

*Full Length Research Paper*

# Assessment of operational aspects of the input supply chain under national agriculture input voucher scheme (NAIVS) in Tanzania

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This study examines the operational aspects of the National Agriculture Input Voucher Scheme in Tanzania from 2009/2010 to 2010/2011 based on secondary and primary data. Primary data were collected from a random sample of 300 households in four regions namely: Rukwa, Mbeya, Morogoro and Shinyanga. Secondary data were collected from the Ministry of Agriculture Food Security and Cooperatives (MAFC), Agro dealers and Local Government Authorities. Results indicate that 88% of farmers reported delayed subsidized inputs significant at  $p = 0.05$ . The inputs become available during planting season when most of the household food stocks and income is exhausted and this makes top up price unaffordable. It was also observed that the top up price is more than stipulated cost sharing of 50% between farmers and the government. Other pitfalls reported in the system include input adulteration and violation of NAIVS guidelines for input distribution. It is recommended that inputs and crop calendars be established that would ensure inputs arrived to beneficiaries ahead of the planting season. In addition, efficient monitoring and evaluation system should be put in place to minimize inefficiency emanating from violation of NAIVS guidelines.

**Key words:** Tanzania, input vouchers, farmers, institutional framework, subsidy programme.

## INTRODUCTION

Many African countries resumed fertilizer subsidy in early 2000 in an attempt to enable smallholder resource poor farmers use inputs to boost production and reduce poverty (Ricker-Gilbert and Jayne, 2009; Chibwana et al., 2010; Danning et al., 2009b). The new system of subsidy is market "Smart" and concurrent with Abuja declaration which resolved to increase timely access and raise fertilizer use by farmers in African Union (AU) member states to an average of 50 kg/ha by 2015 (Danning et al., 2009a; Tiba, 2010; Yawson et al., 2010). It is market smart as pointed out in Minde et al. (2008) and Baltzer and Hansen (2011) because it has a specific

target, measurable impacts, achievable goals, results orientation and timely duration of implementation. Additionally, the declaration aims to eliminate barriers to fertilizer access such as tariffs on fertilizers and fertilizer raw materials in order to increase productivity, reduce food insecurity and poverty levels among smallholders. The new scheme originated from Malawi as a small starter pack in 1998 (Dorward and Chirwa, 2011; Druilhe and Barreiro-Hurlé, 2012). Other African countries such as Nigeria, Zambia, Tanzania, Kenya, and Ghana adopted the initiative at different time (Druilhe and Barreiro-Hurlé, 2012). The Government of United

Republic of Tanzania resumed subsidy programme in 2003/2004 which was implemented through subsidising transport for companies that were involved in the distribution process of the inputs. The idea was to reduce the input cost below the market price to all farmers. Constraints in the distribution system of agricultural input under this arrangement were frequently reported. Some of the complaints raised include subsidy fertilizer ending up in the shops of input suppliers and thus being sold at the market price, inputs being smuggled to neighbouring countries, delayed inputs delivery, re-bagging fertilizer in warehouses and inputs not being effective due to quality deterioration. Additionally, many targeted farmers could not access the inputs under the 2003/2004 programme modalities and it was difficult to identify beneficiaries and non beneficiaries.

The National Agriculture Input Voucher Scheme was introduced in 2008/2009 as a reform of the previous subsidy policy programmes. Under NAIVS beneficiary, farmers are selected based on eligibility criteria. Some of eligibility criteria require farmers be residing in the village, and be willing to apply the subsidy inputs in the target crops in the area of a ½ ha (Pan and Christiaensen, 2012). Also, 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. The voucher has a face value of inputs that government supports the farmer. It is contrary to previous National agricultural input subsidy programmes where the subsidy inputs were sold at a lower price than the market price of inputs to all farmers. NAIVS intends to increase the existing 9 kg/ha of fertilizer use, which is below Africa average of 21 kg/ha, and the world average of 100 kg/ha (Ricker-Gilbert and Jayne, 2009; Eboh et al., 2006; Baltzer and Hansen, 2011). It is also a government response to escalating food and input prices in the world aimed at increasing productivity and food security.

Allocation and distribution of inputs under NAIVS involves a chain of actors with established committees from national to village level. Selection of eligible farmers and committee members is guided by set guidelines. Each committee is assigned responsibilities for implementation to ensure targeting and timely delivery (MAFC, 2012). A pilot study by Pan and Christiaensen (2012) pointed out poor targeting performance whereby 60% of vouchers were captured by village elites. Moreover, the increase in number of vouchers available for distribution was found to enhance the targeting performance. Baltzer and Hansen (2011) have pointed out that, study by Pan and Christiaensen (2012) focused mainly on targeting and did not discuss the performance of the input voucher delivery system. Consequently, there is limited knowledge on how the framework operates in delivering inputs to beneficiaries. It is uncertain whether or not the distribution process abides to stipulated national guidelines.

