

Mali Food Security Policy Research Program

FERTILIZER SUBSIDY IN MALI: ORIGINS, CONTEXT AND EVOLUTION

By

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Food Security Policy Research Papers

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EXECUTIVE SUMMARY

The present research aims to trace the main historical references for agricultural subsidies, including fertilizers, in Mali. It gives an overview of the major historical dates that have influenced the use of fertilizer subsidies, to capitalize learnings and lessons learned from past experiences to improve current practices. The methodological approach is based on a review of the literature, use of available secondary data and interviews with key individuals who have worked on fertilizer use and distribution in Mali.

The analysis of the results shows that the fertilizer subsidy has always been an integral part of the agricultural development strategies of the successive governments of the Republic of Mali from 1960 to 2019. Regardless of the adopted economic system (socialist or liberal) and the vicissitudes of history, the practice of fertilizer subsidies has never disappeared from the financing strategies of agriculture in Mali.

In general, fertilizer subsidies have been perpetuated over time, sometimes reducing the constraints imposed by donors. Moreover, they have recently been justified by the need, on the one hand, to encourage the use of fertilizers to increase agricultural production and productivity in order to ensure food security and to protect farmers against the volatility of fertilizer prices, the adverse effects of droughts on crops and incomes, on the other hand.

Thus, in the early years of independence, under the prevailing socialist economic system, large, uncontrolled fertilizer subsidies were allocated to rural development operations (ODRs). Their mismanagement has led to unsustainable debt for the state without a real impact on the living conditions of the people. For this reason, as part of structural adjustment policies, fertilizer subsidies have been discouraged or even eliminated for most agricultural sectors. But in the wake of the global food and nutrition crisis of 2007, they were rehabilitated and then put back on track to increase agricultural production and productivity.

Currently, the fertilizer subsidy program implemented through paper and electronic technical delivery systems is becoming increasingly controlled to ensure traceability and transparency. However, the cost of this fertilizer subsidy program is increasing and the impact on beneficiary populations remains mixed. Hence the need to reconcile fertilizer subsidies with sustainable investment needs in agriculture, including through public investment (e.g., research and development, extension services and irrigation infrastructure).

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ACRONYMS

APCAM	Assemblée Permanente des Chambres d'Agriculture du Mali
BCM	Banque Commerciale du Mali
BDM	Banque de Développement du Mali
BNDA	Banque Nationale du Développement Agricole
CCCAM	Caisse Centrale de Crédit Agricole Mutuelle
CMDT	Compagnie Malienne de Développement des Textiles
CPS/SDR	Cellule de Planification et de Statistique du secteur Développement Rural
DAP	Ammonia Phosphate
DNA	Direction Nationale de l'Agriculture, Ministry of Agriculture
ECOWAS	Economic Community of West African States
FDS	Support Funds
FI	Input Funds
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
LOA	Loi d'Orientation Agricole
MA	Ministry of Agriculture
MAFAP	Monitoring and Analysis of Food and Agricultural Policies in Africa
MAFDE	Mécanisme Africain de Financement du Développement des Engrais
ODR	Rural Development Operations
OHVN	Office de la haute Vallée du Niger
ON	Office du Niger
OPAM	Office des Produits Agricoles du Mali
OSPR	Office de Stabilisation et de Régulation des Prix
PDA	Agricultural Development Policy
PASA	Structural Adjustment Policy for the Agricultural Sector
PNISA	Plan National d'Investissement dans le secteur agricole
PPAO	Programme de Productivité Agricole en l'Afrique de l'Ouest
SAP	Structural Adjustment Policy
SCAER	Société de Crédit Agricole et d'Équipement Rural
SCAER	Service de Crédit Agricole et d'Équipement Rural
SNSA	Stratégie Nationale de Sécurité Alimentaire
WAAPP	West Africa Agriculture Productivity Program.
WB	World Bank
WTO	World Trade Organization

INTRODUCTION

Context

Mali is an agro-sylvo-pastoral country with more than 70% of its population living in the primary sector. The agricultural sector's contribution to gross domestic product is estimated at nearly 34% and accounts for almost 20% of export earnings (INSTAT 2018). The share of crop production is about 45% against 39% and 8% for livestock and fishing respectively.

Farming is mostly carried out by small family farms, growing mainly millet, sorghum, maize, rice and cotton. A large part of the production is self-consumed by family farms.

In Mali, as in most countries of the subregion, there is a great diversity of agricultural production systems. Most of these systems are characterized by low use of modern inputs such as fertilizers, with the exception of the southern zone (cotton production system) and the central zone (irrigated rice production system with total water control).

As part of the intensification of rice and cotton, farms use organic manure, but also chemical fertilizers. These two crops alone consume nearly 90% of fertilizers. At the country level, the level of fertilizer use remains very low, with an average of 44.2 kg/ha in 2016 (BM 2016), which is well below the 50 kg/ha target set by African governments through the Comprehensive Program for the Development of Agriculture in Africa.

Since Mali's independence, the various development policies and strategies have placed particular emphasis on the development of the agricultural sector. These were first developed in the context of a socialist economy with five-year development plans to subsidize agriculture, in particular fertilizers, through product-specific development programs (e.g., peanuts, millet, etc.), and then through so-called rural development operations (ODRs). Then, with the context of liberalization and disengagement of the State from the productive sectors, the ODRs not having been eliminated, the CMDT and the Office du Niger have been restructured with new missions focusing on target activities. Thus, the missions of the Office du Niger have been refocused on water management, maintenance of primary and secondary infrastructures, delegated project management, management of lands registered in the name of the State and of rural council to farms. On the other hand, rice processing, the construction of agricultural equipment, development and rehabilitation work have been discontinued. As for the CMDT, its missions are focused on the management of the cotton system, while the activities of maintenance of rural roads, transport of cotton and inputs have been privatized (MA 2007). In this context of liberalization and refocusing of the role of the State, agricultural subsidies have been discouraged.

