



AGRICULTURE DIALOGUE

Case Study

**Choice of Optimal Instruments for Boosting
Food Sufficiency: The case of agricultural
input subsidies in Senegal**



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CABRI Agriculture Dialogue

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Acronyms and abbreviations

FBO	Farmer Based Organisation
GDP	Gross Domestic Product
GOANA	<i>Grande Offensive Agricole pour la Nourriture et l'Abondance</i> (Great Agricultural Offensive for Food and Abundance)
IMF	International Monetary Fund
PRSP	Poverty Reduction Strategic Paper
REVA	<i>Retour vers l'Agriculture</i> (Return to Agriculture)



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1. Introduction

Food security is a major issue in Senegal. Domestic agricultural production is far from meeting the needs of the growing population. As a result, the country depends heavily on imports, which further increases its vulnerability to external shocks. For example, the combined effects of lower-than-average rainfall, on which 95% of agricultural production depends, and the price hike in global food markets in 2007 led to an unprecedented food crisis in Senegal. In response, the government in April 2008 launched a very ambitious plan, which is now known as GOANA or *Grande Offensive Agricole pour la Nourriture et l'Abondance* (Great Agricultural Offensive for Food and Abundance). The aim of the programme was to put Senegal on a pathway to attain food sufficiency by 2015. To this end, the plan, with an estimated total cost of FCFA345 billion (US\$803.85 million), focuses on three broad measures: (1) the expansion of the cultivated areas with a particular focus on irrigated land; (2) the diversification of staples, namely corn, cassava, rice; and (3) greater access to agricultural inputs and equipment.

While all three measures are complementary, this case study focuses on the third – access to agricultural inputs and equipment. Greater access to inputs invariably involves all manner of subsidies and there is also the question of fiscal sustainability of the subsidy measures. To date, under the GOANA plan, the government has provided farmers, especially those located in areas with great potential for irrigated agriculture (Senegal river, the region near the Gambia river, and the Anambe basin), with equipment, seeds, and fertilizers. More specifically, the government has subsidised the cost of seeds by 75% to US\$0.20 per kilogram, and reduced the price of fertilizers by half to US\$17 per 50 kilograms.

Fervent advocates of the intervention hail the plan as an appropriate policy response to the global food crisis of 2007–2008 and that the intervention has contributed to the observed increase in the production of various agricultural commodities, certainly in the first years of its implementation. Rice production for example increased from 193,000 tons in 2007–2008 to 604,000 tons in 2010–2011, a near three-fold increase. At the same time, imports have declined from 1 million tons to 650,000 tons. Others question whether the observed increases are necessarily associated with the subsidy. And if so, what is the value for money of such programmes? How far should (and can) the government go with such interventions has been a subject of a lively debate in recent years because the effects of input subsidy programmes on farm productivity can be tenuous if subsidies do not translate into more effective use of the subsidised inputs. Driven largely by the urgency of the world food crisis of 2007–2008, critics contend that it is the politicians and technocrats who have driven the input subsidy programme to the neglect of other forms of government support.

The CABRI Sector Dialogue will therefore discuss the following three questions:

1. Are input subsidies fiscally sustainable as an instrument for food sufficiency?
2. Is the subsidy programme well structured (design, targeting, risk, etc.)?
3. Do the observed results/impact justify the cost (value for money)?

2. Background of the agricultural sector

Agriculture plays a crucial role in the Senegalese economic and social context. But after many decades of government interventions with significant financial and technical support from foreign partners, it is not clear if the country is on target to achieve sustainable food security. Hunger and malnutrition still continue to be persistent problems. It is estimated that about a quarter of the population are exposed to hunger to various degrees. Agriculture contributed to about 14.8% of gross domestic product (GDP) in 2011 (compared to about 11.9% for Sub-



Saharan Africa), but nearly 50% below the West African average of 31%.¹ Given that a very large majority of the labour force is responsible for what could be considered a relatively small share of GDP, the context hints at a significantly low level of labour productivity in agriculture.

Agriculture in Senegal is dominated by subsistence farming. In effect, a tiny 5% of the cultivated land is oriented towards agricultural business. The latter concerns agricultural enterprises (horticulture and arboriculture) and industrial agriculture (groundnuts and cotton). It is mainly located in areas that have irrigation facilities and easy access to the main urban market of Dakar and to export markets. This lack of significant orientation to markets means that the dynamics of the agricultural sector in Senegal would more likely reveal some weak responses to incentives associated with public policies.

Agricultural growth has also been very volatile, more often below the overall growth rate of the economy, and often negative. Between 2001 and 2011, the growth rate has fluctuated within the wide range of **-22.2%** (2002) and 20.5% (2003). During the same period, agricultural activity has contracted four times, the most recent negative growth occurring in 2011. This is a result of a combination of a heavy dependence on rain and climatic conditions related to the Sahelian region. Overall, despite very large endowments with water and run-off water, less than 2% of the cultivated land is under irrigation, leaving the vast majority exposed to the climatic conditions of the semi-arid region which are associated with frequent drought and soil degradation.