Also, it is not well known whether the programme has

managed to correct the inefficiencies of previous subsidy programmes. Effective implementation of subsidy programmes requires a well functioning institutional framework in the supply chain. Polski and Ostrom (1999) defined institution as a broadly known rule, custom or strategy that creates incentives for behaviour in a repetitive circumstance. Institutions are distinguished into three pillars of regulative, normative and cultural-cognitive institutions. Regulative institutions encompass incentive schemes, public procurement policies that are referred to as the formal institutions, while the remaining pillars are referred to as informal institutions (Truffer et al., 2009). The success of subsidy policy reform depends on the institutional arrangements available for translation of intentions into actions and outcomes. Evaluation, design or policy reform requires a systematic way of analysing existing arrangements, generation and comparison of alternatives. The analysis should contain well organised survey of how stakeholders act and reason for acting in a certain way rather than another (Polski and Ostrom, 1999).

The objective of this study therefore is to examine the operational framework of the input supply chain under the National Agricultural Input Voucher scheme in Tanzania. Specifically, the study to assess subsidy inputs distribution system in term of availability of vouchers, timely delivery, input quality and shared price. The knowledge from this study will provide insights on the existing strengths and weaknesses in the delivery system and form the basis for policy reform recommendations.

## MATERIALS AND METHODS

### Sampling design

Research was carried out in four regions namely: Mbeya, Morogoro, Rukwa and Shinyanga, whereby purposive and random sampling methods were used. Mbeya and Rukwa regions were chosen because these were pilot areas and main food crop producers. Recently, Morogoro and Shinyanga are new comers into the programme, moreover, Morogoro has been identified by the government as an emerging grain basket for the nation, and Shinyanga is among the major cash crop producing regions such as cotton that have benefited from NAIVS. From each participating village, farmers registers were used as sampling frames. Simple random sampling technique was used to obtain 5% of farmers for interview from respective registers. Boyd et al. (1981) contends that, a sample of 5% of the total population is statistically adequate in sampling. The distribution of respondents in the villages involved in this study is shown in Table 1.

### Data collection procedure

The study used both primary and secondary data. Primary data were collected in a survey using a semi structured questionnaire administered to 300 households. Some of the collected data were on constraints and challenges on NAIVS input supply chain, access to inputs, distribution procedures, selection of the end users and agro dealers as well as participation in service delivery. Focus group discussions were conducted with key informants such as stockists, District Agriculture and Livestock Development officers

**Table 1.** Names of region, districts and villages involved in the survey.

Region	District	Village	Criteria of selecting	Non beneficiaries	Beneficiaries	Sample of farmers	Major crop(s) for input voucher
Rukwa	Sumbawanga	Chitete	Accessible	21	14	35	Maize
		Katete	Inaccessible	16	12	28	Maize
Mbeya	Mbozi	Isangu	Accessible	16	27	43	Maize/paddy
		Itaka	Inaccessible	7	36	43	Maize/paddy
Shinyanga	Bariadi	Ibulyu	Accessible	23	29	52	Cotton
		Nguliyati	Inaccessible	17	32	49	Cotton
Morogoro	Mvomero	Lusanga	Accessible	21	13	34	Maize/paddy
		Kinda	Inaccessible	10	6	16	Maize

(DALDOs) and Ginnery managers.

The main crops under subsidy that were considered in this study were maize and rice as food crops and cotton as a traditional cash crop. From each district, two villages were selected based on accessibility criterion; one village was accessible in terms of road network and other village inaccessible. Secondary data were gathered from public and private institutions and internet sources. Pretesting of the questionnaire was undertaken in "Wami-Luhindo" village located in Mvomero district. This village received input subsidy and has similar characteristic to villages under the subsidy programme.

#### Analytical framework

Institutional Analysis and Development (IAD) framework (Figure 1) was applied in the assessment of NAIVS operational aspects. In IAD framework, policy issue or objective is defined clearly, followed by analysis of physical and material conditions as they influence policy action and situation and constrain institutional arrangements. Physical and material conditions refer to physical and human resource capabilities related to providing goods and services. These include capital, labour, technology, financial resources, storage and distribution channels which play a significant role in policy design and implementation (Polski and Ostrom, 1999). Determination of physical and material condition of goods or services requires answering important questions that are focused in economic nature of activity.