Following the global food and nutrition crisis of 2007, the use of subsidized fertilizer for the benefit of farms has once again become an integral part of the agricultural development strategies of the Government of the Republic of Mali. This strategy is in line with the vision of the Loi d'orientation agricole (MA 2006), which, in Article 24, states that: "The State and local authorities grant subsidies and / or support to farms under contracts for the conservation and sound management of natural resources". It also finds part of its justification in the Agricultural Development Policy, concerning the management of food and nutrition crises, notably that of 2007/2008, which rehabilitated the intervention of the State in favor of the agricultural sector. In response to this crisis, Mali has put in

place emergency measures to facilitate access to food and short and medium-term measures to boost agricultural production through the supply and subsidy of inputs and agricultural equipment.

Fertilizer subsidies account for an increasing share of agricultural spending. Fertilizer subsidy amounts represent almost 90% of the cost of the fertilizer and seed subsidy program Theriault, Traoré et al. (2015). Since the global food and nutrition crisis of 2007/2008, the budgetary resources allocated to the subsidy of agricultural fertilizers have increased significantly from about 11 to nearly 40 billion CFAF between 2008 and 2017 (MA 2007).

The sustainability and durability of the fertilizer subsidy policy is today one of the main areas of consideration for public authorities. The extent of the expenditure related to these grants was highlighted by the International Monetary Fund's mission to Mali in 2013, which recommended that the Malian government prepare a proposal for agricultural subsidy reform to limit its impact on the state budget.

Despite their importance in the financing of agriculture, fertilizer subsidies remain poorly documented in Mali and their historical references are unknown to the main actors. The analysis of these references allows actors to have a historical repository of past practices in agricultural subsidies. It also makes it possible to report on the developments observed, as well as to clarify the current context. The document sheds light on current practices in light of past experiences.

Objectives

The present research aims to revisit the main historical references for agricultural subsidies, and more particularly fertilizers, in Mali, in order to deepen the reflection on their origins and to find ways of improvement.

Its objectives are : (1) to outline the major periods that influenced agricultural subsidies in Mali; (2) to identify the various subsidy programs implemented; and (3) to capitalize on lessons learned and previous experiences in order to improve current fertilizer subsidy practices.

The document is structured as follow. The methodological approach is explained in the second section. The third and fourth sections, relating to the results of the study, outline the historical references of fertilizer subsidies in Mali and characterize the different subsidy practices in effect. Finally, the final section on conclusions focuses on key lessons learned as well as policy implications.

METHODOLOGY

To achieve the objectives of this work, the methodology adopted is essentially based on different sources of data and information on agricultural subsidies and fertilizers in particular.

In this respect, and as a first step, documentation and collection of available secondary data have been carried out. They concerned Mali's agricultural development policy documents, legislative and regulatory texts, articles and reports on input subsidies in Mali and other countries in connection with the 2006 Abuja Summit Declaration on Fertilizers in Africa. The figures come from the Institut d'économie rurale, the Institut national des statistiques, the Cellule de planification et de statistique du secteur du développement rural, the Ministry of Finance (Direction générale du budget (DGB)) and the Direction nationale de l'agriculture.

In a second phase, informal and semi-structured interviews were conducted with resource persons (former Ministers of Agriculture, former Directors of Rural Development Services, Director of

Agriculture, Technical Advisors to the Primature) having been the architects of various agricultural subsidy policies since independence.

In the third stage, the collected information was processed and analyzed by triangulating the information from the contact persons with the information from the available documents and statistics.

HISTORICAL REFERENCES FOR FERTILIZER SUBSIDIES IN MALI

From 1960, date of independence to the present day, Mali has known two economic systems, the socialist system and the liberal system, which can be subdivided into four main periods depending on the trends in fertilizer subsidies: (1) the centralized state period (1960-1980), of socialist inspiration; (2) the transitional period towards economic liberalism, structural adjustment (1980-1990); (3) the period of liberalization of the agricultural sector (1990-2005) and; (4) the period following the 2007/2008 global food and nutrition crisis (from 2007 to the present).

For each of the selected periods, the main agricultural policy measures that influenced agriculture and farm input subsidies are presented in Table 1.