The main agricultural commodities cultivated in Senegal are groundnuts, rice, and millet. These three crops combined accounted for more than 40% of the total agricultural production in 2011.² But as a result of low productivity, domestic production has consistently fallen short of matching the growing demand, as indicated in the chronic deficits of the commodity trade balance. A typical example is rice. The 2010 production of 604,043 metric tons, equivalent to US\$166.2 million, did not satisfy the domestic demand of 1.3 million metric tons. The country was then importing more than it produced, and this heavy reliance on foreign supply spelt some vulnerability to external market shocks, such as food price hikes.

The combined effects of underperformance and vulnerability of the sector translates into a weak food security profile. Malnourishment still affects a large portion of the population. In the 2010–2012 period, it affected about three million Senegalese, or 21% of the overall population of 12.8 million. Over the last two decades, the incidence of malnourishment has been stable in terms of the proportion of the population affected. This meant that the absolute number of malnourished people has been on the rise.

2.1 Agricultural expenditure

To the credit of the current and previous government administrations of Senegal, there has been a significant desire to foster agricultural productivity and improve food sufficiency since independence in 1960, despite the complexities of the socio-economic, social and climatic conditions that surround agriculture in this least developing Sahelian country. With the support of overseas development assistance, agriculture in Senegal has been one of the sectors that received significant financial contributions from the budget of the government. Figure 1 indicates the structure of the government budget expenditure on agriculture and foreign donors' support. One important feature is that spending on agriculture has risen significantly between 2002 and 2009. Spending increased from FCFA55.1 billion to FCFA170.2 billion, which amounted to a three-fold increase (in nominal terms). However, this public effort towards

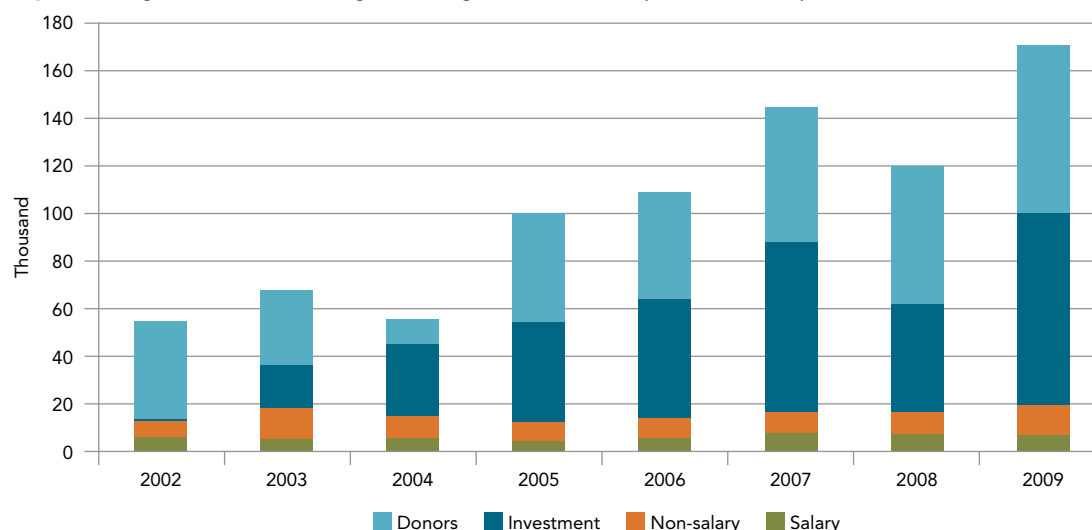
1 World Development Indicators Online. Unless otherwise specified, the same source was used for the next statistical information.

2 <http://faostat.fao.org/>.



agricultural development may seem relatively weak. It falls short of the Maputo Declaration of July 2003 by which African governments pledged to devote at least 10% of their national budget to agriculture. Since 2003, the Senegalese government has only slightly crossed that threshold in two of the years during that period (2007 and 2009), but for the overall period, the average share was lower, at 9.7%.

Figure 1: Agriculture spending in Senegal: 2002–2009 (FCFA million)



Source: DAPS, Ministry of Agriculture, Senegal.

In addition, there has been a structural shift in the public budget towards more capital spending. The latter went from FCFA1.2 billion in 2002 to FCFA80.3 billion in 2009, which is a 65-fold increase over the period. Capital spending represented 9.4% of agricultural spending in 2002. By 2009, the share of capital spending as a proportion of total agricultural spending had increased more than four times. The shift occurred in 2004. But this component of public spending tended to be more pro-cyclical than the non-capital spending, as indicated by the significant decrease in 2008. The budget crisis led to a fall by almost 40% of capital spending, while non-capital spending continued to rise. It still bounced back to its long term positive trend. Overall, capital spending averaged nearly half (47.8%) of agricultural spending over the period.

The donor community has also been increasingly interested in agriculture because of the implications for food security and poverty alleviation. Their financial support to overall agricultural spending in Senegal has risen from FCFA40.7 billion in 2002 to FDF70.0 billion in 2009, representing respectively 73.9% and 41% of the total agricultural spending. This indicates the strong reliance of government agricultural budget on foreign assistance, which so far has been very reliable. The financial and economic crises that hit donors' economies since 2007 seem to have had marginal effects on the flow of foreign assistance to Senegal. In fact, it has risen since 2005. The extent of donor financial and technical support highlights the crucial role of the foreign assistance to agriculture in Senegal.