Also, it considers the way a good or service is provided, produced, as well as the physical and human resources required for producing goods or services, and other important aspects in the distribution channel of goods and services. It analyses the community attributes such as demographic features, norms, values, beliefs, degree of general understanding and preferences on policy oriented strategies and outcome.

#### NAIVS operational framework

Six main actors were involved in the NAIVS implementation framework. Every actor assigned specific responsibilities stipulated in the National Voucher Guidelines (MAFC, 2012). Efficient operations were expected to result into timely delivery of quality inputs to target farmers and increased crop production. IAD framework is applied to evaluate the activities and performance of involved actors in the NAIIV framework presented in Figure 2.

#### Data analysis

Data were analysed based on descriptive statistics using frequencies and cross tabulation with chi-square test. The statistical package for social sciences (SPSS) version 18 and Excel programmes were used.

## RESULTS AND DISCUSSION

#### Government budget on input subsidy

Results revealed continued increase in government budgets for input subsidies from Tsh. 2.0 billion in 2003/2004 to Tsh. 128.7 billion in 2010/2011 fiscal year. Also the quantity of subsidized fertilizer and the number of beneficiaries has substantially increased as depicted in Table 2. In earlier years, the subsidy was supported from government budget, although from 2009 World Bank allocated a total of US\$ 299 million to support the subsidy programme (World Bank, 2012). It was difficult to account the number of beneficiaries in the previous subsidy programs although under NAIVS the number of beneficiaries is determined. In 2008/2009, the numbers of beneficiaries were 740,000 and increased to 2,011,000 in 2010/2011. However, the number decreased to 1,800,000 in 2011/2012 as farmers received the subsidy in 2008/2009 graduated from the program and were expected to be self dependent. These results are promising although it is unclear whether or not graduated farmers are self dependent. Baltzer and Hansen (2011) have pointed out that, sustainability of smart subsidies are expected if farmers are able to accumulate finance and productive assets to overcome market barriers after programme termination.

Input subsidies reduce fertilizer cost to farmers who otherwise would be excluded from fertilizer use due to limited ability to afford its cost. Increases in subsidy budget are associated with increase in demand for agricultural inputs which is likely to increase productivity.

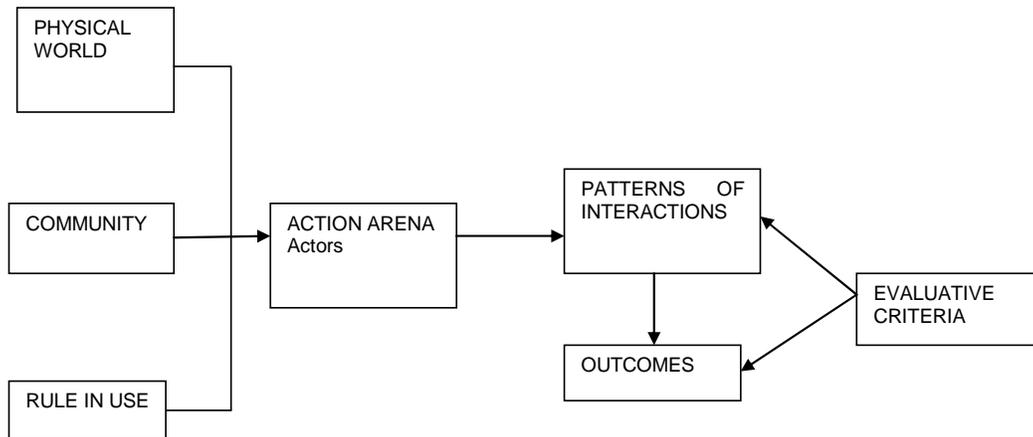


Figure 1. Institutional analysis and development (IAD) framework (Polski and Ostrom, 1999).