Table 1: Changes in agricultural subsidies from 1960 to the present day

Economic system	Socialist system	Liberal system		
Period	Centralized state 1960-1980	Transitional (Structural Adjustment) 1980-1990	Liberalization of the agricultural sector 1990-2005	After the global food and nutrition crisis from 2007 to the present
Key measures affecting agricultural policy and input subsidies	<ul style="list-style-type: none"> - Strong state intervention; - Economic planning; - Attempt to exploit collective fields; - Supervision of production based on export channels; - Agricultural trade administration; - Financing and supply of inputs; - Low participation of farmers and private agents in decision-making 	<ul style="list-style-type: none"> - Macroeconomic reforms; - Refocusing the role of the state; - State withdrawal from productive activities, marketing and pricing; - Beginning of liberalization of cereal products; - Beginning of private sector strengthening 	<ul style="list-style-type: none"> - Liberalization of agricultural markets; - Liberalization of the supply of agricultural inputs and their privatization; - Strengthening the private sector 	<ul style="list-style-type: none"> - Abuja Declaration of 2006 on fertilizers for the realization of the Green Revolution in Africa; - Adoption of the LOA, August 2006; - Adoption of the PDA, August 2013; - Adoption of an agricultural subsidy policy, in 2008 "Initiative riz" following the global food and nutrition crisis of 2007/2008
Subsidy program	Subsidy financing of agricultural inputs and equipment through state-provided distribution and credit mechanisms	Subsidy financing of agricultural inputs and equipment through state-provided distribution and credit mechanisms	General program on cotton inputs through an Inputs Fund (FI)	<ul style="list-style-type: none"> - Initiative riz in 2007/2008 ; - Subsidy program for agricultural inputs and equipment
Objective of subsidy program	1960-1970 : Development of industrial crops to finance the economy; 1970-1980 : Implement the food strategy to achieve food self-sufficiency	Implement the food strategy to achieve food self-sufficiency	Achieve food security	<ul style="list-style-type: none"> - Achieve food sovereignty; - Encourage the use of fertilizers by making them more accessible to the producer; - Increase production and agricultural productivity
Cost of subsidy program	<ul style="list-style-type: none"> - Financial impact of the very high subsidy on the state budget; - Cumulative deficit of the Office de commercialisation des céréales du Mali (OPAM) reaching US \$80 million (about 40 billion CFAF) 	<ul style="list-style-type: none"> - Phasing out of input subsidies; - Low financial impact of subsidies on the state budget; - Lower production and productivity 	<ul style="list-style-type: none"> - Removal of the subsidy policy for agricultural inputs and equipment except the cotton zone; - Low impact of input subsidies on the state budget (only cotton received subsidies with World Bank authorization); - Lower production and productivity 	High financial impact on the national budget, 11 to 36.7 billion between 2008 and 2017.
Mechanism for implementing the agricultural subsidy	- Access to agricultural input subsidies through Rural development and development programs	- Access to agricultural input subsidies through Rural development operations	- Access to agricultural input subsidies through CMDT	<ul style="list-style-type: none"> - Access to inputs through a technical guarantee from the technical services of the Ministry of Agriculture; - Access to inputs through an electronic bond (e-voucher) directly linking supplier and farmer.
Targeted crops	Industrial sectors (cotton, groundnuts, tea, dah, sugar cane), and cereals (rice, millet, sorghum)	Industrial sectors (cotton, sugar cane, tea), and cereals (rice, millet, sorghum)	Cotton sector	Rice, cotton, maize, millet sorghum, wheat, cowpea
Targeted producers	Any producer of the targeted crops	Any producer of the targeted crops	Any producer of cotton	Any producer of the targeted crops
Reason for the end of the program	<ul style="list-style-type: none"> - Producer debt and ODR; - Unsustainability of subsidy program costs due to mismanagement of agricultural inputs 	<ul style="list-style-type: none"> - ODR debt; - Unsustainability of subsidy program costs due to mismanagement of agricultural inputs; - Start of implementation of structural adjustment programs 	<ul style="list-style-type: none"> - Implementation of PASA ; - Accession of Mali to the World Trade Organization (WTO) in 1995; - Limitation or elimination of agricultural subsidies 	- NA (Not Applicable) because the subsidy program is underway, but its cost is increasing.

The Centralized state period (1960-1980): a heavily subsidized economy

During the first years of independence, everything revolved around the State which was the only master of the game. The economy was planned and heavily subsidized with a predominance of the State in all sectors of development.

The Government of the Republic of Mali, like most West African governments, was particularly concerned with rapidly advancing industrialization through import substitution. Agriculture was seen as a supplier of cheap food, foreign exchange and labor to fuel growth in non-agricultural sectors. Agricultural policies were therefore designed to extract resources to contribute to the growth of non-agricultural sectors (Hollinger 2015).

Thus, at the beginning of the first years of independence (1960-1970), the main industrial crops targeted through programs were cotton, groundnuts, dah, tea and sugar cane. Cotton originally grown in the Office du Niger area (irrigated cotton) moved to the Koutiala Plateau because of its low profitability compared to rice (1.1 t/ha of cotton versus 1.2 t/ha of rice), its high need for labor and the arduousness of cotton work (Vittorio 1977). Concerning groundnuts, its cultivation was widespread in the circles of Kita, Kolokani and Bafoulabé. With regard to dah, the area of choice was the San circle. As for tea, it was grown in the region of Sikasso. And finally, sugar cane in the Office du Niger area.

To meet the food needs of the population and ensure food self-sufficiency, the Malian government has implemented a food strategy that has led to the creation of the Office des produits agricoles du Mali (OPAM) in 1965. This strategy consisted of the implementation of a set of measures that the State had taken since the research, extension, marketing of cereals. The aim of the intervention was to make the production of cereals a bigger incentive for the producer while being affordable to the consumer. In this respect, the State has focused on cereals consumed (rice, millet, sorghum and maize), creating service delivery structures geared towards the promotion of several products in different geographical areas. Development actions in agriculture were planned in a five-year plan and implemented by autonomous organizations called programs such as cotton, peanuts, rice, tea, dah, sugar cane, millet, sorghum and later, through rural development operations (ODRs).

Guidelines were issued by the State, on the basis of technical work from a committee on prices and incomes, created for this purpose, to maintain low prices to the producer and the consumer according to the level of wages which was also very low. Consumer prices were maintained by means of public storage. The supply of inputs and support services was also subsidized. Input markets were considered highly volatile, unreliable and characterized by unequal bargaining power between farmers and traders, resulting in both farmer and consumer exploitation (Hollinger 2015). These guidelines were implemented by the Office de stabilisation et de régulation des prix (OSPR), which was also responsible for ensuring the proper implementation of policy measures and managing subsidies to public organizations. To ensure the effective implementation of its policy on the ground, the State has implemented its monetary instruments of sovereignty, including the Banque commerciale du Mali (BCM) and the Banque de développement du Mali (BDM) for the financing of agricultural equipment through the establishment of a Common Fund managed by the Secretariat of State for Agriculture (Kone 2010).

