

Cross-Country Comparison of Voucher-Based Input Schemes in Sub-Sahara Africa Agricultural Transformation: Lessons Learned and Policy Implications

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Summary

Access of farmers to modern agricultural inputs is a backbone of any agricultural transformation and productivity. Many governments in sub-Saharan Africa (SSA) have adopted policies of subsidizing agricultural inputs using the voucher-based approach as part of their agricultural transformation programme. This paper synthesized, compared and draws out some lessons from the experiences of countries that have implemented agricultural input voucher models in SSA with an empirical examination of the Nigeria Growth Enhancement Support Scheme (GESS) Electronic-wallet as a case study. Data were collected from both primary and secondary sources, and analysed with quantitative and qualitative techniques. One of the major finding is that input vouchers constrained participation of commercial farmers, and limit what the smallholder farmers can purchase. Each country input subsidy scheme is implemented differently with a number of unique features in terms of the size, objectives, targeting, delivery mechanisms, timeframe and degree of success. Major thing common to all is that vouchers are used to solve the challenge of access and availability of inputs. Kenyan inputs subsidy programme (NAAIP) is unique due to its “one off subsidy” approach for each of the beneficiaries. Nigeria e-wallet schemes, now adapted by Malawi and Zambia, delivers farm inputs to farmers through the mobile phones. Vouchers models provide greater involvement of both private and financial institutions, and they are less expensive at the long-run. Government supports to the voucher value, good network, stakeholders’ sensitization and good targeting are imperative for SSA agricultural transformation from subsistence to commercial.

Key words

ICT-based systems, electronic-wallet, agricultural productivity, commercialisation, sustainability

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Introduction

Smallholder agriculture is the mainstay of food production in the developing countries and the key to ensuring long-term global food security (Druilhe and Barreiro-Hurlé, 2012; FAO, 2014). This system is however much less productive and profitable because of a lack of access to inputs (World Bank, 2007). Government therefore had to subsidize agricultural inputs. A subsidy is a payment, generally made from public resources that reduces the price that a buyer pays for a good or service below the price at which the seller provides it (Takeshima and Lee, 2012). Agricultural subsidies is an effective tool of bringing economic and social changes to a developing country (Lister, 2011) if well targeted and complemented (Duflo *et al.*, 2010) with right policy instrument. Subsidies act as social safety net transfer to poor rural dwellers (Morris *et al.*, 2007), and a potential way of incentivising farmers to purchase inputs that they are unable or unwilling to obtain at market rates owing to lack of access to credit (Dorward *et al.*, 2014). Subsidies increase access to inputs (such as seeds, fertilizers) for the poor farmers to achieve high productivity (Druilhe and Hurlé, 2012; Ajah and Nmadu, 2012). Subsidies serve as a very important policy instrument in agricultural transformation. Input subsidies breed perpetual dependency among recipients if continuously used (Mwanaumo, 1999). They involve huge costs of investment; market distortion; crowding-out of commercial inputs, and at many times benefit the elites and wealthier farmers rather than the poor smallholders (Fan *et al.*, 2007; Banful, 2011; Dorward and Chirwa, 2011). Subsidy programmes can be sustainable if they can be maintained over the long term without draining the public resources, or if the outcomes in terms of wider adoption and improved agricultural productivity persist after their termination. The universal input subsidy programmes pursued by many Africa countries before 80's were eliminated due to failure on both accounts (Baltzer and Hansen, 2012). To address some of the pitfalls, innovative approaches known as the input vouchers (smart subsidies) are introduced (Morris *et al.*, 2007; Gregory, 2006) into many SSA countries to give the poor farmers access to inputs and the technologies needed (Wiggins and Brooks, 2010). These forms of subsidies are administered in a manner that provides incentives for the development of commercial supply and rural financial markets; link inputs use to complementary farming practices and technologies; and designed to target vulnerable groups (Kelly and Crawford, 2007).

The key concepts for this study are input distribution, accessibility and sustainability. Input distribution is the mode by which inputs are obtained by the provider and made available to the beneficiaries. Input access is the mode by which the farmer beneficiary acquires the inputs, in the desired quantities and at the right time. The availability of inputs to the individual farmer refers to the physical existence of the inputs from the reliable source. Sustainability of input refers to a dimension – a time-frame over which period is being considered. All inter-related in that the distribution will determine the level of availability and access of inputs by the farmer.

This study is about policies and interventions using subsidy to increase access to agricultural inputs by smallholders in sub-Saharan Africa. The paper is novel because of a dearth of study on cross-country comparison of voucher-based input models in

terms of the strengths, weaknesses, opportunities and threats (SWOT). In order to know whether the use of voucher-based approaches are capable of transforming smallholder agricultural, this paper attempts to provide answer to the following research questions: what are the various forms of input vouchers that have so far been implemented in SSA countries? What is the main objective of introduction in each of the selected SSA countries? What are the experiences and lessons to learn in terms of strengths, weaknesses, opportunities and threats from the various methods of smart subsidies implemented? Are there special features in the Nigeria E-Wallet subsidies model worthy of adaptation? Is Nigeria e-wallet model an effective, feasible and sustainable policy option of transforming the smallholder farmers?

This paper analysed the various forms of input vouchers schemes that have been implemented in some of the SSA countries with a detail reference to the Nigeria e-wallet scheme; synthesized the experiences on the implementation of e-wallet, compare and draw some lessons from various countries where the input vouchers have been implemented.

The results of the finding will have tremendous contributions to agricultural scientific fields such as agricultural production and policy. Specifically, the findings will help agricultural researchers and policy makers to close up the crucial gaps in knowledge about input vouchers and enable them to be able to contribute to debate on the implementation of smart subsidy programs going on in various countries. The results will provide critical insights into the potential benefits and risks on the use of electronic vouchers, political and technical issues that are essential to the success or failure of agricultural voucher-based input implementation. The findings will also be useful to smallholder farmers, agro-dealers, out-grower scheme operators, agriculture input suppliers, agricultural output aggregators, agriculture financial and insurance services providers and agriculture information service providers. Lessons from various case studies will assist countries that have implemented voucher-based agricultural input schemes and those that have not implemented on how best to overcome various challenges which come in form of weaknesses and opportunities facing such schemes. The findings will add to the existing body of knowledge / literature on voucher-based input schemes. More specifically, the results will provide quantitative empirical evidence on the distribution, reasons why farmers embraced voucher-based input schemes in Nigeria, perceptions and challenges confronting them so that other countries can learn.

A brief review of literature on input vouchers

Input vouchers are like real money and certificates by which smallholder farmers are given the ability to pay for inputs such as fertilizer and seeds at a registered shop of their choice (Kachule and Chilongo, 2007). Input voucher programs include a targeting mechanism, a financing mechanism, and a voucher redemption system with built-in safeguards against fraud (Gregory, 2006). The vouchers contain a lot of information, including the type and quantity of input, period of validity and name of retail shop (Mazvimavi, 2013). Vouchers constitute a flexible market development policy tool that permits holders to purchase specific quantities and types of inputs from trained dealers who agree to accept vouchers as payment. Farmers redeem the input vouchers through agro-dealers. The agro-dealers redeem the vouchers

from the program organizers with an agreed margin to cover their expenses. Vouchers are designed to address the problems of access rather than availability of seed. Input vouchers constitute a flexible market development policy tool that permits voucher holders to purchase specific quantities and types of inputs from trained dealers who agree to accept vouchers as payment; the dealers can then redeem the vouchers from the program organizers with an agreed margin to cover their expenses and agreed level of profit (Gregory, 2006). Fertilizer paper vouchers was first used by International Fertilizer Development Center (IFDC) in Afghanistan for 200,000 targeted farmers in 2002 and 2003 (Gregory, 2012), used again in Malawi in 2003 and 2004 to demonstrate an alternative to the Targeted Inputs Program (TIP), and at pilot level in Nigeria in 2004. E-vouchers that use mobile delivery and tracking system to distribute subsidized agricultural input through private-sector suppliers were first used in Nigeria in 2009. It involves a web-based system that can be accessed on mobile phones. This allows for real time registration of beneficiaries and electronic payment to the retail agents who distribute the inputs (WFP, 2014).