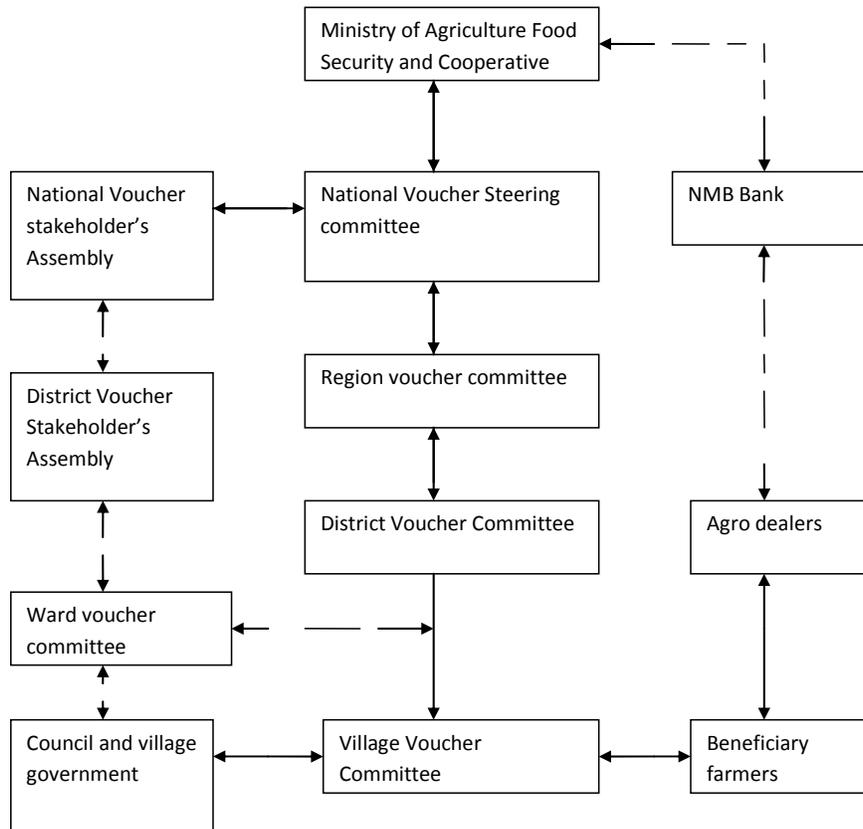


Figure 2. NAIVS implementation framework (MAFC, 2012).

However, increased demand for agriculture inputs might inflate input prices in the long run depending on the supply side of the inputs. Also, increased budgets on subsidies drive resources away from other public goods (Wiggins and Brooks, 2010; Nagy and Edun, 2002).

**Cost sharing / cash top up**

Fifty percent (50%) cost sharing between the government and eligible farmers was not practical in some districts as could be noted from Table 3. In Sumbawanga district,

**Table 2.** Budget for fertiliser subsidies to farmers (MAFC, 2013).

Year	Quantity of fertiliser subsidised (tons)	Amount of money spent on fertilizer (billions)	Subsidy as percentage of total agricultural budget	Number of beneficiaries
2003/2004	39,387	2.0	3.7	
2004/2005	81,766	7.2	11.3	
2005/2006	63,000	7.5	6.0	
2006/2007	90,755	21.0	17.3	
2007/2008	83,076	19.5	14.8	
2008/2009	130,000	31.9	28.0	740,000
2009/2010	142,000	69.2	30.3	1,511,900
2010/2011	201,015	128.7	50.8	2,011,000
2011/2012	195,959	118.6	45.9	1,800,000

Source: MAFC (2013).

**Table 3.** Variation in input costs at free market price and subsidy price.

Location	Input type	Free market price (Tsh)	Voucher value (Tsh)	Farmers contribution (Tsh)	Percentage of farmers contribution
Chitete	OPV maize seeds	39000	20000	19000	49
	DAP/NPK	82500	30000	52500	64
	Urea	72167	22000	50167	70
Katete	OPV maize seeds	39700	20000	19700	50
	DAP/NPK	82900	30000	52900	64
	UREA	72400	22000	50400	70

