentration of rice producing in the Office du Niger zone, 30 villages were selected.

Farmers' participation in market was analyzed using a regression model that was estimated with rice paddy sales as dependent variable. The explanatory variables used relate to: average irrigated rice plot size, area of other crops cultivated, unit composite fertilizer price, unit urea price, average paddy price, and other qualitative variables (status of land ownership, level of education of the head of household, age of the head of household, type of household, average distance to extension service, access to credit, membership to a farmer association, existence of a cooperative for the irrigated rice scheme).

### **Results and Discussion**

The use of fertilizers is increasingly becoming an integral part of irrigated rice intensification and a means of land productivity enhancement. Availability of water, use of appropriate levels and qualities of fertilizers can significantly contribute to improve the productivity and profitability of irrigated rice activities. Fertilizers use is a common practice in all irrigated rice infrastructure in West Africa region. Rice producers are fully aware of its importance in increasing irrigated agriculture productivity in general and irrigated rice in particular.

In our study, we distinguished between recommended fertilizers doses and doses actually applied. On average, the number of recommended urea bags to be applied per hectare is 4.09 bags (CV=1.18 %) while the actual number of bags applied per hectare is 3.52 bag. For the case of the composite fertilizer, the recommended bags are 3.82 and number of bags actually applied is 3.27 bags. The cost of a 50 kg-bag of urea is 13,572 Fcfa and 13,500 Fcfa for the composite fertilizer. On average, per hectare spending for urea use is 46,614 Fcfa and 42,676 Fcfa for the composite fertilizer. Countries strategies of developing irrigated rice in West Africa start from the total developed irrigated land and total resource allocated to this endeavor. Implicitly this also reflects the average

rice field area allocated to individual rice farmer or household heads. The analysis of this indicator has indeed shown highly significant differences of the means of rice areas per country. Large rice fields are observed in Mali which is the country having the largest potential of irrigable and the largest actual irrigated land area. For the total sample, the average rice plot area are 0.8955 ha, 1.94 ha, 1.034 ha for dry season 2005, wet season 2004, and dry season 2004 respectively. In Mali, wet season rice irrigated rice areas are larger.

### Regression model results

For the total sample, the average ratio of paddy sales is approximately 41 %. The average paddy price for the three countries is 157. The unit cost of fertilizer used is 271.35 fcfa and 267.49 fcfa for urea and composite fertilizer (NPK) respectively.

The regression model was run for each single country. For the case of Burkina Faso, only the area of the non rice crop was significant implying a direct relation between the capacity of marketing paddy rice with quantity of other crops grown (such as the cereal maize, sorghum, millet and legumes).

For Mali, the explanatory variables that were significant is: the average size of the irrigated rice plot. Hence, the average paddy grower to sale more rice and earn more income, he needs to have a bigger rice field. In Niger also, the average size of the irrigated rice plot was significant leading to the same conclusion as in the case of Mali.

### Conclusions

The preliminary results indicate that most significant explanatory variable is the average irrigated rice plot (Mali and Niger) and total area of other crops grown

by the producer. The institutional variables were not found significant.

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