The foregoing trends demonstrate a clear will of the Senegalese government and its foreign partners, including the European Union and the USA, to place agriculture at the centre of economic growth and poverty alleviation strategies. This is mainly because Senegal is one of the targeted countries in the US global hunger and food security initiative, "Feed the Future". For greater effectiveness of the many policy tools, including subsidy and technical assistance, there is a long-standing argument for a better alignment of donors' intervention

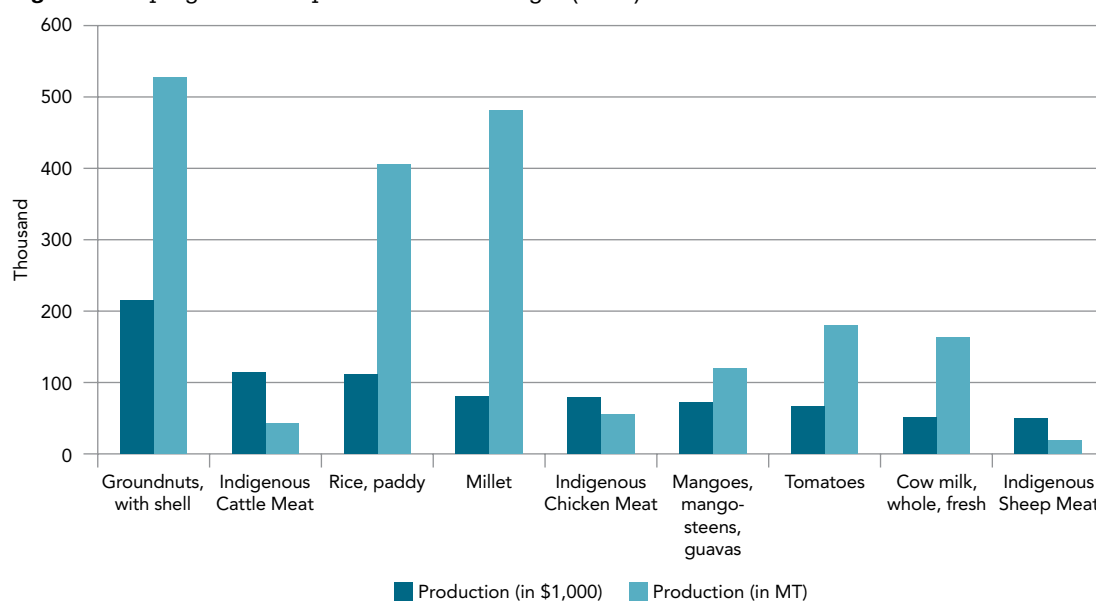


to government priorities, and that the actual disbursements of those donors must match their pledges and be done in a timely manner. The initiative to gather foreign donors around a common platform are intended to harmonise their various interventions, especially when they complement each other. Most people believe that timely disbursement and greater harmonisation of aid pledges for the agricultural sector would contribute to greater efficiency in resource allocation, and hopefully greater effectiveness of various intervention programmes that complement government's efforts.

2.2 Economic aspects at the national level

The Senegalese economy depends mostly on the agricultural sector with groundnuts, cattle meat, rice, millet, and tomatoes as some of the main products as illustrated in Figure 2.

Figure 2: Top agricultural production in Senegal (2011)



Source: FAOStat (online).

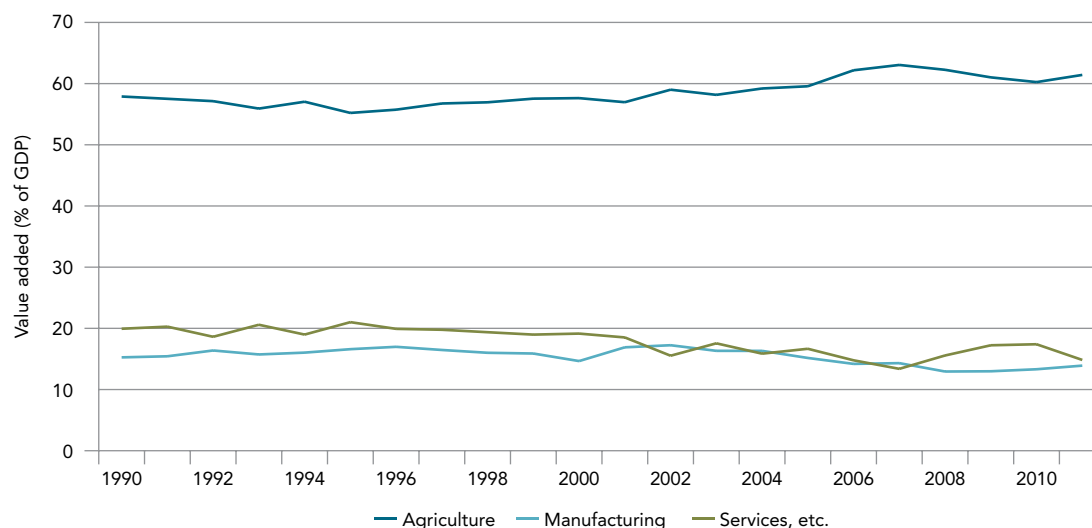
Despite the total economic growth, which started in 1996 at 4.2% and was mostly fuelled by the service sector (see Figure 3), the agricultural sector remained stagnant due to the declining production of cash crops. Major crops such as peanuts and cotton remain vulnerable to international market threats and to drought. Senegal remains one of the 10 poorest countries in the world.³ Thirty-eight percent of the population is considered poor, and 67% of them live in rural areas (Senegal/MEF, 1998).