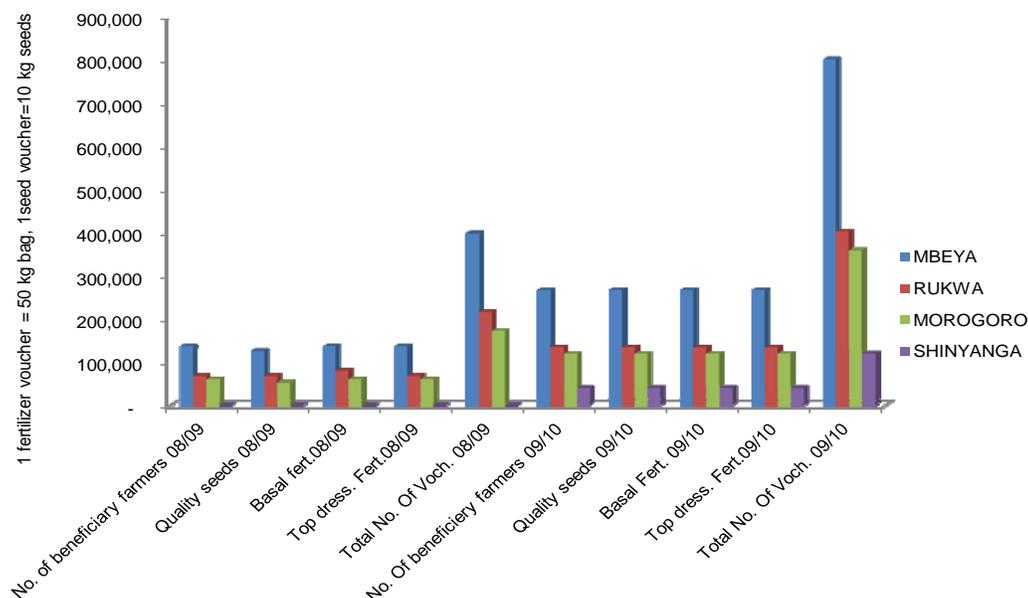
there was variation in farmer contribution depending on the location. The district established transaction costs to be charged by an agro dealer per bag of input including the profit margin depending on distance from main input supplier. There was variation in the amount of cash top up charged to farmers depending on input type and this cost exceeded 50% stipulated in the national input subsidy guideline. In Mbozi, prices were under the control of market forces of supply and demand. Farmers were free to use the voucher to buy fertilizer at any agro dealer in the district and there were many agro dealers. In Bariadi, the cost sharing was as stipulated in the national voucher guidelines, whereas Mvomero revealed mixed results. In Lusanga, cost sharing was 50% while in Kinda farmers received seeds free of charge with no fertilizers disbursed in 2010/2011 season. It was not clear whether the fertilizer was not in the distributed package or fertilizer was used to compensate the cost of seeds. However, report from the Ministry of Agriculture Food Security and Cooperatives (MAFC) revealed distribution of subsidies as a package suggesting malpractice in Kinda.

Total cost of top up contribution per subsidy package per eligible household in Rukwa was 123,000 TSh; and this was considered 41% higher than anticipated for interviewed households. Top up was considered afforded

by large scale farmers with more than 35% households undecided on who is able to afford the top up. This implies that, rich farmers benefit more from subsidies than poor farmers. It was noted that input distribution is done during planting season when most farmers do not have food stock left for sale to purchase inputs. Although, some farmers expressed the need for loans to purchase inputs, there were limited alternatives for credit services. To cope with top up, some farmers shared the cost for the input package and share the inputs. In case, farmers offered the voucher to their relatives who were able to pay top up although those relatives were not in the list of beneficiaries. By implication, farmers who share the subsidy package do not attain technical efficiency in production. Also, wealthier farmers benefit more from subsidy than poorer making economic efficiency of the programme doubtful.

#### **Number of beneficiaries during 2008/2009 to 2009/2010 period**

Generally, there has been increased trend in the number of beneficiaries (Figure 3). In absolute terms, Mbeya region leads in the number of beneficiaries followed by



**Figure 3.** Number of input vouchers distributed to beneficiary farmers in the study regions.

**Table 4.** Percent response on subsidy received by household through voucher from 2008/2009 to 2011/2012.

Districts	One year	Two years	Three years	More than three years
Sumbawanga	37.04	37.04	25.93	0.00
Mvomero	73.68	26.32	0.00	0.00
Mbozi	17.74	30.65	51.61	0.00
Bariadi	38.98	40.68	18.64	1.69

Rukwa region. Morogoro and Shinyanga regions have lowest number of beneficiaries and input vouchers. Shinyanga region did not receive vouchers in 2008/2009. This is because cash crops were not targeted during the first year of NAIVS although in the subsequent years it was introduced. Increase in the number of beneficiaries and vouchers imply more fertilizer use and likely increase in productivity. However, the impact of these changes on productivity of target crops is a subject for another paper.

### Targeting delivery

In Mvomero, 73.68% of households reported to have benefited from the subsidy for one year, and there was no household that reported to receive vouchers for three years (Table 4). In Mbozi and Sumbawanga, some smallholder farmers benefited from subsidy for up to three years. Even with some farmers receiving subsidy for three years, it was not provided consecutively. No farmers were found to benefit from subsidy for four years in the three districts. However, in Bariadi district, smallholder farmers received vouchers for up to four

years. In Bariadi district, provision of subsidy through vouchers system was changed during 2011/2012 season by introducing contract farming. Subsidy through contract farming does not limit the number of years the smallholder farmers should benefit from the programme. Under contract farming, farmers borrow inputs from a ginnery company and are required to sell cotton to the company at harvest time. Deductions for the input costs are made from sales of cotton and the balance remitted to the farmers. This is achieved through farmer groups. This implies that farmers who do not belong to groups do not benefit from the programme. Farmer groups are used for insurance purpose as social cohesion act as collateral. However, it is unclear how farmers will respond at harvesting time as the contract farming is still new.