Salient features of smart subsidies

Smart subsidy uses vouchers, matching grants and partial loan guarantees to encourage a private-sector-led approach as well as target poor farmers who would not otherwise have used the inputs (Minot and Benson, 2009). A smart subsidy favour(s) market-based solutions and aim(s) to promote development of agricultural input markets while targeting and enhancing the welfare of the poor (Tiba, 2011). These subsidies involving (S)pecific targeting to farmers who would not otherwise use purchased inputs (or to areas where added fertilizer can contribute most to yield improvement), (M)easurable impacts, (A)chievable goals, a (R)esults orientation, and a (T)imely duration of implementation. That is, being time-bound or having a feasible exit strategy (Minde and Ndlovu, 2007). They are determined by supply and demand rather than the government. In this case, smart subsidies, carried out largely through the promotion of the private sector (Baltzer and Hansen, 2011). Input vouchers, an example of smart subsidies must have (a) clear objectives; (b) targeted to a specific population such as the smallholder farmers; (c) contribute to competitive open market development; (d) private sector development; (e) have an exit strategy with a time limit on the support that is usually a minimum life of three years, a maximum life of five years.

Materials and methods

Study area

The area of study was sub-Sahara Africa (SSA). SSA is a region of Africa south of the Sahara that is made up of 49 of the 54 African nations. Ten (10) countries were purposively selected and analysed based on the various agricultural input vouchers implementation both in the past and present. Nigeria and Ghana were selected from the West Africa, while Kenya, Tanzania, Rwanda, Ethiopia, Zambia, Malawi, Zimbabwe, and Mozambique were selected from the East Africa. The large number of selected countries in the East Africa was based on the number of countries that have implemented one form of voucher-based input schemes or the others in the sub-region.

Sampling procedure

This study adopted a two-stage sampling procedure. In the first stage, ten (10) countries in SSA where input vouchers model has been implemented as a mechanism to assist the smallholder farmers was purposively selected. A country must have implemented one or more forms of voucher-based agricultural input subsidy before selection. The second stage involved a pilot survey of 30 beneficiaries, 30 non-beneficiaries and 5 agro-dealers in Ogun State, Nigeria for an empirical analysis. Nigeria out of the countries sampled was selected because of the ease of getting information from the relevant stakeholders (government agency responsible for the implementation, the farmers and agro-dealers). Ogun State was also selected out of all the states benefiting from the Nigerian GESS- e-wallet program based on the same reason. We used equal sample size of beneficiaries and non-beneficiaries for the pilot survey based on convenience as well as the available list of registered GESS e-wallet farmers in Ogun State from Ogun State Agricultural Development Programme. Beneficiaries were taken from those that registered and were given the input and the non-beneficiaries were those that registered but were not given the input based on one reason or the others.

Types of data and methods of data collection

Both secondary and primary data were used in this study. Secondary data were collected from various sources such as: The Federal Ministry of Agriculture, the Ogun State Agricultural Development Programme and the World Bank. Primary data were collected through the pilot survey of the farmers and agro-dealers in Ogun State using questionnaire and interview. Some of the information obtained from these primary sources include: e-wallet service delivery, reasons of farmers and agro-dealers registration for the voucher-based input schemes, what the farmers have benefitted through the program, the frequency and challenges, as well as their overall perceptions on the scheme in the state. Data collected were complemented with secondary information from extensive review of past studies (scientific articles) from peer reviewed journals, policy-relevant systematic review of documents and reports on agricultural input subsidy implemented by various countries from textbooks and relevant implementing institutions such as the ministry of agriculture and the World Bank.

Methods of data analysis

The methodological approaches employed to address the research objectives were both qualitative and quantitative methods. In the qualitative approach, we adopted a historical data/information to analyse the various voucher-based agricultural input schemes and policy changes. We used case study examples and SWOT (Strengths, Weaknesses, Opportunities and Threats) analytical methods. The SWOT analytical method was used to identify and categorise significant internal (Strengths and Weaknesses) and external (Opportunities and Threats) factors faced in the implementation of voucher-based input schemes. We used the SWOT method in order to be able to justify the Nigerian e-wallet vouchers, and to gain insights into the past period when the scheme was implemented and think of possible solutions to the existing or potential problems of the schemes. In the quantitative approach, we adopted simple descriptive statistics such as the frequency distribution tables and percentages for the empirical analysis.

Results and discussion

Commonalities and key differences among the selected SSA countries

There are many commonalities and key differences among the selected SSA countries for this study that are likely to influence implementation of vouchers subsidy programs (Table 1). All the selected countries are agrarian with large area of land for agricultural purposes. For instance, Nigeria has as high as 708,000 thousand square kilometre of agricultural land although with low level of fertilizer consumption (17.8 kg/ha arable land) compared to country such as Kenya with 52.5 kg/ha arable land. The annual population growth rate (%) slightly varies among the selected countries and vast majority of the people live in rural areas (more in Malawi and Ethiopia) compared to other selected countries.

Comparative analysis of agricultural input vouchers, and lessons learnt

In recent years, various forms of input voucher programs have been developed and implemented in SSA countries. The time and duration of implementation of the vouchers vary from one country to another. For instance, while country like Malawi has been using input vouchers in its nationwide fertilizer and seed subsidy programs since 1997/1998, Zambia started this between 2002/2003, Tanzania in 2008, Ghana between 2008/2009, and Nigeria since 2004. The input voucher schemes also vary by: different names depending on the country implementing it (for example National Accelerated Agricultural Inputs Access Program in Kenya and e-wallet in Nigeria), kind (targeted or untargeted), participation level between the public and private, objectives, types of input support, and mode of distribution among different countries (Table 2).

Malawi experiences on agricultural vouchers

Malawi has been implementing a combination of direct input distribution and vouchers known as the flexi-vouchers. It started with a starter pack scheme and targeted input program from 1998 to 2004. In 2005/2006 the country introduced the Farm Input Subsidy Program (FISP) that used paper coupons (vouchers) as a means of input redemption. But this paper based voucher system faced myriad of challenges among which are: influx of counterfeit coupons that resemble genuine ones and redemption of the same by illegal beneficiaries leading to the introduction of the e-voucher system in 2013/2014. The e-voucher is a scratch card which possesses unique combination of digits linked to a voter identification card of a specific beneficiary in an electronic system (Minot and Benson, 2009). The first phase of the e-voucher pilot commenced in 2013/2014 growing season in six districts in the country. The second phase of the pilot was a scale up of the e-voucher project and covered 18 districts up from the initial six. During the second phase, beneficiaries were able to redeem both seed and fertilizer in six Extension Planning Areas (EPAs) that initially participated in the project while the beneficiaries in the additional 12 villages redeemed seed only using the e-voucher. Farmers were expected to pay a cash price when redeeming the coupon. This price is equivalent to about one-third of the retail price of fertilizer. Because of the large scale of the program, its budgetary costs have been difficult to control, and displacement of smallholder commercial fertilizer sales has been high.