The reforms initiated under the framework of the 2002 Poverty Reduction Strategic Paper (PRSP) (IMF, 2006) had among other priorities to promote agriculture, gender equality and women's economic independence. This is done by aiming at improving their economic status through access to credit, better education, and funding of women's development projects. The substantial share of the total budget allocated to agriculture (25%) did not seem to have favoured the primary sector's growth, which remained low at 2% in 2004 and below the 7–8% needed to reduce poverty by half before 2015 (Dia, 2010).

³ IMF, 2006; Annabi et al., 2005.



Figure 3: Agriculture, manufacturing, and services value added (percent of GDP)



Source: <http://data.worldbank.org/indicator>.

3. The implementation of agriculture subsidies

The GOANA was one of Senegal's major reforms to reach food sufficiency. The main instruments for the delivery of agricultural support would be the supply of more equipment and subsidised seeds to farmers, and also to make additional hectares of land available to farmers at no charge. The basic assumptions were that these were the major constraints to food abundance and for greater or immediate impact, the project will focus only on areas with great potential for irrigated agriculture.

Soon afterwards, another major initiative geared towards the agricultural sector would follow; that is, the Return to Agriculture or *Retour vers l'Agriculture* (REVA)⁴. More than a policy designed to promote agriculture, REVA was also a tool designed to tackle rural migration and emigration. The main instruments of REVA were improvements in commonly shared rural agricultural infrastructure, encouraging young farmers and female farmers through training in farm practices from planting to harvesting, and the provision of production tools and equipment.

Throughout these various programmes, subsidies had remained one of the most favoured tools used by the government. In 2004, fertilizer subsidies were re-introduced, the first time since 1988 (except between 1997–1999). The new subsidy programmes covered a large spectrum of agricultural crops, including groundnuts, millet, sorghum, maize and rice. The programme would mobilise large amounts of government resources. Apart from fertilizers, there were subsidies on seeds, phytosanitary products, fuel, agricultural equipment, water, and producer prices. The support programme would also take the form of exemptions from tariffs and value added tax on imports of equipment. Then, after the world food crisis of 2007–2008, various subsidies were extended to farmers as part of a government effort to increase agricultural production and to reduce the country's vulnerability to external shocks.

⁴ More details on this policy initiative can be found at http://www.ipar.sn/IMG/pdf/2006_reva.pdf (accessed on June 25, 2013).



3.1 Cost of subsidies

Subsidy programmes came with significant fiscal efforts. Subsidies increased from a meagre FCFA75 million in 2001 to FCFA36.3 billion in 2011, a 484-fold nominal increase in this 10-year period. This large increase in absolute terms is also synonymous with a similar increase in the effort of the government to support the sector. The distribution of this subsidy effort reveals that fertilizers were the main target, with more than 30% of the total subsidy amounts, followed by the commercialisation of groundnuts (27.8%), groundnut seeds (13.7%), other seeds (8.3%), and machinery and equipment (6.7%).

Subsidies continue to be the main component of the current Senegalese government involvement in agriculture. For the 2011–2012 campaign, some FCFA30.9 billion were necessary to subsidise various agricultural inputs. This financial effort went in part to the groundnuts sub-sector, with 69,000 tons of seeds that amounted to FCFA10.6 billion. In addition, with the goal of promoting diversification in agricultural production, there was a subsidy of 66 to 87% of the price of seeds for crops targeted by the special programmes (maize, millet, sorghum, rice, cassava, etc.) for some FCFA3.4 billion. Still, the subsidy of fertilizers was by far the main support tool. With more than FCFA15 billion, the government was able to subsidise almost all varieties of fertilizers to the tune of more than 50% of their price.

Table 1 provides a schematic look at various instruments of government intervention along the production chain. Government intervention may focus on the pre-production stage, often with the view to improving access to land and crucial inputs – seeds, fertilizers, equipment and betterment of farming infrastructure, particularly roads and water. As in the case of Senegal under the GOANA plan, better targeting is often the case for such interventions because government can tackle specific cultural, economic and social challenges that farmers face, including, for example, using land access to reverse rural to urban migration and attracting and encouraging young farmers, as under the REVA plan. The means of delivery also matter. There is the choice between government delivered programmes through ministry, departments and agencies, through the private sector, or through farmers associations and cooperatives. Subsidies may be delivered through outright price reductions or for better targeting through the use of vouchers.