### Evaluative criteria and outcome

#### *Eligibility criteria and farmers selection*

Selected farmers were eligible to receive one bag of fertilizer (di ammonium phosphate) DAP (50 kg), one bag

**Table 5.** The likelihood of poor and rich farmers getting subsidy.

District	Response (%)			
	Sumbawanga	Mvomero	Mbozi	Bariadi
Selection in favour of relatively rich people	62.26	43.24	47.50	41.18
Selection in favour of relatively poor people	18.87	13.51	15.00	11.76
Equal chances of selection for poor and rich people	9.43	43.24	28.75	43.53
Poor chances of selection for rich people	0.00	0.00	0.00	1.18
Poor chances of selection for poor people	9.43	0.00	8.75	2.35
Total	100	100	100	100

**Table 6.** Voucher delivery time in the four districts (2008/2009 to 2011/2012).

Districts	Responses (%)	
	Late delivery	On - time delivery
Sumbawanga	30(91)	3(9)
Mvomero	32(88)	3(12)
Mbozi	61(95)	3(5)
Bariadi	50(79)	13(21)
Total	163(88)	22(12)

$\chi^2 (3, N = 185) = 8.01, p = 0.05.$

of urea (50 kg) and 10 kg of maize seeds or 15 kg of rice seeds. Cotton farmers were eligible for cotton seeds and one acre pack of pesticides. The number of vouchers that were distributed to districts and villages did not meet demand of eligible farmers. As a result vouchers were given to farmers alternately; farmers who received vouchers in one year did not get them the following year. Inadequate vouchers created corruption and social conflicts among politicians, village leaders and farmers. On the other hand, non beneficiaries started refusing to contribute in community development projects in the village. They claimed to be discriminated and argued that subsidy input beneficiaries should be responsible to pay back in terms of contribution to community development projects. Farmers in the list of beneficiaries were forced to accomplish pending contributions in community development projects before they were given the vouchers. This was associated with inadequate awareness of the eligibility criteria. It was noted that farmers did not graduate after three years, which is contrary to exiting strategy in smart subsidies. Smart subsidy requires farmers to be subsidized for three consecutive years and graduate from the programme. After graduation, farmers are expected to become self sufficient and able to support themselves. Results presented in Table 5 show the likelihood of poor and rich farmer's selection in the programme.

In Sumbawanga and Mbozi, selection favoured relatively rich people likely related to the targeting criteria for farmer's ability to contribute the cash top up. Similar

findings have been reported in Malawi where subsidized fertilizer was often provided to wealthier households with community and political connections (Ricker-Gilbert, 2011).

### **Input subsidy delivery**

The government prepares vouchers and deliver them to selected farmers through a series of committees from the national to the village level. Farmers submit the vouchers to selected agro dealers to redeem the inputs. The voucher has the value the government contributes and should be approved at district level. Agro dealers submit vouchers to a selected bank, which has been contracted by government; in this case, the National Microfinance Bank (NMB) to redeem money. Distribution is supposed to follow the National voucher guidelines stipulating the procedures to be followed by every actor in the channel. For example; recruitment of village vouchers committee and eligible farmers required farmer's participation through village assembly. Also village assembly were to select names of agro dealers to enter competition at district level where qualified dealers were approved. Observations indicate that village committees existed in all villages were gender balanced.

### **Timely delivery**

Results on whether or not vouchers were delivered on time reveals that; 88% of households did not receive the inputs on time significant at  $\chi^2 (3, N = 185) = 8.01, p = 0.05$  (Table 6). Also, 68% of vouchers were delayed for more than seven weeks. In some situations where inputs were delayed, farmers had already planted maize using saved grains from the previous season. In such situation, they required only top dressing fertilizer, but instead they were forced to take the whole input package including basal fertilizer and asked to save the seeds and basal fertilizer for use in next cropping season. This was difficult as farmers resources are limited and have other priorities to allocate their money. Delayed inputs had consequences on continued reliance on poor quality

**Table 7.** Percent response on quality of distributed inputs.

Full name of village	Not quality inputs	Quality inputs
Chitete	1(5.9)	16(94.1)
Katete	0(0.0)	16(100.0)
Isangu	14(46.7)	16(53.3)
Itaka	8(22.2)	28(77.8)
Ibulyu	15(50.0)	15(50.0)
Nguliyati	13(38.2)	21(61.8)
Lusanga	1(6.3)	15(93.8)
Kinda	5(62.5)	3(37.5)

$\chi^2 (7, N = 187) = 31.4, p = 0.00$ . Note: Number in the parenthesis is in percentages.

seeds and low adoption of production technologies. The farmer's decision of timely planting was interfered and in some situations late planting was practised, thereby increasing the probability of getting lower yields as they were totally dependent on rain fed agriculture. These findings imply failure to attain the NAIVS objective of timely delivery of inputs to farmers at reduced costs. Also, it is contrary to NAIVS guideline which requires vouchers to be distributed prior to planting season.