From 1964, the State undertook a policy of modernization of Malian agriculture. In this regard, it has created a specialized service called Service de crédit agricole et d'équipement rural (SCAER) under the supervision of the BDM responsible for ensuring the supply of inputs and agricultural

equipment, in particular in areas growing cotton, groundnut and rice. It was established in 1971 as an Agricultural Credit and Rural Equipment Corporation (Société de crédit agricole et d'équipement rural) to support producers in the cotton, groundnut and rice growing areas with inputs and agricultural equipment. This company has played both the role of central input supply source and credit institution through agricultural subsidies. It transferred to the ODRs the inventory of supplies, inputs and agricultural equipment which in turn delivered them to the producers in their respective areas and recovered the repayments (MA 2007)

Consequently, subsidies granted to SCAER have made it possible to use input selling prices and farm equipment within the reach of farmers in the areas supervised by the ODRs, which has greatly favored the equipment of the rural world (Bah 2000). During this period, successive droughts caused the SCAER to malfunction, as it was difficult for the ODRs to repay the small repayments they received from producers. Between 1976 and 1977, the cumulative deficit of the Office de commercialisation des céréales du Mali reached US\$80 million, or about 40 billion CFAF (Humphrey, 1986 as quoted by (Hollinger and Staatz 2015). This large deficit led to a reduction in financial resources and undermined the policy of subsidizing inputs and agricultural equipment, leading in 1980 to the shutdown of the SCAER.

The period of structural adjustment (1980-1990): questioning agricultural subsidies

Until the early 1980s, the logic of the Centralized state continued to prevail in Mali's agricultural development strategies. Achieving food self-sufficiency was at the heart of the government's concerns. In addition to industrial crops (cotton, tea, sugar cane), primary cereals (rice, millet, sorghum) were targeted to provide food for the population. The subsidy of agricultural inputs was always done through the ODRs which provided agricultural credit by giving priority to the distribution of loans on recovery. The objective was to place the maximum of inputs and agricultural equipment, which was supposed to induce development.

A major constraint of the system was the low loan repayment rate. The debts recorded led banks to lose their interest in agricultural credit, leading to the creation of the Banque nationale de développement agricole (BNDA) as a banking institution specializing in the financing of agriculture in 1981. The BNDA was also very quickly confronted with the recurring problems of unpaid loans. Indeed, in Mali, as in most developing countries, state-owned banks were directly responsible for implementing government agricultural policy with subsidized or even negative interest rates, leading to a higher risk of debt. (Griffin 1996, Neveu 2001). When the interest rate applied by a bank to its customers is negative, the risk to the borrower disappears and the demand for credit far exceeds the available funds. For this reason, bank loans have not always been used effectively, hence their non-reimbursement.

In this respect, in the late 1980s, the finding was bitter. The ODRs were in fact poorly managed and were gradually closed or restructured. The bankruptcy of these operations has led to outstanding debts at unsustainable levels. From 1987, the subsidy policy for inputs and agricultural equipment was definitively abandoned (AGRA 2018) .

Due to the bankruptcy of the ODRs, a vast program of reform and structural adjustment was undertaken by the State in relation with its partners, notably the World Bank and the International Monetary Fund. Structural adjustment consisted of three main components: (1) fiscal austerity to restore fiscal balance; (2) the liberalization of many sectors of the economy, the privatization of some public enterprises and the abandonment by the public sector of many areas of service

provision, marketing and agricultural finance; and (3) closer alignment of domestic prices with international prices, largely through the devaluation of the CFA franc (Hollinger 2015).

These reforms led to the government's withdrawal from the productive sectors and the liberalization of the economy. Most industrial units and state-owned companies have either been closed or restructured for the benefit of the private sector. This was the beginning of the structural adjustment phase of the agricultural sector (PASA) and with it, the abandonment of agricultural financing. This has had the effect of limiting the tasks of supervision and development of the rural world entrusted to the major development structures, in particular the Office du Niger and the Compagnie malienne de développement du textile (CMDT). Some missions have been transferred to local populations as part of the empowerment of local actors.

As part of the implementation of this adjustment program, agricultural subsidy policies have been discouraged by the major donors. Several measures to liberalize the economy began to emerge. For example, the monopoly of the Office des produits agricoles du Mali (OPAM) was terminated in 1986. With the exception of the cotton area, Mali has decided to terminate the policy of subsidizing inputs and agricultural equipment (MA 2007, Smale 2019). This measure was followed in 1989 by the liberalization of imports and internal trade in cereals.

The removal of these agricultural subsidies has been considered by many authors as a mistake in agricultural development. African Development Bank President Adesina argues that the end of government subsidies to African farmers linked to structural adjustment programs was an absolute disaster (Fleshman 2008).

The period of liberalization of the economy (1990-2005): from the limitation to the removal of agricultural subsidies

In the early 1990s, Mali definitely embraced economic liberalism. It became a full member of the World Trade Organization (WTO) in 1995, following the signing of the General Agreement on Tariffs and Trade (GATT) in 1993. The consequences of this adherence to the WTO were the adoption of a number of rules designed to promote the liberalization of the economy, in particular the Free Trade Agreements established by the Uruguay Round Final Act (April 15 1994). Commitments also included reducing or removing barriers to trade, including customs duties, non-tariff distortions and import quotas. Some of the commitments also concerned the limitation of agricultural subsidies and export aid (MA 2007). Thus, WTO membership meant, implicitly, the end of the agricultural subsidy policy that the country had pursued since the first years of independence.