Lessons: Malawi experience shows that flexi-vouchers are the most economically enhancing tool for smallholder farmers, especially the poorest. Distribution of flexi-vouchers allowed households to have freedom in the selection of inputs. Utilization of local retail outlets for distribution instead of distribution of

Table 1. Key countries statistics

Characteristics	Nigeria	Ghana	Malawi	Zimbabwe	Kenya	Tanzania	Rwanda	Zambia	Mozambique	Ethiopia
Total population (million)	183,523,432	26,984,328	17,308,685	15,046,102	46,748,617	52,290,796	12,428,005	15,519,604	27,121,827	98,942,100
Population density (people per sq. km)	198.67	113.13	146.09	38.51	80.55	55.33	471.87	20.62	33.84	89.60
Annual population growth (%)	2.7	2.4	3.1	2.3	2.6	3.2	2.4	3.1	2.8	2.5
Rural population (%)	53	47	84	67	75	69	72	60	68	81
Fertilizer consumption (kg/ha arable land)	17.8	35.8	43.2	36.8	52.5	4.7	9.3	42.1	9.3	19.2
Mobile phone subscription (per 100 people)	78	115	30	81	74	63	64	67	70	32
Literacy rate (%)	68.90	57.90	62.70	90.70	85.10	69.40	70.40	80.60	47.80	42.70
Agriculture GDP (% of total GDP)	20.6	21.4	30.1	20.1	29.3	26.9	32.5	10.8	28.9	47.7
Agricultural land (thousand sq. km)	708,000	157,000	57,900	162,000	276,300	396,500	18,425	237,360	499,500	362,590

Source: Agricultural land stat (Agricultural land refers to the share of land area that is arable, under permanent crops, and under permanent pastures) are obtained from World Bank (2013) available at <http://data.worldbank.org/indicator/AG.LND.AGRI.K2/countries?display=default>; Population and Population density are obtained from World Bank (2015) available online at <http://statisticstimes.com/population/countries-by-population-density.php>; GDP-sector from <http://statisticstimes.com/economy/countries-by-gdp-sector-composition.php>; Mobile cell from <http://data.worldbank.org/indicator/IT.CEL.SETS.P2>; Literacy data (2013) from African Economist <http://theafricaneconomist.com/ranking-of-african-countries-by-literacy-rate-zimbabwe-no-1/#.VrfXeFI7zIU>; Fertilizer consumption data (2014). Fertilizer products covering nitrogenous, potash, and phosphate fertilizers from <http://data.worldbank.org/indicator/AG.CON.FERT.ZS>; Rural population data (2014) from <http://data.worldbank.org/indicator/SP.RUR.TOTL.ZS>; Population growth rate (2014) from <http://data.worldbank.org/indicator/SP.POP.GROW>

Table 2. Summary comparison of findings from the SSA countries input vouchers tour

Country	Location	Role of the government	Roles of the private sector	Name of the input vouchers	Kind of subsidies, program implementation and funding	Year of introduction	Main objective	Input support and mode of distribution	Status
Malawi	East Africa	Free inputs from the government	Participation in input distribution	Starter pack scheme (physical distribution initially, moved to vouchers)	Untargeted (implemented by the Government of Malawi with the funding support from DFID, WB, EU and Government of China)	1997/1998	Provides a tiny pack of free inputs containing roughly 0.1 ha - worth of fertiliser, maize seed and legume seed.	Packs contain 2 kg hybrid maize seed, 10 kg fertiliser and 1 kg either groundnut or soybean seed.	2004
		Provision of subsidy	Importation, packaging and distribution	Targeted Inputs Program (TIP) (a physical distribution that moved to vouchers)	Universally targeted (Funded and implemented by Malawi government)	2001	Rural smallholder households with one Starter Pack containing 0.1 ha-worth of fertiliser, maize seed and legume seed	A pack of free inputs containing 12.5 kg of basal fertilizer (23:21:0+4S), 12.5 kg of top dressing fertilizer (urea) and maize seed. Included in the pack were also legume seeds.	2004
		Purchase from importers Warehousing Retailing	Importation and local transportation of input	Sustaining Productive Livelihoods through Inputs for Assets (SPLIFA)	Targeted (Funded by DFID and the World Bank and implemented by IFDC and NGO Consortium)	1998	To enable marginal farmers to achieve household food security. To improve rural transport infrastructure by building or upgrading feeder roads. To engage small-scale agricultural inputs dealers in the distribution of inputs.	50 kg urea and 10 kg maize seed in the first cycle in return for labor on public works programs (roads). 25 kg urea and 5 kg seed in second cycle)	2004
		Government purchase of fertilizer and exchange for vouchers through parastatal depots	Wholesale supply, distribution and retailing of fertilizers	Agricultural Inputs Subsidy Program (AISP), voucher-based	Universal (Implemented and funded by Government of Malawi via donors such as the DFID, Norway, EU, WB, Irish aid, UNDP)	2005/2006	Improve food security; Improve food accessibility and affordability of agro-inputs among vulnerable farmers in the country price.	Maize: one 50 kg of basal fertiliser (DAP), one 50 kg of top fertiliser (urea), one 10 kg of maize seed or tobacco: one bag of D compound one bag CAN tobacco and legumes seeds.	On-going

Country	Location	Role of the government	Roles of the private sector	Name of the input vouchers	Kind of subsidies, program implementation and funding	Year of introduction	Main objective	Input support and mode of distribution	Status
Zimbabwe	East Africa	Provide conducive environment	Contracted fertilizer supplier to sell to targeted households through rural retail shops in exchange for voucher	Zimbabwe Emergency Agricultural Input Program (ZEAIP)	Targeted (Funded by the World Bank and implemented by private company)	2009/2010	To increase access to improved seed among 300,000 smallholder farmers farming in food-insecure communal lands of Zimbabwe.	Distribution of 10 kg packs of improved varieties of maize seed.	2011
		Monitoring and evaluation of the programme	Verification of the quality of agricultural inputs that meet FAO's technical specifications	Electronic voucher (Electronic Payment System (PEPS))	Targeted (Funded by the World Bank and implemented through a partnership with MoAMID and private company)	2011/2012	Provide e-voucher beneficiaries with agricultural inputs of their choice, while at the same time helping to re-vitalise the supplier-wholesaler-retailer chain in rural areas.	Farmers can buy the agricultural inputs they want from four broad categories – seeds; fertilizers and lime; agrochemicals; and tools and spare parts for farming equipment.	On-going
Kenya	East Africa	Provision of subsidy, monitoring and evaluation	Importation and distribution	National Accelerated Agricultural Inputs Access Program (NAAIAP).	Targeted (Funded and implemented by Tanzania government)	2007/2008	Increase access to quality inputs to poor small holder farmers	One 50 kg of basal fertiliser (DAP), one 50kg of basal fertiliser (urea), one 10 kg of maize seed.	Still on-going
Tanzania	East Africa	Pay importers based on coupons Distributes coupons	Importation and distribution through Wholesaling Transport Warehousing Retailing	National Agricultural Input Voucher Scheme (NAIVS).	Targeted (funded and implemented by the Tanzania government).	2008/2009	Promote proper utilisation of fertiliser to enable farmers increase maize crop productivity.	One 50kg of basal fertiliser (DAP), one 50 kg of basal fertiliser (urea), one 10 kg of maize seed, cashew seeds, agro-chemicals, tea and coffee seedlings, rice and sunflower. Voucher redeemed at the local bank	Still on-going
Rwanda	East Africa	Importation Wholesaling	Transport Warehousing Retailing	Crop Intensification Program (CIP)	Targeted (implemented by Ministry of Agriculture and Animal Resources in Rwanda)	2007/2008	To make fertilizer affordability and increase use by smallholder farmers.	Farmers redeem vouchers at local agro-dealers, who confirm eligibility using a master list	2010
		MINAGRI purchase fertilizers for strategic stocks to be able to guarantee farmers access	Involved in the distribution of fertilizers to farmers	mVISA wallets	Targeted (implemented by Bank of Kigali (BK))	2014	To improve input subsidy distribution.	Fertilizers bags as urea, NPK for crops like maize and wheat	Up to date