In some situations, special forms (paper certificates) were used to substitute vouchers to reduce the delayed time. However, the forms were useful when the MAFC informed Local Government Authorities to print the documents in advance. Even with these government efforts, about half of households who received the paper certificates were not able to purchase subsidized inputs as the certificates were rejected by agro-dealers (Malhotra, 2013). The implication is that, printed paper certificates were not the best option to overcome delayed vouchers. Also, a delay in disbursements of funds for used vouchers was noted leading to agro dealers default in loan repayment. The consequence was limited loan access from the National Microfinance Bank (NMB) to supply inputs in the following season, and failure of small agro dealers to remain in the input supply business. Smart subsidies such as NAIVS are aimed to promote private sector involvement in input business. Agro-dealers aim to generate profit from input business. Profit limiting environment is likely to encourage agro-dealers to exit from the input business lowering market competition which is not in favour of farmers.

### **Quality of distributed inputs**

Results on whether or not the distributed inputs are of the right quality are significant  $\chi^2 (7, N = 187) = 31.4, p = 0.00$  (Table 7). In Kinda, 62.5% of farmers reported poor quality of distributed maize seeds because they had low germination rate. Households in Isangu (46%), reported poor quality of distributed fertilizers. They complained of DAP being mixed with Minjingu which is relatively cheap;

and table salt was sold as calcium ammonium nitrate (CAN). Despite distribution of inputs through ginneries under contract farming in Bariadi, poor quality inputs were also prevalent. In Ibulyu village, 50% of farming households reported poor quality of pesticides, and argued that cotton seeds did not germinate. Quality inputs have standard criteria according to manufacturer specifications. Quality fertilizer has ability to release desired nutrients in the applied site where quality seeds have higher germination, plant vigour and high productivity. Seed germination, plant vigour and physical characteristic of fertilizers such as texture were determining factors of input quality.

Efficacy of pesticide was the main quality factor. Use of quality seeds, fertilizers and pesticides are crucial in agriculture productivity. Poor quality of delivered inputs implies that farmers have to incur extra costs of inputs and labour for replanting. Application of poor quality inputs is also a moral hazard especially under unpredictable weather conditions. Farmers in the study area depend entirely on rain fed agriculture and missing the first rains or late planting/replanting is likely to cause low production or even crop failures.

### **Voucher committee selection**

Leadership reputation was stipulated as a requirement of members of village voucher committee. Some village leaders recruited weak representatives in the village voucher committee to protect their dishonesty interests. Reports from key informants revealed that, in some situations farmers were involved in selection of committee members, but were not courageous to refuse the names suggested by their leaders. Farmers were not well informed about their role stipulated in the national voucher guideline. They felt that by rejecting the appointed candidates they would face problems in their community because they would be considered to have acted against the system. In addition, more than 73% of farmers did not know where to report problems associated with the programme. In the guideline there is

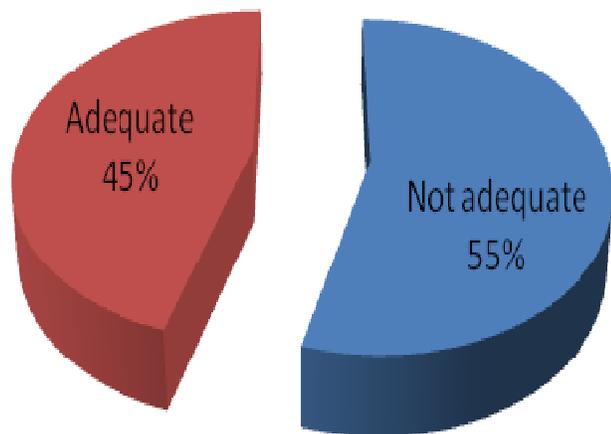


Figure 4. Availability of extension service under NAIVS.