Until the early 2000s, the practice of abandoning subsidies was still in place. Only the cotton sector received subsidies from the state, partly because of its importance in the economy. However, the amount of the subsidy was decided on the recommendation of the World Bank (MA 2007). The subsidy for cotton was based on an inputs fund (FI) taken from a support fund for the cotton sector which was mainly intended to stabilize prices for cotton producers. The inputs fund was intended for the inputs subsidy for the cotton grower.

The period following the global food and nutrition crisis (from 2007 to the present): A revival of agricultural subsidy policies

From 2007/2008, the question of agricultural subsidies has resurfaced in Mali thanks to the combination of two major factors: (1) the Abuja Declaration of the African Union Summit on Fertilizers in Africa in 2006; and (2) the global food and nutrition crisis of 2007/2008.

The aforementioned summit brought together the African Ministers of Agriculture of the African Union States in the framework of a conference for the realization of the African Green Revolution. It followed a major observation of the stagnation of yields in Africa over the course of thirty years due, among other things, to the low use of fertilizers by farmers. Its objective was to set up an African mechanism for financing fertilizer development to kick-start agricultural growth by promoting the use of fertilizers. The declaration adopted at the end of the so-called "Abuja Declaration on Fertilizers and the African Green Revolution" invited all African countries to increase fertilizer consumption. Point five (5) of that declaration put the question of fertilizer subsidy back on the table. This is why Member States have decided to provide targeted fertilizer subsidies to help the poorest farmers, especially women, and/or farmers without land title, to increase the use of fertilizers within these groups.

The resolutions of the Abuja Summit were reinforced a year later by the global food and nutrition crisis of 2007/2008. This crisis had led to soaring prices for staple foods, which had led to food riots in several African countries. Most countries wanted to adopt agricultural policies to support production and productivity in order to prevent the effects of future food crises.

Following the global food and nutrition crisis of 2007/2008, the position of donors has shifted to the issue of subsidizing agriculture. Several governments have also initiated proactive actions to contain the adverse effects of this food crisis on the population. It is in this context that Mali, like many African countries has initiated strategies to support agriculture to achieve food sovereignty. In this regard, in 2008, it set up a voluntary initiative called the "Initiative riz" to reduce the cost of inputs to rice producers through the subsidy of fertilizers and seeds in order to significantly increase production and productivity.

Since the implementation of this "Initiative riz " in 2008, the agricultural subsidy has resurfaced in Mali and its practice has been institutionalized and has continued over time, becoming one of the main levers for financing agriculture. Since then, the amount of the agricultural subsidy has increased dramatically and its share of the agricultural budget has grown steadily. Thus, a line of credit called "intrans agricole" was created in the state budget to support the subsidy of inputs (fertilizer and seeds) and agricultural equipment.

At the start of the input subsidy program in 2008, the main crops targeted are irrigated rice and Nerica rice. The fertilizer subsidy then expanded in 2009/2010 to cotton, maize and wheat. In 2010/2011, millet / sorghum and cowpea were also covered by inputs subsidies.

This shows that the inputs subsidy has diversified over time. It has been spreading since 2009 and now covers the majority of inputs in the agricultural, livestock and fisheries sectors. In addition to fertilizers and certified seed, subsidies cover feed concentrates for the production of milk, meat, eggs and broilers, as well as vaccines against Newcastle disease, fry and fish feed.

But, mineral fertilizers remain the main inputs concerned by the input subsidy in Mali.

The implementation and distribution of fertilizers in the field takes various forms, including the technical paper guarantee and the electronic e-voucher. The main developments noted are presented through the implementation mechanisms, the target producers and crops, as well as the quantities of fertilizers and the related costs.

CHARACTERIZATION OF THE CURRENT FERTILIZER POLICY

This section focuses on the fertilizer subsidy policy currently in effect in Mali. It includes targeted crops, distribution systems and related costs.

Target crops and inputs

Crops eligible for fertilizer subsidies are determined by the Ministry of Agriculture. The choice of speculations is essentially based on the technical indicators of each crop. The main criteria are the profitability and contribution of each crop by its value added to the national economy.

Mineral fertilizers(DAP and urea) from irrigated rice and Nérica were targeted from the start of the Initiative riz. From the second year fertilizers of maize, cotton and wheat (DAP, urea, complex cotton, niéléni) and organic manure PROFEBA were taken into account. During the third and fourth years, mineral fertilizers of millet / sorghum, and organic fertilizer TOGUNA were targeted.

Cost of the fertilizer subsidy program

Since the food and nutrition crisis of 2008, the Government of the Republic of Mali has regularly allocated a significant part of the agricultural budget to the purchase of fertilizers according to the needs expressed from the technical guarantees(Theriault, Smale et al. 2018, Smale 2019). The prices of subsidized fertilizers have risen from 11000 to 12500 CFAF / bag of 50 kg. Table 2 below shows the trends observed in the quantities of fertilizer purchased and the amounts of fertilizer subsidies, the budgets allocated to the agricultural sector and the size of the State budget. The proportions of the fertilizer subsidy in the agricultural budget and those of the agricultural budget and the fertilizer subsidy in the State budget are also presented.

The table shows that the amount of fertilizer used has increased rapidly with the implementation of the fertilizer subsidy, increasing from 51,779 to 495,748 tonnes between 2008 and 2017, an increase of more than 850%. Over the past three decades, the amount of fertilizer purchased annually is around 264,000 tonnes.