Country	Location	Role of the government	Roles of the private sector	Name of the input vouchers	Kind of subsidies, program implementation and funding	Year of introduction	Main objective	Input support and mode of distribution	Status
Zambia	East Africa	Direct procurement and distribution of agricultural inputs at a subsidized rate.	Supply inputs	The Fertilizer Support Programme (FSP)	Targeted (Zambia government and implemented through the Ministry of Agriculture and Co-operatives)	2002/2003	To improve household and national food security, incomes, and accessibility to agricultural inputs by small-scale farmers and building the capacity of the private sector to participate in the supply of agricultural inputs.	Eight (8) bags of fertilizer (basal and top dressing), 20 kg of maize seed	2008/2009
		Keep prices of input low as well as price of farm outputs especially maize	Inputs marketing and distribution	Food Security Pack by Programme Against Malnutrition (PAM)	Targeted (funded by government and implemented on behalf of government by NGOs)	2000	PAM distributed farm input packs to districts and beneficiaries utilising a network of district-based NGOs	Seeds of cereals, legumes, a root /tuber crop, and other crops, with fertilizer and/or lime as appropriate.	2004/2005
		Payment of subsidy to suppliers	Distributing agricultural inputs	Farmer Input Support Programme (FISP) - paper voucher	Targeted (funded and implemented by the Zambia government)	2009/2010	To improve household and national food security, and increase access to agricultural inputs for smallholder farmers	FISP pack includes both fertilizer and hybrid maize seed.	2015
		Government is responsible for pre-planning, tendering, distributing inputs to satellite depots, selecting beneficiaries, facilitating the collection of cost sharing contributions from farmers.	Distribution of agricultural inputs	Farmer Input Support Programme (FISP) - Electronic-voucher system	Targeted (Funded by the Zambia government and implemented by the Ministry of Agriculture and Livestock (MAL))	2015	To prevent corruption in the distribution of farming inputs.	Cover seeds, fertilizers and herbicides.	On-going

Country	Location	Role of the government	Roles of the private sector	Name of the input vouchers	Kind of subsidies, program implementation and funding	Year of introduction	Main objective	Input support and mode of distribution	Status
Mozambique	East Africa	Facilitator rather than implementer	Both local and certified commercial seed traders participate to bring about variety and increase the scope of choice. Create awareness of the different seed sources and varieties available to farmers.	Agricultural input trade fairs (ITFs) and vouchers	Targeted (Funded by some international organizations such as the Italian Cooperation and implemented by NGOs and private companies)	2001/2002	To support food production in the drought/flood affected areas with the objective of alleviating and preventing hunger and promote a rapid recovery of agricultural production.	Wide range of products and inputs (not only agricultural) to meet basic needs, such as foodstuffs, water containers, and clothes	2005
		Provision of subsidies	Distribution of agricultural inputs	Electronic voucher scheme	Targeting (Implemented and funded by Mozambique government with the funding support by FAO)	2015	To add flexibility to the production decisions of farmers, and improve their knowledge regarding electronic money, and reduce the lack of familiarity with technology prevalent among smallholders	Fertilizers for crops like maize	On- going
Ethiopia	East Africa	Provision of incentive	Private individuals and develop and manage seed multiplication plots	Seed Vouchers and Fairs	Targeted (Funded and implemented by the Ethiopian government, Donors such as FAO and NGOs)	2002/2003	To transfer the choice of seed and variety to the individual households and provide local seed, seed that already exists in the community	Seeds of preferred crops and varieties	On-going
Ghana	West Africa	Distribution and reimbursement of the voucher	Supply of the input, distribution and retailing of the fertiliser and seed inputs. Distributors affiliated with the fertilizer importers were allowed to participate, but independent dealers were excluded from participation	Ghana Fertilizer Subsidy Programme (GFSP) Voucher system	Targeted Funded and implemented by the government of Ghana)	2008	To increase productivity/production in line with government's commitment to ensuring food security and improving the living standards of Ghanaians	Fertilizers (NPK 15:15:15 NPK 23:10:05 and urea)	On-going

Country	Location	Role of the government	Roles of the private sector	Name of the input vouchers	Kind of subsidies, program implementation and funding	Year of introduction	Main objective	Input support and mode of distribution	Status
Nigeria	West Africa	Procurement and distribution of fertilizers at subsidized price to farmer	Complement the government distribution channel and increase the density of the outlet network	Fertilizer Voucher Program	Targeted (implemented by the International Center for Soil Fertility and Development (IFDC) and Developing Agricultural Inputs Markets in Nigeria (DAIMINA))	2004	i. Allow farmers to procure fertilizers with a 25% subsidy from private dealers, complementing the government distribution channel and to increase the density of the outlet networks.	Fertilizers (urea, NPK, and SSP)	2005
		Federal government procures fertilizer for sale to states at a subsidy of 25%; state governments typically institute additional subsidies on fertilize	Make bids to the FGN to import and distribute subsidized fertilizer	Fertilizer vouchers under the Market Stabilization Program (FMSP)	Targeted (implemented by the Nigeria government)	2008/2009	Ensure availability of fertiliser to farmers	Fertilizers such as NPK, and urea	2012
		Subsidised inputs directly to farmers through their mobile phone. The federal government subsidized fertilizer by 25% and the state governments are expected to add another 25%	The private sector seed and fertilizer companies sell directly to farmers through the use of cellphone-based system developed to send subsidies	GESS E-Wallet	Targeted (funded and implemented by both federal and the state government of Nigeria with the support of donor like the World Bank)	2012	To ensure availability of fertiliser, seeds and other inputs to smallholder farmers at the right time by reaching 20 million farmers in the 4 years of the introduction.	Each farmer gets two 50 kg bags of fertilizer at the subsidized rate, along with a free bag of either improved maize or rice The vouchers are redeemed at at any agro dealer redemption centre	On-going

Source: compiled by the author, 2015

pre-packaged inputs increases the availability of desired inputs such as fertilizer at retail level. The direct input distribution such as the use of starter packs does not allow the private sector to expand its retail distribution networks countrywide into the rural areas. The approach is costly to the government and is susceptible to pilferage and fraud compared to the voucher-based systems. It also sidelined the private sector in the procurement and distribution of fertilizer with negative consequences on the private agricultural input sector. The uniqueness of Malawi e-vouchers which is linked to beneficiaries ID card provides utmost security and ensures that the right beneficiaries redeem farm inputs.

Zimbabwe experiences on agricultural voucher

In 2011/2012 agricultural season in Zimbabwe FAO scaled up distribution of agricultural inputs through an electronic voucher system called Electronic Payment System (PEPS) (FAO, 2012). The objective of the programme was to provide e-voucher beneficiaries with agricultural inputs of their choice, to get more agro-dealers and suppliers on board and re-establish more business relationships while at the same time help to re-vitalise the supplier-wholesaler-retailer chain in rural areas. PEPS were targeted at districts where there is mobile network coverage, ZESA coverage, and an agro-dealer/retailer network at ward level. PEPS ensure immediate cash payment of commission to retailers and real time electronic transmission of payment to the relevant wholesalers/suppliers. Swipe cards are loaded with e-vouchers to the value of USD 160 and distributed to selected vulnerable beneficiaries. At the time of purchase the beneficiary are required to pay 10% of the value of the purchase to the retailer in cash, while the rest of the total value is electronically deducted from the swipe card.

Lessons: The advantage of the Zimbabwe Emergency Agricultural Input Program (ZEAIP) is that it spreads the benefits of aid to local businesses and did not rely on using NGO staff to independently distribute seeds. The voucher does not restrict the beneficiary to any one retailer, but allows them to choose inputs from pre-registered retailers within their ward, supplied by registered wholesalers and/or suppliers. Farmers buy the agricultural inputs they need from four broad categories - seeds, fertilizers and lime, agrochemicals, and tools or spare parts for farming equipment.