Table 1 provides a simple framework for discussion, highlighting the range of instruments or mechanisms that may be employed at each stage, the potential fiscal needs, the signalling incentives and potential benefits to farmers, and finally the risks that may be associated with the different nodes of intervention.



Table 1: Instruments and mechanisms of agricultural support along the production chain

	Pre-production stage	Production stage	Post production
Objectives	<ul style="list-style-type: none"> • Improve accessibility to inputs • Expand growing capacity • Encourage adoption of new technology • Improve food security 	<ul style="list-style-type: none"> • Expand output • Minimise cost • Improve quality • Enhance production technology 	<ul style="list-style-type: none"> • Improve incomes • Improve food availability and access
Instruments	<ul style="list-style-type: none"> • Land availability (land banks) • Targeted input subsidy (voucher) programmes <ul style="list-style-type: none"> – Seeds – Fertilizer – Equipment • Subsidised credit scheme • Common infrastructure <ul style="list-style-type: none"> – Roads – Irrigation • Farmers Association unions and cooperatives. • Private sector wholesalers and retailers, dealers network 	<ul style="list-style-type: none"> • Disease control • Extension services • Technological services • Quality control • Farmers Associations, unions, cooperatives 	<ul style="list-style-type: none"> • Post-harvest services • Storage facilities • Transportation (access to markets) • Price support • Food supply programmes
Fiscal needs	<ul style="list-style-type: none"> • Recurrent government support through budget by way of subsidies needs to be funded on annual basis • Risk of expenditure substitution by farmers who apply for same amount of seeds and fertilizers but enjoy cost saving • Administrative cost of managing and monitoring subsidy programmes 	<ul style="list-style-type: none"> • Recurrent expenditure for disease control and extension services largely through payroll and administrative spending in managing programme • Manpower and skills development costs • Cost sharing may compromise programme effectiveness 	<ul style="list-style-type: none"> • Storage facilities and transportation may be one-time capital expenditures • Price support schemes may require income buffers
Incentives	<ul style="list-style-type: none"> • Input subsidy can be targeted to individual farmers on the basis of years of experience, acreage or landholding size, household assets, location, crop type • Incentive compatible for farmers to encourage use of inputs to boost productivity, especially for those who otherwise cannot afford the desired amount of inputs 	<ul style="list-style-type: none"> • Incentive compatible with farmers because of the positive externalities in the provision of these services with high lump-sum fixed costs for individual farmers. Disease control is a public good as it does not benefit one farmer alone 	<ul style="list-style-type: none"> • All farmers benefit proportionate to size of harvest and productivity
Risks	<ul style="list-style-type: none"> • Borne largely by government depending on the nature of the subsidy schemes • Inputs may be transferable or re-sold in different markets while applying less than desired amount, especially in the case of fertilizers • Susceptible to “leakage” – inputs may be diverted and sold to farmers and traders in a different location or for different crops not covered by subsidy scheme 	<ul style="list-style-type: none"> • Minimum risks to both farmers and government since programme is centrally delivered in kind and is non-transferable 	<ul style="list-style-type: none"> • Minimum risks to farmers and government since programme is centrally delivered in kind, non-transferable. • May have to share maintenance costs. • Price support risk is borne solely by government



3.2 Discussion point on subsidies

While input subsidies (be it seeds, fertilizers and equipment) may guarantee accessibility and can be targeted for specific groups, specific crops and region, the inputs are transferable and therefore subject to leakages. That is, those who benefit from improved access to these inputs may divert and sell to other farmers or to traders. Senegal has relied exclusively on input price reductions – as high as 75% for seeds and 50% for all fertilizers. General input price reductions are subject to abuse limited only by the extent of the availability of the inputs. It is conceivable that farmers favoured by the price reduction scheme would acquire the subsidised inputs beyond their needs and transfer the surplus to other farmers outside of the scheme.

4. Impact of subsidies: Micro-evidence from sample survey

In June 2013, a team of surveyors interviewed farmers in the agricultural area of the Senegalese River valley. Some of these farmers received the fertilizer subsidy and others did not. The information collected is summarised in Box 1.

Box 1: Information collected from survey

- General farms' and farmers' characteristics: owner's education/training and experience, affiliation to farmers' union and associated benefits, land size and ownership, types of cultivated crops, etc.;
- Input usage: labour force (size, education, experience, unit cost, etc.), quantity, unit price, fertilizers, seeds, machines/equipment, water usage (rain, irrigation), electricity, etc. and government subsidy on those inputs;
- Output: total production, share that is sold, unit price, main market, type and extent of government support (if any), storage facilities, processing units, etc.;
- Investment and finance: value of new and old equipment, loan application, major financial institutions, and terms of the loans (cost, maturity, guarantees).

4.1 Profile of farmers

The sample consisted of one hundred and eighty three (183) farmers. They were scattered over three main rural communities: Diama (62%); Gandom (19%); and Ronkh (19%). In most cases (88.5%), the owner of the land was also the one who cultivated it. For the average farmer, the activity on the current land has been going on for nearly three decades, which was a decade short to match the length of his farming experience. Some 53.3% of farmers had some form of formal education, but the vast majority of them are not very educated: 48.9% of the total sample barely attained primary or secondary levels. A large majority of farmers (85.3%) were affiliated to farmers' unions. They contributed annually for an average of FCFA104,138 and received in return a variety of benefits ranging from some form of help (22.4%), subsidy (27.9%), some advantages in kind (9.3%), purchase and marketing support (7.7%), insurance services (7.7%), and others (10%).