The amounts allocated by the State to fertilizer purchases vary considerably from year to year. However, there is a trend increase. They went from 11.6 billion with the beginning of the “Initiative riz” in 2008 to nearly 36.7 billion in 2017; an increase of more than 215%. The average annual expenditure of fertilizer subsidies over the last three years is more than 37 billion CFAF per year, nearly 12% of the budget of the Ministry of Agriculture and 2% of the State budget.

Table 2: Changes in quantities (in tonnes), expenditure (billion CFAF) and the proportion of the budget allocated to fertilizer subsidies (%) from 2008 to 2017

Year	Fertilizer quantity (A)	Fertilizer subsidy amount (B)	Agricultural budget	State Budget (D)	Agricultural share in State budget (%) (C/D)	Share of fertilizer subsidy in the agricultural budget (B/C)	Share of fertilizer subsidy in the State budget (B/D)
2008	51,779	11.64	134.64	1055.68	12.75	8.64	1.10
2009	122,550	16.20	147.16	1154.81	12.74	11.01	1.40
2010	195,622	21.53	204.82	1276.29	16.05	10.51	1.69
2011	218,611	31.00	159.35	1423.74	11.19	19.45	2.18
2012	254,807	36.00	75.36	988.61	7.62	47.77	3.64
2013	266,707	35.00	133.41	1482.58	9.00	26.23	2.36
2014	351,861	34.08	209.17	1823.05	11.47	16.30	1.87
2015	313,390	37.00	261.27	1895.58	13.78	14.16	1.95
2016	375,752.62	38.00	308.88	2056.49	15.02	12.30	1.85
2017	495,748.22	36.70	348.55	2336.93	14.91	10.53	1.57
Average	264,682.78	29.72	198.26	1549.38	12.46	17.69	1.96

Source : Authors. Data compiled from Ministry of Agriculture documents 2008/2009 to 2017/2018.

Distribution of subsidized fertilizers

The distribution of subsidized fertilizer is mainly through the technical paper guarantee. However, an electronic distribution of fertilizer subsidies is also being piloted to improve the traceability and transparency of fertilizer distribution. The following parts are devoted to the characterization of these two systems of distributions.

Technical paper guarantee

The technical paper guarantee is a technical document or specifications intended for farmers and which entitles them to fertilizers access for a crop year. It contains all the information necessary to identify and locate the beneficiary through the crops grown, the areas under cultivation, the number of livestock, the size of the fish ponds and the subsidy requested.

The technical guarantee has been in effect since the start of the “Initiative riz” in 2018. It is developed by the technical services of agriculture which are also responsible for the distribution of fertilizers to the beneficiaries. The main actors involved in the distribution chain for cotton and rice

are: the Groupement d'intérêt économique (GIE) of the cotton sector composed of the CMDT, the Office de la haute vallée du Niger (OHVN), the Assemblée permanente des chambres d'agriculture du Mali (APCAM); the Office du Niger (ON) and other offices responsible for the promotion of rice. The Direction nationale de l'agriculture (DNA) covers the rest of the production areas (diffuse areas not supervised by the Offices or the CMDT).

The technical paper guarantee plays a major role in the access to fertilizer subsidies. To this end, it is the object of a strong desire at the farm level as the crop year approaches.

Despite the efforts made by the Government of the Republic of Mali, the subsidy system based on the technical paper guarantee is now experiencing many recurring problems of transparency in the management of the mobilized resources and traceability of the distribution of agricultural inputs.

In addition, the mobilization of technical support staff for the production and distribution of technical paper guarantees generates a huge loss of time. Numerous cases of wrongdoing in the establishment of false technical guarantees involving producers, suppliers and technical agents have been reported.

Moreover, the lack of targeting of beneficiaries makes it difficult to distribute fertilizers fairly to producers who are really in need. These predatory behaviors of many players involved in the distribution of fertilizers are real sources of inefficiency of the system of fertilizer subsidies based on technical guarantees.

In this regard, the Government of Mali has asked the World Bank for the experimentation and implementation of an innovative electronic e-voucher system to improve the efficiency of the fertilizer distribution system in Mali.

Electronic distribution (e-voucher) of fertilizers

The e-voucher guarantee is part of ECOWAS's alignment with the so-called smart grant programs (AGRA 2018). The experimental phase is under the authority of the "Comité national de la recherche agricole (CNRA)" through the West African Agricultural Production and Productivity Project (WAAPP/PPAAO) funded by the World Bank (Koné 2019).

The electronic distribution of fertilizers (e-voucher) is organized around an electronic transaction management platform, a beneficiary database, and a register of agricultural input suppliers. It involves networking beneficiaries and fertilizer suppliers. Beneficiaries receive an electronic message (SMS) indicating the amount of fertilizer by type that they must withdraw from a given supplier. Vouchers or electronic coupons sent to producers are recorded in a database and supplier directory.

The e-voucher system would be considered more effective because of the guarantees of transparency, reduction of fraud in the distribution of inputs and security it offers for all the actors involved (e.g., state agents, providers, producers). With the e-voucher system, extension agents have more time for their main producer-led activities because they are no longer directly involved in the distribution of inputs. It would also reduce costs by removing many intermediaries involved in the distribution system. Similarly, instant payment of the government counterpart to suppliers would be facilitated.

The implementation of the e-voucher system is conditional on the access of an up-to-date list of potential beneficiaries as well as their access to a telephone, a communication network, and the ability to read and write as well as the coverage of the telephone network.

The electronic distribution system or e-voucher guarantee had its first experiment in 2014/2015 and in 2015/2016 in areas characterized by great insecurity (Gao, Timbuktu and Mopti). The operation involved the distribution of a kit consisting of seeds and fertilizer, distributed free of charge to the targeted populations. It was based on a database of geo-referenced beneficiaries.