Kenya experiences on agricultural voucher schemes

The Kenyan National Accelerated Agricultural Inputs Access Program (NAAIAP) uses a village based beneficiary selection criteria, where community based selection committees and village assemblies scrutinized and approved lists of selected beneficiaries for each year. Upon approval, lists of beneficiaries are submitted to the Ministry of Agriculture for final approval and voucher issuance. The beneficiary list is computerized and this makes it easy for the Ministry of Agriculture to monitor trace the beneficiaries using the electronic database. For one to qualify as a NAAIP beneficiary, such a farmer should own at least an acre of farm land; be vulnerable (either be a widow, orphan, child headed household, HIV/AIDS affected/infected), and be willing to join a group.

Lessons: Kenya NAAIP when compared to other countries such as Tanzanian and Malawian agricultural inputs subsidy programmes is unique with regards to its “one off subsidy”

approach for each of the beneficiary. NAAIP beneficiaries receive subsidized inputs only once and are weaned of thereafter. After a year of receiving subsidized inputs, farmers are linked to Equity Bank for seasonal input loans. The rationale behind this is that Government does not want to create perpetual dependency among beneficiaries. Farmer's names are also electronically registered and this makes beneficiary tracing easy.

Tanzania experiences on agricultural vouchers

Tanzania transport subsidy for fertilizer of 2002 with the main objective of increasing the widespread usage of the input was redesigned in 2007 into what became the National Agricultural Input Voucher Scheme (NAIVS). NAIVS was piloted in 2007/2008, fully implemented in 2008/2009 and continued each subsequent year (FAO, 2014). It was launched as a smart-market subsidy targeted at providing small-scale farmers with access to critical agricultural inputs such as fertilizers and improved seeds at a 50% subsidy. Under NAIVS, farmers are selected based on eligibility criteria. Some of eligibility criteria is that, farmers must be residing in the village, and be willing to apply the subsidy inputs in the target crops in the area of a half hectare (Pan and Christiaensen, 2012). It targets farmers who have not afforded to apply inputs in the previous five years and able to pay the cash top up. Eligible farmers are provided vouchers that entitle them to buy inputs from agro-input dealers at a subsidized price.

Lessons: The redemption of the voucher through commercial agro-dealers encouraged the development and expansion of sustainable wholesale to retail input supply channels.

Rwanda experiences on agricultural voucher schemes

Farmers in Rwanda get fertilisers at subsidised cost using electronic identity cards at nearby agro-sales points. This system called the Crop Intensification Program (CIP) introduced by the Ministry of Agriculture and Animal Resources is targeted at increasing farm productivity. In this project, farmers use their ID cards to print tickets from vending machines available at agro-products dealers that then allow them to purchase the right fertilisers at a lower price. The CIP programme include free maize seed, a 50% government subsidy on fertilizers, free advisory/extension services, support with post-harvest handling, providing of some guarantees on price and active linkage to better paying markets. Government set minimum and indicative prices for the produce and support farmers interested in bulk marketing for better prices. Application rate is largely uniform across the different landscapes and farms – provided: 200 kg per hectare of NPK 17 followed by 100 kg per hectare of urea for rice; and 100 kg of DAP per hectare followed by 50 kg of urea for maize (Green World, 2014).

Lessons: The key difference between the Nigerian and Rwandan schemes is that, from its inception, Rwanda's initiative incorporates a multifunctional mobile wallet. At the beginning of the season, Ministry of Agriculture and Animal Resource identifies eligible farmers and collects information such as their name, national ID number, mobile phone number, and the type and value of the fertilizer subsidy. MINAGRI transfers this information to Bank of Kigali and Urwego Opportunity Bank, who remotely register the farmers for mVISA, a bank-based mobile wallet service. Registered farmers receive a text message with

instructions on how to set up a PIN and use their mVISA accounts, and bank staff go to the villages to sensitize and train farmers on how to use the service.

Zambia experiences on agricultural voucher schemes

Zambia government has implemented several input programme such as: Fertilizer Credit Programme (FCP) between 97/98-01/02, Fertilizer Support Programme (FSP) in 2002/03-08/09, later renamed as Farmer Input Support Programme (FISP) in 09/10. The FISP for instance was designed to distribute one hectare of maize input packs at subsidized prices on a direct cost-sharing basis and disengaged government from credit provision. In the FISP, inputs were also accessed only through approved farmer cooperatives and other farmer group. Zambia government however in 2015 launched the electronic voucher system under the FISP with a commitment of about 90% of its agricultural budget on subsidies. The e-voucher platform helps farmers to activate and redeem their vouchers for seeds and fertilizers and receive auto-payments upon successful redemption. Farmers who registered with the scheme are also eligible to receive pre-paid mobile phone vouchers, each worth around US\$53, to use at agro-dealers. Only farmers with mobile phones in network coverage areas benefit from this system. The system allows small scale farmers to access farming input (such as seeds and fertilizers) using electronic cards that are loaded with cash amounting to ZKM1400, and it is expected to prevent corruption in the distribution of farming inputs. This is because it eliminates the need to use middlemen to distribute agricultural inputs as it allows farmers to source their inputs directly from seeds producers and suppliers in the country. If beneficiaries lose their vouchers, they can use their mobile phones to retrieve them as their phone number is linked electronically to the specific e-voucher card.

Lessons: PAM distributes farm input packs to districts and beneficiaries utilising a network of district-based NGOs. FSP targets vulnerable but viable farm households, defined according to a set of multiple criteria. FISP experienced several challenges that hindered its successful implementation, the major one being the failure of farmers to graduate out of the programme. The initial design of the programme intended that beneficiaries graduate every two years, however none of the farmers, have graduated, since its inception was leading to the introduction of e-voucher in 2015. The Zambian government believes that the e-voucher programme they have just introduced in 2015 will succeed because it has worked well in other African countries like Malawi, Mozambique and Zimbabwe. Zambia's decision to spend 90% of its agricultural budget on subsidies has left little money for activities that generate a greater impact on agricultural growth and poverty reduction.

Mozambique experiences on agricultural voucher schemes

Agricultural input trade fairs (ITFs) and vouchers have been implemented in Mozambique since 2001/2002. It was initially on a pilot level and subsequently scaled up as the preferred mechanism for responding to agricultural emergencies at national level. In 2015, Food and Agriculture Organization of the United Nations (FAO) launched the electronic voucher scheme within the framework of its Millennium Development Programme to

replace the paper voucher scheme that was implemented by FAO in the provinces of Manica, Zambézia, Nampula and Sofala in 2012. The main objective is to increase smallholders' and emerging farmers' access to improved agricultural inputs by providing them with temporary subsidies

Lessons: The most successful fairs are those that take place in areas where markets are well-developed, suggesting that careful attention must be paid to the design of voucher/fair programmes if they are to strengthen markets in different way.

Ethiopia experiences on agricultural voucher schemes

There are two different voucher approaches implemented in Ethiopia following the 2002-2003 food crisis. One used seed vouchers in conjunction with seed fairs, whereas the other did not entail fairs, permitting beneficiaries to exchange their vouchers for seed in designated market centres over a longer time frame. In the case of vouchers with seed fair, all activities are concentrated in a specific location and around specific events allowing for more rapid and efficient implementation. Farmers do not have the time at the fairs to negotiate on the prices of the seeds that they acquired in exchange for their vouchers. In the case of voucher programme without seed fairs, it is observed that after an initial rush to exchange vouchers, which resulted in high prices in the first week, farmers realised that they could negotiate better prices if they do not all go at once to exchange their vouchers.