More than 62% of farmers cultivated at least two distinct pieces of land. The size ranged from less than a hectare (ha) to 70 ha, with an average of size of 2.0 ha, suggesting a large number of small farm holders. The most frequent forms of land acquisition were affectation by the rural community (40%) and heritage (30%). Most of the cultivated land (71.7%) was located on areas already designated for agricultural activity and with adequate infrastructure, like roads. The farming activity was somewhat diversified, with only 31.7% cultivating just one product. Rice



is by far the most cultivated crop: it occupied more than 66% of all land. Onions came next with 22%, followed by tomatoes with less than 5%. All farms used some form of irrigation.

In more than 90% of the farms, the labour force was no more than 5 workers. This is a further indication of the low scale of farming activity in general. The corresponding total salary averaged FCFA210,253. The total cost of labour however went beyond salaries, for 88.8% of farmers are also paid in kind, namely some part of the harvest. Because most of the farms used irrigation, the total usage of water for the average farm was 3 886.8 cubic meters, which amounted to a total cost of FCFA105,112. Fertilizers were quite intensively used in the farming activities. More than 82% of farmers used more than one type of fertilizers, and the average amount used was more than 384.4 kg, or 192.2 kg per ha, costing on average FCFA87,415.

Machinery and equipment used in the farming combined both archaic, traditional methods (use of animals, mainly horses) and modern equipment (such as irrigation equipment and tractors). The end-period market value of the total capital stock was estimated at FCFA3.4 million. This relatively low capital accumulation might be associated with the small scale of the activity as well as some difficulties to accessing financial markets. The range of borrowing opportunities was in effect quite narrow. More than two-thirds (67.7%) of the farmers self-financed their investment through non-distributed profits. Access to banks and microfinance institutions is very limited: 14.8% for the former, 7.7% for the latter. Alternative sources of financing included commercial loans from input providers (1.6%), from clients (5.5%), and relatives and friends (2.7%). In general, farmers sold most of the production. Only one-fifth of the total harvest was not sold. Most likely, the unsold part could be either used for farmers' and their workers subsistence or it might be damaged because of a lack of storage facilities. About a third of farmers did not own storage facilities, individually or collectively. For those who did, more than 55% did own storage facilities for themselves, and 45% used collectively-owned facilities.

4.2 Distribution of fertilizer subsidy

Government support in the forms of subsidy programmes covered large aspects of farming activities, but was mainly focused on fertilizers.⁵ Table 2 shows the extent of the government effort to subsidise farmers. Of the 179 farmers who used fertilizers, more than half benefitted from government subsidy programmes. It is most likely that those who did not, were using traditional fertilizers like composting or manure or fell outside the eligibility criteria for subsidies. Furthermore, there is some heterogeneity in the extent of the subsidy benefits. As a share of fertilisers' price, government support ranged from 5% to 100%. It is conceivable that those who received lower price discounts might have been using some types of fertilizers that were not supported by any public programmes.

Table 2: Extent of government subsidy on fertilizers

	Count	Average	Minimum	Maximum
Subsidy beneficiaries	183	0.5	0	1
Subsidy on price (FCFA)	92	117.6	10	500
Price (FCFA)	179	245.4	26	500
Subsidy: share of price (%)	92	82.1	5	100

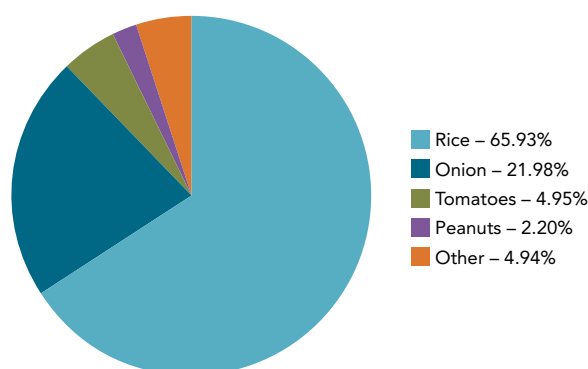
⁵ The questionnaire also asked farmers whether they received some subsidy for other inputs like water, seeds, land acquisition, equipment, electricity, etc. No meaningful answers were collected: either there were no such programmes, or they did not know the extent of the public support. As a consequence, we decided to focus on fertilizers only.



5. Analysis

Rice is the most produced crop among the surveyed farmers. Specifically, 66% of farmers produced rice as their primary crop, as illustrated in Figure 4. The remaining farmers considered onion, tomatoes, and peanuts as their primary crop. More than 82% of farmers used fertilizers, as previously mentioned. The survey indicates that on average farmers used different types of fertilizers. Among these are diammonium phosphate, NPK 10 10 20, NPK 09 23 30, and Urea.