From 2016/2017, thanks to a pilot program initiated by the World Bank-financed Agricultural Productivity Project in West Africa (WAAPP), the experimentation of the e-voucher system has been extended to two large production areas in Mali, notably the Niono and Bla circles for rice, Koutiala and Yanfolila circles for cotton and dry cereals. Initially in these four circles, all producers should benefit from subsidized fertilizers as part of the e-voucher system exclusively. Table 3 below gives the situation of the subsidized products as well as the concerned crops in 2016 and 2018

Table 3: The proportions of areas (%) targeted speculations per holding and the fertilizer doses of the e-voucher guarantee

Speculation	Proportion of targeted area	Fertilizer type (kg / ha dose)			
		Urea	DAP	NPK	Cotton complex
Year 2016/2017					
Rice	-	150	100		
Millet / sorghum	-			100	
Year 2018/2019					
Millet / sorghum	10%			35	
Rice with total control of water	100%	200	200		
Upland rice	100%	100	100		
Controlled submersion rice	50%	100	100		
Conventional maize	50%	150		100	
Hybrid maize	100%	200		100	
Cotton	100%	50			200

Source (DNA 2016-2018)

Crops affected by e-voucher fertilizer subsidies were initially millet / sorghum and rice. Since 2018/2019, e-voucher fertilizer subsidies have been extended to maize and cotton in the CMDT zone. At the national level, only 10% of millet/sorghum areas are eligible for fertilizer subsidies, compared with 100% for irrigated rice, upland rice, hybrid maize and 50% for rice in controlled submersion and conventional maize.

The main fertilizers subsidized under the e-voucher system include: Urea, DAP and cereal and cotton complexe fertilisers. The total volume of fertilizer is determined on the basis of the proportions of target areas as is the case with the technical guarantee.

Since the start of the e-voucher program in Mali's major production basins, two surveys have been conducted in 2016/2017 and 2018/2019 respectively. The first surveys carried out in 2016/2017 as part of the e-voucher pilot program were significantly delayed for the crop year with low participation from the main technical structures of the Ministry of Agriculture. In contrast, the 2018/2019 surveys involved all stakeholders (INSTAT, DNA, CPS/SDR, CMDT, ON). The CPS/SDR was responsible for the conduct of this last survey, which involved the basic management staff in the agricultural sector. The purpose of these surveys was to make an exhaustive inventory of all the farmers in the test areas and to determine the needs of the producers. They form the basis for identifying potential beneficiaries of the e-voucher system. The selection is only final when the producer removes the fertilizers from the supplier authorized or selected for the area. As soon as the producer receives his endowment, his name is directly validated and registered as final beneficiary by a server dedicated to the e-voucher system.

The fertilizer distribution of the e-voucher system is done in the capital of the municipality. On the other hand, with regard to the exhaustive census of the producers, it is done in the villages. Fertilizers distributed as part of the electronic system are presented in Table 4.

Table 4: Evolution of the quantities of fertilizer distributed between 2016/2017 and 2018/2019

Year	e-voucher Guarantee		Technical guarantee	Total (tonnes)	Share of e-voucher Guarantee (%)
	Number of beneficiaries	Quantity (tonnes)	Quantity (tonnes)		
2016/2017	26,284	2589.022	375,752.62	378,341.64	0.68
2017/2018	-	2336.995	495,748.22	498085.21	0.47
2018/2019	39,100	10,207.180	531705	531705	1.91

Nb. The quantity of fertilizer for the 2018/2019 technical guarantee is a forecast of the consolidated and harmonized 2018/2019 campaign plan.

Fertilizers distributed under the e-voucher system are very low. They represent 0.68, 0.47 and 1.97% of the quantities of fertilizer distributed through the technical paper guarantee. In the first two years of 2016 and 2017, 2589 and 2336 tonnes of fertilizer were distributed compared to 10,207 tonnes in 2018. In 2016, the e-voucher pilot program financed fertilizers. By contrast, in 2017 and 2018, fertilizers are financed from the State budget.

The main problems encountered in the experimentation and implementation of the e-voucher system are presented in the following sections.

In 2016/2017, the shortcomings noted on the list of beneficiaries were detrimental to the smooth running of the e-voucher operation. In fact, the list contained persons who were not active in agriculture (repairers, traders, etc.).

In large production areas in particular, in Niono and Koutiala circles, distribution operations started late because of a late census of producers in July. Fertilizers were only sent to destination in August, almost at the end of the rainy season. This also delayed the establishment of the list of beneficiaries.

In addition, the quantities of fertilizer delivered to the farmers were not sufficient in view of the needs expressed. This implies that input needs had been underestimated because of inadequate methodology. Thus, in order to cover the maximum of producers, much reduced quantities were distributed among the various beneficiaries, causing discontent.

In 2017/2018, distribution was made at the same time as fertilizer distribution via the technical paper guarantee. And this, although there should only be the e-voucher distribution system, exclusively, in the targeted areas. However, the problems encountered in the first year could not be solved, in particular the insufficient quantities of fertilizers received by the beneficiaries and the delay in the acquisition of fertilizers. Producers also disapprove of the cash payment for the withdrawal of fertilizers due to the low financial base during this period. In the circle of Yanfolila, near the Guinean border, it was reported that in the Sankarani area the beneficiaries could not receive the messages because of interference with the Guinean telephone network.