Lessons: The seed voucher and fair approach enhances livelihoods by building assets and strengthening social relations, institutions and organisations. The process of redeeming vouchers for cash leads to a delay in the case of voucher programme without fairs.

Ghana experiences on agricultural vouchers

In Ghana, subsidised fertiliser was not directed to one particular crop, such as maize, but was applied rather to a wide variety of crops. In comparison to countries such as Malawi and Zambia in 2008, Ghana instituted a voucher-based fertilizer subsidy program. The program was unique in SSA because of its strong involvement of the private fertilizer market. The program relied on a public private partnership in which the sourcing of fertilizer was handled solely by existing fertilizer importers and distribution was by private retail outlets, while the role of the public sector was confined to the distribution and reimbursement of the vouchers. To redeem the value of a voucher, the retailer was to submit vouchers used towards fertilizer purchases in their establishment to a fertilizer importer. The importer in turn was to transmit an invoice for the value of vouchers to the Ministry of Food and Agriculture (MoFA) and to receive payment within a week. The system of subsidy allowed farmers to choose the supplier her/himself and remove the burden of distribution from the state. However, vouchers were issued for specific fertilizer types- which disallowed the farmer the choice of fertiliser.

Lessons: Ghana voucher-based fertilizer subsidy program is unique because of the strong involvement of the private fertilizer market. The complex rules for redeeming the vouchers prevented a considerable share of fertilizer retailers from participating in the program. This is an important lesson for the design of "market-smart" fertilizer programs in SSA.

Table 3. The structure of the Nigeria e-wallet voucher system

Dissemination		Redemption		Reimbursement
1. Vouchers are sent electronically and automatically to targeted registered farmer	2. Customers (the registered farmer) receive voucher on phone	3. Customers/farmers redeem vouchers at select retailers (agro-dealers)	4. Redemption automatically received by input dealers	5. Retailers (agro-dealers) are then reimbursed

Nigeria experiences on agricultural voucher schemes

The International Center for Soil Fertility and Development (IFDC), and Developing Agricultural Inputs Markets in Nigeria (DAIMINA) pilot project was on the use of fertilizer vouchers in three states in 2004 (Kano, Bauchi and the Federal Capital Territory (FCT) which marked the beginning of agricultural input voucher in Nigeria (Table 2). The objective of the project was to allow farmers to procure fertilizers with a 25% subsidy from private dealers, complementing the government distribution channel and increasing the density of the outlet network. The pilot was expected to demonstrate the potential for a more efficient private sector management system of the state and federal government fertilizer subsidy to targeted beneficiary farmers (Gregory, 2006). A second pilot was done in 2008 (Kano and Bauchi) and another one in 2009 in Kano and Taraba States. This 2009 scheme was expanded under the Growth Enhancement Support Scheme (GESS) e-wallet into many states by 2012 and went alive in all the state in Nigeria by 2014 with over 1,000 registered agro-dealers. The GESS e-wallet completely put an end to the direct procurement and distribution of seed and fertilizers by the government. The e-wallet is an efficient and transparent electronic device system that makes use of vouchers for the purchase and distribution of agricultural inputs (Ezeh, 2013). The GESS was designed as a component of the Agricultural Transformation Agenda of the Federal Government (ATA) for the provision of subsidized inputs to farmers in Nigeria (FRN, 2013). The e-wallet scheme aimed at delivering subsidized farm inputs to farmers and facilitates a shift from subsistence to commercial farming.

The structure of the Nigeria e-wallet scheme and phases of implementation

Under the scheme, registered farmers receive e-wallet vouchers with which they can redeem fertilizer and seeds from agro-input dealers (Fertilizer Suppliers Association of Nigeria, 2012) (Table 3). The subsidized electronic vouchers for inputs are delivered directly to the farmers' mobile phones and then the vouchers are used like cash to purchase the inputs directly from agro-dealers. GESS e-wallet is a three-year scheme that take only ninety days to implement with the goal of reaching 20 million farmers by

2018 (Table 4). The scheme allows farmers to get a 50% subsidy, and a maximum of two bags of fertilisers. Farmers pay either via a mobile phone platform called the "e-wallet" or by vouchers for those who cannot access the mobile phone platform.

Analysis of the operation of e-wallet model in Nigeria

Selection and registration of farmers and agro-dealers for the Nigeria e-wallet scheme

Selection and registration of beneficiaries for the e-wallet in Nigeria is the responsibility of the government. The criteria for farmer's participation include: farmers being above 18 years old; have participated in a survey authorized by the government to capture farmers personal detailed information; must own a cell phone with a registered SIM card and have at least sixty naira credit in the cell phone. For farmer without phone to be entitled to a phone, such farmer must be registered on the e-wallet platform. Paper vouchers are issued to those who do not have phones. Government provides a subsidy to the farmer through the voucher to buy the phone. The farmer takes the voucher to the local mobile phone operator and pays the balance which is the difference between the value of the voucher and the cost of the phone. Once a farmer buys a phone and a SIM card, his new phone number will be updated on the e-wallet database and he will be able to receive his e-wallet voucher that entitled him/her to purchase fertilizer and seeds at subsidized rates.

The fulfilment of the stated conditions guarantees the issuance of an e-wallet voucher with a Token Administration Platform (TAP) contactless card, which is linked to the farmer's record via the tablet's Near Field Communication (NFC) interface. TAP allows farmers to redeem their inputs in areas where there are no networks, simply by using Android phones as smart card. The voucher is then used to redeem fertilizers, seeds and other agricultural inputs from agro-dealers at half the cost (Signal Alliance, 2014). All the farmers need to do is to visit one of the redemption points and tap their card against a Nexus 7 tablet which is preloaded with the information. This allows the agro-dealer at the redemption centre to confirm the farmer's identity, see the government-funded vouchers to which the farmer is entitled and supply the farmer with the products they demand. Once the agro-dealer confirms that the person standing in his/her front is indeed the farmer, the agro-dealer then taps a button and up come the various vouchers to which the farmer is entitled. "The farmer then says 'OK, that he/she will have two bags of fertilizer and a bag of seeds'. The agro-dealer also says 'OK, implying it will cost the farmer 'X'. The farmer then hands over the money and completes the transaction by tapping his NFC card on the Nexus 7 tablet. The farmer gets a receipt and goes to the warehouse to get the bags of fertilizer and the bag of seed.

Table 4. Growth enhancement support investment

Farmers Group	Phase	Period
Group one: 5 Million Target Farmers	1	2012-2015
Group two: 5 Million Target Farmers	2	2013-2016
Group three: 5 Million Target Farmers	3	2014-2017
Group four: 5 Million Target Farmers	4	2015-2018