Figure 4: Distribution of primary crop produced by farmers



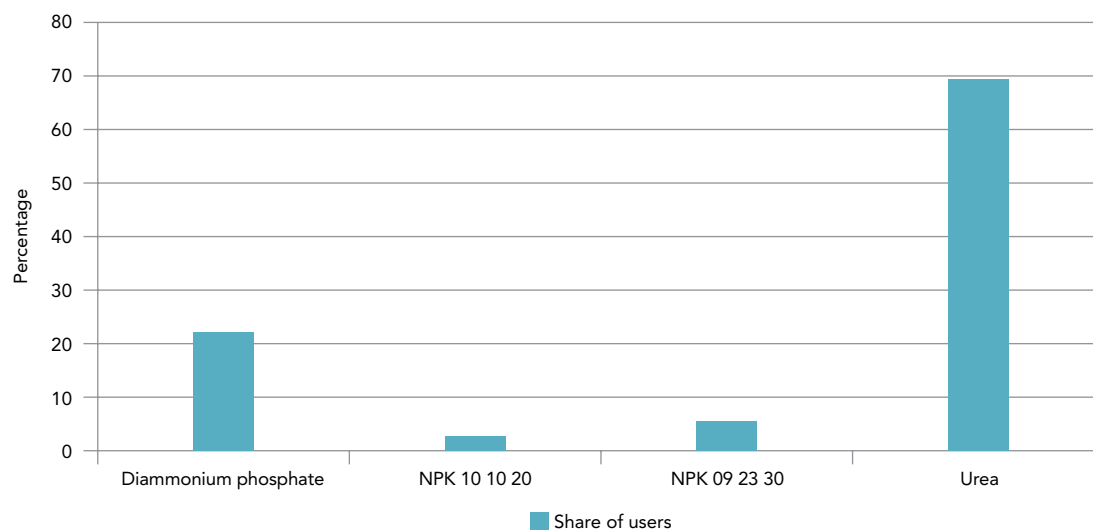
Source: Survey data, June 2013.

Figures 5 and 6 display the distribution of primary and secondary fertilizers used. It was found that Urea and diammonium phosphate are the two most used fertilizers. While 69% of fertilizer users considered Urea as their primary fertilizer, 22% considered diammonium phosphate as their primary fertilizer. Further, while 37% of fertilizer users considered di-ammonium phosphate as their secondary fertilizer, 36% considered Urea as their secondary fertilizer. When matching crop use and fertilizer choice, we found that 70% of rice producers consider Urea as their primary fertilizer and 28% considered diammonium phosphate as the primary fertilizer. On the other hand, 78% of onion producers considered Urea as primary fertilizer while only 10% considered diammonium as secondary fertilizer.

The rest of the analysis focused on rice producers only. This was done to place greater emphasis on the relationship between the subsidy and the productivity of the farmers. The rice producers were divided into three groups; producers who do not use fertilizer (2.5%), producers who used fertilizer but did not receive the subsidy (44.17%), and producers who used fertilizer and received the subsidy (53.33%). The outcome was compared in Table 3.

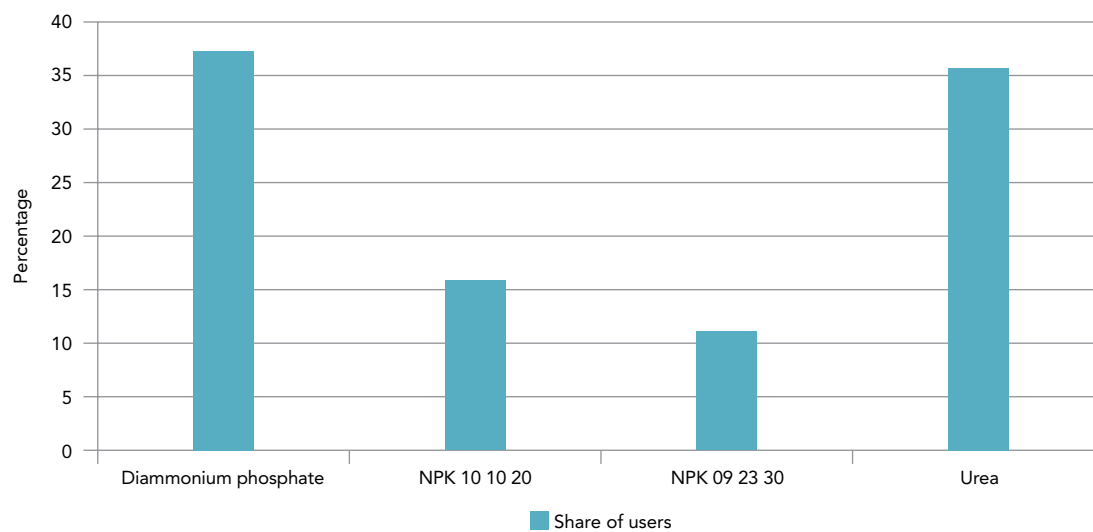


Figure 5: Share of primary fertilizer used for the production of primary crop (N=180)



Source: Survey data, June 2013.

Figure 6: Share of secondary fertilizer used for the production of primary crop (n=126)



Source: Survey data, June 2013.