In the third year, 2018/2019, a new comprehensive survey, entrusted to the CPS by the e-voucher pilot program was conducted. A new, more consensual list of beneficiaries has been established. The quantity of fertilizer distributed reached 10 207,180 tonnes. Despite this significant increase in the amount of fertilizer, the problems have not been solved. The delay in the payment of fertilizer suppliers poses a real threat to the continuity of activities of the e-voucher operation.

CONCLUSIONS AND RECOMMENDATIONS

The results of the study show that the practice of subsidizing agricultural inputs is very old in Mali. It dates back to the first years of independence and is part of the general framework of major development and financing strategies for agriculture. These fertilizer subsidies have been recurrent in the Malian economy. In fact, regardless of the adopted economic system, the State has resorted to fertilizer subsidies whose practices can be characterized in two major phases.

In the system of socialist economy adopted during the first years of independence (1960-1980), the fertilizer subsidy was the main financing mechanism for agriculture through development programs and later through rural development operations. The economy was heavily subsidized by the State. In spite of the enormous subsidies granted, the companies and the state enterprises were dissolved as a result of mismanagement and the consequences of the droughts of the 1970s.

Following the collapse of the socialist system, the State has opted for a market economy. In this respect, it has gone through a first transitional phase of adjustment and restructuring of its economy from 1980 to 1990 gradually phasing out agricultural input subsidies. Then, in a second phase, it liberalized agricultural markets between 1990 and 2005, with the result that agricultural input subsidies were limited or even eliminated.

However, due to the food and nutrition crisis of 2007/2008, the use of fertilizer subsidies was justified for the revival of production and productivity. Thus, agricultural subsidy policies, formerly abandoned as part of the liberalization of the economy, have been reinstated.

Fiscal costs are considered increasingly high and represent a significant share of agricultural sector spending, while the impacts on production and productivity remain mixed. Thus, traceability and transparency are at the heart of the new distribution programs.

In general, the main actors, in particular producers and economic operators, have integrated these subsidies into their financing strategies. But if this trend continues, fertilizer subsidies are likely to continue in the years to come, creating a bottleneck and a vicious circle in which it will become increasingly difficult for the State to get out. In this regard, it is important to:

- (1) target the real investment needs in agriculture to improve the living conditions of the population;
- (2) reconcile fertilizer subsidies with the sustainable investment needs of agriculture and;
- (3) put special emphasis on public goods (research and development, irrigation infrastructure, agricultural equipment), whose impacts are certain on agricultural growth and on poverty reduction.
- (4)

REFERENCES

- AGRA (2018). Présentation au GT-EAR. Revue du Programme de Subvention des Intrants Agricoles au Mali : Leçons apprises, analyse des meilleures pratiques d'ailleurs et recommandation d'amélioration du programme de subvention des intrants. Ministère de l'Agriculture, Bamako, Ministère de l'Agriculture: 20.
- Bah, B., Diakité, L. (2000). Analyse des politiques de la filière engrais au Mali. Ministère du Développement Rural, Bamako, Ministère du Développement Rural: 65.
- BM (2016). Les données ouvertes de la Banque mondiale.
- DNA (2016-2018). Rapports d'activités e-voucher 2016, 2017 et 2018. Bamako, Ministère de l'Agriculture.
- Fleshman, M. (2008). Moisson de l'espoir pour les agriculteur: Au Malawi, les subventions agricoles amènent une récolte exceptionnelle.
- Fuentes, P. A., B. Bumb and M. Johnson (2011). "Improving fertilizer markets in West Africa: The fertilizer supply chain in Ghana." Draft for Review, International Fertilizer Development Center and International Food Policy Research Institute, Washington, DC.
- Griffin, K. (1996). Macroeconomic Reform and Employment: An Investment-Led Strategy of Structural Adjustment in Sub-Saharan Africa. GENEVA, University of California.
- Hollinger, F. and J. M. Staatz (2015). Croissance Agricole en Afrique de l'Ouest: Facteurs déterminants de marché et de politique, l'Organisation des Nations Unies pour l'alimentation et l'agriculture.
- Hollinger, F., Staatz, J. M. (2015). Croissance Agricole en Afrique de l'Ouest: Facteurs déterminants de marché et de politique. . Rome, FAO et BAD, 2015: 426.
- INSTAT (2018). "Compte économiques du Mali."

- Kone, Y. (2010). Le marché du crédit face aux risque agricole : La riziculture de l'Office du Niger. Doctorat, Bamako.
- Koné, Y. K., A.; Traore, A. , Keita N. , Haggblade, S. ;Thériault, v., Smale,M. (2019). "Constats empiriques sur le programme pilote de subvention e-voucher au Mali."
- MA (2006). Loi d'Orientation Agricole. Ministère de l'Agriculture Bamako, Ministère de l'Agriculture
- MA (2007). Rural struct, Dimensions structurelles de la libéralisation pour l'agriculture et le développement rural : Programme Rural Struc Mali - Phase I. Bamako, Ministère de l'Agriculture.
- Neveu, A. (2001). Financer l'agriculture: Quels systèmes bancaires pour quelles agriculture? Paris, Charles Léopold Mayer.
- Smale, M. V. T. (2019). A cross-country summary of fertilizer subsidy programs in Sub-Saharan Africa. Michigan, Michigan State University.
- Therriault, V., M. Smale and A. Assima (2018). "The Malian fertiliser value chain post-subsidy: an analysis of its structure and performance." Development in Practice **28**(2): 242-256.
- Therriault, V., A. Traoré, B. Témé and M. Smale (2015). Revue de la Structure et de la Performance de la Filiere Engrais au Mali. Feed the Future, Michigan MSU.
- Vittorio, M. (1977). " L'Office du Niger au Mali, d'hier à aujourd'hui." Journal des africanistes **47**: 53-82.