Table 5. SWOT analysis of the Nigeria GESS e-wallet voucher programmes

<u>Strengths</u>	<u>Weaknesses</u>
<ul style="list-style-type: none"> • Fertilizer and seed retailers no longer supply seeds and fertilizers directly to government but sell directly to farmers. • The e-wallet helps to build an efficient distribution channel to deliver fertilisers to the farmers. • It completely cuts out middlemen and distributors. • The voucher program is observed to be less costly in terms of implementation compared to the conventional approach. • The approach hand over the distribution of subsidized fertilizer from government to private dealers. • The vouchers system reduces transaction costs with location of agro-dealers closer to farmers. • The e-wallet system also allows farmers to conduct transactions in their local languages. • Reduce leakage in the subsidized fertilizer. • The voucher does not restrict the beneficiary to any one retailer, but allows them to choose inputs from pre-registered retailers within their ward, supplied by pre-registered wholesalers and/or suppliers. • The scheme provides a fair, equitable, accountable and transparent means of distributing farm inputs to the rural farmers. • The e-voucher does not require farmers to have as deep technical knowledge of the redemption transactions as other players. • No government staff are needed to facilitate transactions. • Government helps the farmer to buy inputs by providing direct support through their mobile phones (e-wallet). • Data on the farmer and quantity distributed can be tracked online during transactions. • E-vouchers help to overcome some of the pervasive challenges of voucher programmes such as disruptive delays (e.g. late payments), prevalence of counterfeit vouchers, complicated and inconvenient voucher redemption or poor systems for invoicing leading to programme stagnation and corruption. 	<ul style="list-style-type: none"> • Beneficiaries have no choice of inputs received through direct distribution. • Many beneficiaries find it difficult remembering and entering their PIN due to limited literacy. • Cost of providing technical assistance and training to both the recipient farmers and private sector input dealers and the targeting of voucher recipients is a weakness. • The scheme restricts what people can acquire and do not meet their priority needs. • Quota is set at 100 kg of fertilizer per beneficiary under e-wallet scheme; beneficiaries that need less than 100 kg of fertilizer always re-sell some of the subsidized fertilizer they received in the open market causing leakages. • Absence of an independent regulatory and legal framework to monitor the market in terms of quality and standards. • Existence of collusion between government officials, agro dealers and the farmers themselves. • Poor quality of input (fertilizer and seeds) is observed by farmers in many occasions. • Knowledge in a systematic manner under the e-voucher as a departure from the old way of voucher redemption is needed. • There exists what can be termed as systemic problem. Several millions of farmers who were registered in 2012 and 2013 have not been captured in the national farmers' database and so could not have benefited from the programme. For instance, in 2012, out of the 4.2 million registered farmers, only about 1.3 million farmers were captured and able to receive subsidised inputs. Also, out of the 5 million registered farmers in 2013, only 3.6 were captured with opportunity to receive fertiliser. • Fewer numbers of agro-dealers in rural area (low density coverage of agro-dealers). • The two bags (100 kg) of fertilizer subsidized under the scheme are seen by smallholder farmers to be very inadequate to make impacts on their yields. • The scheme did not effectively capture the interest of medium-scale and commercial farmers. • Farmers on many occasions still have to travel a long distance (far as 150 km) before getting to agro-dealers shop. • The inability of the agro dealers to access credit facilities impede their capacity to stock large quantity of fertilizers at a time.
<u>Opportunities</u>	<u>Threats</u>
<ul style="list-style-type: none"> • This system allows farmers to access fertiliser subsidies directly by using their mobile phones. • Vouchers also allow for greater economic diversity by offering small farmers opportunities to purchase inputs which were previously unaffordable. • Multiple transactions could be made during the month, not limited to a single time use. • The system allowed registered farmers to receive text messages alerting them that they could pick up their input package at a local redemption centres. • Have more potential in developing the private fertilizer sector. • The vouchers are used to augment purchasing power for farmers already aware of benefits but unable to afford their real demand. • With voucher cards, those that have their names on the register and could not receive text messages but can produce any form of identification are given the inputs. • The system unlocked huge private sector investments. The number of private seed companies rose from 5 to 80 within three years. Multinational seed companies saw opportunities and moved in. • The voucher system allows farmers to source their inputs directly from seeds producers and suppliers in the country. • The scheme enables Nigeria to build a kind of farmers' database. • The scheme stimulates financial inclusion. • Implementation of the e-voucher helps to manage the distribution of farming inputs. • The e-wallet model allows participation of the private sector and have potential for market development at local level. • Promotion of private distribution networks. • Improved access by reducing distance of input dealers. 	<ul style="list-style-type: none"> • Lack of monitoring to verify end use of the fertilizer and seeds subsidized remains a threat. • Government failure to fulfil their pledges of the subsidy to the agro-dealers as at when due. • Delays in the decision making and budgeting process make the subsidized fertilizer to arrive too late for many farmers. • Poor network connectivity. • The scheme is still characterized with adulteration; rent-seeking entrepreneurs who buy the fertilizers and reconstitute them into lower quality fertilizers. • There is also the issue of delays in effecting payments to the agro dealers, importing and distribution of fertilizers which invariably leads to late fertilizer applications and large amounts of carry-over in some years. • Some farmers generally found the process of redeeming fertilizers cumbersome, coupled with long queues and the need for repeated visits to collection centres before being able to purchase fertilizers. • Seeds are in many occasions not available and sometimes arrived very late. • Inadequacy of quantity of seeds received is a threat to the size of farmland the farmer can plant. • Non-receipt of vouchers and difficulties activating numbers. • Some of the farmers did not grow crops for which seeds were given. • Some farmers also reported that they were given receipts for seeds though no seeds were given. • Lack of know-how on how to activate numbers, or the numbers to dial for fertilizer and seeds. • Types of fertilizer available at the collection centres which are mainly the NPK and urea are sometimes not the types required for farmer's crops and farms. • The small number of agro-dealers (Table 6) results in long queues in some redemption centers, leading frustrated farmers to abandon redemption of their vouchers. • Unpleasant manner of some staff at redemption centre make things difficult for farmers. • Most farmers thought it was scammers at work when they received the text messages; so many of them do not turn out to redeem their inputs. • Complaints from some farmers and agro-dealers that the types of fertilizer supplied were not right for the local soil types. • Lack of funding was a major problem for dealers in securing inputs for distribution under the scheme. • The banks, which signed MOUs to participate in the scheme, provide little or no funding to the agro-dealers. While in most cases banks complained that most of the agro-dealers do not meet up with their requirements for loans under the scheme, the agro dealers also complained that their requirements were too stringent. • Suppliers' reluctance to fully bear the burden of distribution logistics to all the redemption centres. • Delay attitude by some banks officials preventing agro-dealers access to GES credit facility.

Source: Compiled information on the Nigeria e-wallet model

For an agro-input dealer to participate in the programme, he/she must own a mobile phone with a registered SIM card, and attend training programmes designed for the programme (Adebo, 2014). The agro-dealers are required to conduct honest business and guide against fraud; choose and prepare a location for the business transaction; provide storage facilities and be available at the appropriate time to attend to farmers' needs. Other prominent personalities in the scheme are the helpline personnel and redemption supervisors. Each state Agricultural Development Project (ADP) supplied the helpline staffs, and about 3-5 helpline staff assigned to each of the Local Government Area. The helpline staff and supervisors connect to the farmers on a daily basis to attend to their needs. The redemption supervisor helps in verifying farmer's identity as well as a farmer's code in the text message received by the farmer, and then compares it with the name and code listed in the farmers register which the supervisor received from the mobile phone. The subsidized farm inputs are delivered directly to farmers through their mobile phones.

SWOT analysis of the Nigeria GESS e-wallet schemes

Table 5 clearly shows the strengths and weaknesses of GESS e-wallet input vouchers in Nigeria which are internal factors of the implementation of the vouchers, and the opportunities and threats that are external factors to the implementation the scheme. A critical studied of these factors in the SWOT analysis matrix showed that there are great numbers of opportunities and threats (external factors) to the implementations of the input vouchers compared to the strengths and weaknesses. When observed by strengths and opportunities, we observed that these outweigh the weaknesses and the threats the implementation of e-wallet agriculture input scheme is facing in Nigeria.

Empirical findings on service delivery of e-wallet scheme in Ogun State, Nigeria

Generic GES e-wallet scheme was rolled out in Ogun State in 2012 with about 21 registered redemption centres. Out of the 39,259 targeted farmers for inputs, only 4,745 farmers were observed to actually received inputs probably due to non-availability of the necessary inputs. In 2014, a total of about 69 fertilizer companies indicated their interest to supply fertilizers and about 95 agro-dealers (Table 6), but 35 redemption centres were accredited across the State with a 53,000 registered farmers who benefited from the generic roll out which lasted for 10 weeks with a redemption of 596.25 mt of improved seeds and 5,300 mt of fertilizer respectively.