Table 3: Comparative analysis of fertilizer users and subsidy recipients

Variables	No fertilizer	Fertilizer and no subsidy	Fertilizer and subsidy
Years of education	5	3.5	3.4
% of FBO member	100	94	92
Productivity (t/ha)	3.2	3	4.1
Quantity of fertilizer used	0	411	572
Land size	0.7	1.2	1.4
Subsidy as share of price			60%

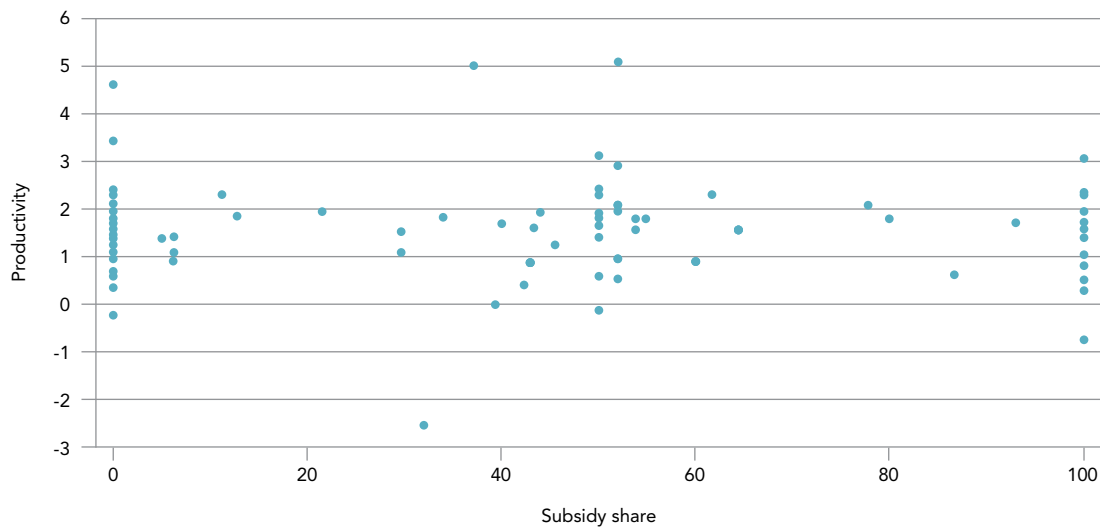
Source: Survey data, June 2013.



When comparing the variables in Table 3 among the three groups, it is noticeable that there are not drastic differences between them. Years of education, Farmer Based Organisations (FBO) membership, and land size can be deduced to be similar across the three groups. However, there are notable differences between the second and third group with regards to the quantity of fertilizers used and productivity. Farmers who used fertilizers and received a subsidy are associated with higher use of fertilizers and have higher rice yields. It is important to warn the reader at this point that no causation can be deduced from this illustration. More rigorous analysis with data collected under an experimental environment is necessary before one can draw such a conclusion.

On average the fertilizer subsidy covered 60% of the fertilizer price among subsidy recipients. We compare this share with the natural logarithm of rice productivity and derive the graph presented below (Figure 7). The graph seems to suggest that the difference in productivity between producers who receive 100% subsidy and those that receive 10% is negligible. In other words, although we found differences in productivity and fertilizer usage between subsidy recipients and those who did not receive it, similar conclusions cannot be derived when comparing fertilizer subsidy recipients by the share of the fertilizer price the subsidy covered.

Figure 7: Comparing productivity and subsidy



Source: Author's estimates.

The next natural question to ask is on the value for money of the subsidy. This can be done by comparing the cost of the subsidy to the additional output associated with the subsidy. In other words, how does the 60% reduction in fertilizer price (the cost) compare with the 37% increase in rice productivity? This simple comparison alone is not sufficient. Given the fact that this intervention used a rather transferable instrument, there are reasons to believe that there may be some spill over or leakages. Farmers may find it more beneficial, at least in the short term, to sell their subsidised fertilizers to traders/farmers of neighbouring countries who do not benefit from any other form of subsidy. Or the subsidy could have lured previously discouraged farmers to start producing again. Whether positive or negative, these leakages can be significant enough to influence any value for money analysis of the subsidy.



References

- Annabi N, Cisse F, Cockburn J and Decaluwe B (2005) *Trade liberalization, growth and poverty in Senegal: A dynamic micro simulation GGE Model Analysis*. CIRPEE Working paper no. 05–12. [article&id=86&Itemid=140](#), (accessed on December 2010).
- Dia Sow F (2010) *Intra-household Resource Allocation and well-being: the case of rural household in Senegal*, PhD Dissertation.
- <http://www.data.worldbank.org/indicator>.
- <http://www.faostat.fao.org/>.
- http://www.ipar.sn/IMG/pdf/2006_reva.pdf, (accessed on June 25, 2013).
- International Monetary Fund (2006) *Senegal: Poverty Reduction Strategy Paper – Second Annual Progress Report*. Washington, D.C.
- Sénégal Ministère de l’Economie et des Finances (MEF), DPS (1998) *Enquêtes Sénégalaise auprès des Ménages (ESAM), 1994–1995*, 178p.

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