Reasons for non-participation by farmers on GESS e-wallet input scheme in Ogun State, Nigeria

The results of findings in Table 7 revealed that 66.7% farmers did not registered as a result of unbelief in the scheme going by their past experiences of other scheme implemented in Nigeria.

Input voucher distribution in Ogun State, Nigeria

Since the roll out of input vouchers scheme in 2012 in the Ogun State, about 76.7% of the respondents have received voucher three times meaning once per year till 2015, while 100 per cent had received at least two bags of each: NPK (50 kg) and

Table 6. Distribution of registered fertilizer companies and agro-dealers in Ogun State for E-wallet input redemption in 2014

S/N	Local government area	No of fertilizers company	No of agro-dealers	Average capacity (Mt)
1	Abeokuta North	3	6	37.5
2	Abeokuta South	4	10	60
3	Odeda	4	8	30
4	Ewekoro	2	3	30
5	Ifo	5	8	32.1
6	Obafemi-Owode	5	7	27.5
7	Ado-Odo Ota	4	5	30
8	Sagamu	3	4	40
9	Ijebu-Ode	2	2	30
10	Ijebu-East	3	3	30
11	Odogbolu	4	3	30
12	Ijebu-North	6	6	35
13	Ogun Waterside	1	1	30
14	Egbado South	5	9	28.3
15	Egbado North	2	3	30
16	Imeko Afon	4	6	28
17	Ipokia	3	3	30
18	Ijebu North East	3	2	30
19	Ikenne	4	4	30
20	Remo North	2	2	30

Source: OGADEP Report 2014

Table 7. Reasons of farmer's non-registration on the input voucher scheme in Nigeria

Reasons for not registering with the scheme	Frequency	Percentage
Not aware of the scheme	1	3.3
Not having enough information about the scheme	3	10
Not having a telephone	9	30
Not believing it will be of benefit/ not interested	20	66.7
Two bags too small for my cultivation	12	40
Not around during registration	4	13.3

Note: The responses are multiple choices; Source: Field survey, 2015

Table 8. Input voucher distribution

Input Voucher distribution	Input package	Frequency	Percentage
Three vouchers		23	76.7
Two vouchers		7	23.3
Total		30	100
	Types of input received		
NPK (units of 50 kg)		30	100
Urea (units of 50 kg)		30	100
Improved maize seeds		21	70
Rice seeds		09	30

Note: The responses are multiple choices; Source: Field survey, 2015

urea fertilizer (50 kg). About 70% received improved maize seeds and only 30% received improved rice seeds along with the fertilizers (Table 8).

Table 9. Sources of information about e-wallet scheme and farmers' perception and Nigeria

Sources of information about input voucher scheme	Frequency	Percentage
Agro-dealers	12	40
Extension Officers	30	100
Other farmers	6	20
Radio	5	16.7
Farmers response about the quality of inputs		
Very good	7	23.3
Good	13	43.3
Poor	10	33.3

Note: The responses are multiple choices; Source: Field survey, 2015

Sources of information about e-wallet scheme and farmers' perceptions on inputs received

All the respondents received information about e-wallet scheme through the agricultural extension officers, while only 40% of the sampled farmers obtained their own information from the agro-dealers (Table 9). The inputs received were assessed to be just "good" by 43.3% farmers, while 33.3% considered the input they received as poor.

Challenges and suggestions on the Nigeria e-wallet voucher schemes by farmers and agro-dealers in the study state

The results of the analysis of challenges from both farmers and agro-dealers point of view on the e-wallet vouchers scheme introduced by the Nigerian government showed poor telephony network and low density coverage of agro-dealers as a major (100%) challenge by farmers by being insolvent during the redemption period making it difficult or impossible to redeem (83.3%), while absence of the input on many occasions and lack of funding were identified by agro-dealers as major challenges. As ways out, sensitization of mobile network owners in Nigeria for wide coverage especially to rural areas (100%), availability of financial credit (70%) possibly through enforcement of given of concession by the central bank to commercial bank to give credit to prospective farmers and agro-dealers at reasonable interest rate (70%), timely delivery of input vouchers (70%) and review of the bureaucratic verification process to avoid time wastage (70%) were suggested for smooth running of the voucher schemes by farmers (Table 10).

Lessons on the Nigeria voucher scheme: One major lesson from the Nigerian e-wallet system is the fact that the scheme has been able to expand the private sector opportunities. In addition, the default rate under the scheme was observed to be minimal because farmers are directly reached and empowered.

Conclusions and recommendations

Agricultural transformation through private sector is a reality in SSA countries. Transformation from subsistence farming system to profitable, self-sustaining and competitive commercial agriculture demands the use of input voucher. Generally, the strengths and opportunities of the input vouchers especially the e-vouchers as used in country like Nigeria were found to

Table 10. Disadvantages of e-wallet and suggestions by farmers and agro-dealers in Nigeria

Challenges of e-wallet by farmers	Frequency	Percentage
Low level of awareness	15	50
Insufficient supply of the input	15	50
Cumbersome procedure of getting approval from cellulants	18	60
Poor telephony network and low density coverage of agro dealers	30	100
Being insolvent during the redemption period making it impossible to redeem	25	83.3
Farmers suggestions		
More sensitization of farmers using radio broadcast and farmers association leaders about the scheme	15	50
Availability of financial credit	21	70
Timely delivery of input vouchers	21	70
Review of the bureaucratic verification process to avoid time wastage	21	70
Sensitization of mobile network owners in Nigeria for wide coverage especially to rural areas	30	100
Challenges of e-wallet by agro-dealers		
Absence of the input on many occasions	5	100
Lack of funding	5	100

Source: Field survey, 2015

outweigh the weaknesses, and the threats. Input vouchers make subsidies smart, in that they simultaneously serve as a mechanism to target subsidies, develop demand in private markets and associate the voucher scheme with financial institutions providing credit to farmers or retailers with greater flexibility and transparency. Input vouchers in SSA countries are implemented differently and possess a number of unique features. The use of electronic vouchers subsidy rather than the paper type are gaining support as a policy tool to foster effective agricultural input distribution. Voucher approach supports the return to a market-based system. Input vouchers model play a vital role in "jump starting" market inclusion for millions of smallholder farmers in SSA. Experiences from the selected countries in this study show that increasing the scale of vouchers subsidy schemes put enormous fiscal pressure on the national budgets, availability of the input to farmers as at when needed, limited quantity of input made available to farmers thereby constraining farmers in the area of land they can cultivate. These are threats on the use of input vouchers in SSA and capable of affecting the sustainability of the programme. Again, input vouchers constrained participation of commercial and middle scale farmers. The poor smallholder farmers are also limited to the quantity of input they can purchase.

The study recommends that each country and donor should understand the needs of the smallholder farmers and design voucher schemes that meet the needs of the targeted population. The use of a single service provider as in the case of Cellulant for the Nigeria e-wallet should be discouraged so that many players can come on board to enhance greater efficiency of the scheme. Government must completely get out of fertilizers and seeds

distribution while all import and distribution should be done by the private sector in order to record the desired success in the programme as experienced through private sector intervention in Nigeria. This step if taking will also guarantee sustainability of input vouchers and food production. The use of e-monitoring of vouchers subsidy will assist at minimizing inefficiency resulting from fraud and cheating by some people in the system.

There is need for national and local campaigns on input vouchers so that farmers can understand why some are entitled to vouchers and others not. The analysis of strengths, opportunities, weaknesses and threats (SWOT) of e-wallet undertaken should be a good starting point for other SSA countries intending to adapt the scheme. Experiences of seed vouchers and fairs in Ethiopia and Mozambique show that the approach is the best for countries with a lot of local seeds. It allows farmers to choose what crops/ varieties and quantities they want.

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