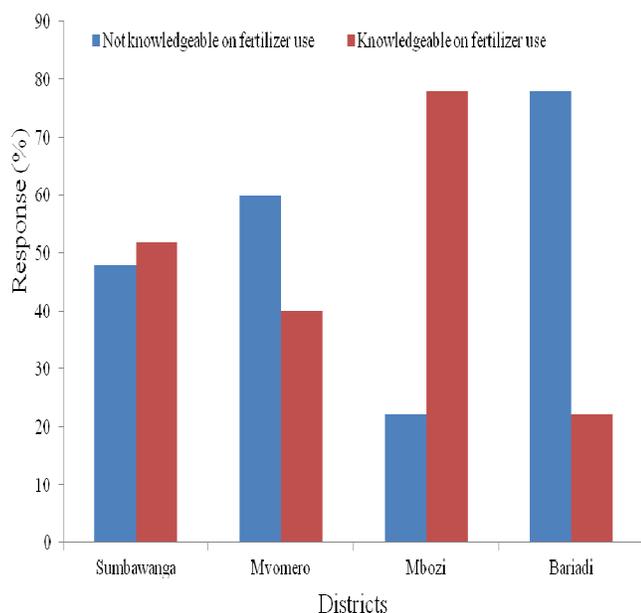


Figure 5. Household knowledge on chemical fertilizer use in percentage.

a provision of an opportunity to appeal to higher levels. Village complaints needs to be reported at ward level, ward to district and district complaints reported to region level, but farmers were not aware. The only option was to report problems to village leaders but in situations where village leaders were the source of problem, farmers were in dilemma.

**Selection of agro dealers**

Criteria for selection of agro dealers included possession of capital enough to run smoothly the service, short

distance from village, experience in input business and possession of Taxpayer Identification number (TIN). The application procedure was to send application to village government where village assembly chose the names of preferred stockists. Stockists with business based in the village were given priority. The chosen stockists were screened at district level. Research investigations revealed violation of procedures for some districts. In such districts, selected agro dealers were not from the list suggested by the village assembly and had no input shop in the district. Chosen agro dealers had limited capital to be able to distribute subsidy inputs on time and throughout the season.

Nevertheless, key informants reported that selection of committees and agro dealers was interrupted by some politicians.

**Extension and farmer’s knowledge on input use**

**Extension service**

Inadequate extension service under the voucher scheme was reported by 55% of farmers (Figure 4). Sixty five percent of respondents claimed that extension service was mainly based on verbal communication and only 20% mentioned use of leaflets. Key informants reported existence of demonstration plots in Bariadi contrary to other study locations. It was unlikely to deliver adequate message to farmers due to limited capacity of extension staff. Farmers in Bariadi were of the opinion that extension service provided by Techno-Serve could be better if assigned to the district council as they possess strong extension capacity. It was also noted that contract farming is more likely to improve the extension service revealed by use of demonstration plots.

**Knowledge on chemical fertilizer use**

Figure 5 presents variations in the number of farmers knowledgeable about level of chemical fertilizer application from one study location to another. Results show that 78, 52, 40 and 22% of farmers in Mbozi, Sumbawanga, Mvomero and Bariadi, respectively were knowledgeable to use chemical fertilizer. High knowledge of farmers on chemical fertilizers use in Mbozi and Sumbawanga is associated with earlier introduction of subsidy in these locations. Subsidies are known to stimulate the adoption of improved technologies (Lee, 2005). The long term objective of the government support of subsidy programme was to promote adoption and efficiency application of essential productivity enhancing inputs (URT, 2012). Farmers in these locations might have adopted the use of fertilizers and improved seeds associated with early introduction of subsidy in these locations. This is expected to increase agriculture productivity and food security.

**Table 8.** Percent response on quality of distributed inputs

Full name of village	Not quality inputs	Quality inputs
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### ***Household education and awareness on input subsidy***

The level of awareness on input subsidy distribution slightly varied among educated and low educated household heads [ $\chi^2 (3, N = 300) = 7.7, p = 0.05$ ]. Awareness of household heads with no formal education was 87.2%, compared to primary education 95.2% and secondary and above 100% (Table 8). High education exposure is associated with more ability to process relevant information and increases the chances of adoption of improved technologies (Morris et al., 1999, Kaliba et al., 2000).

### ***Influence of socio-economic attributes in receipt of subsidy inputs***

Some of the socio-economic characteristics such as age, gender and marital status were tested to find out whether or not they have relationship with vouchers received by household. A chi square statistic test results reveals no significant relationship between these variables and subsidy input received by household. However, when same variables were tested for awareness of subsidy distributed to farmers, only age of household head was significant  $\chi^2 (3, N = 300) = 8.32, p = 0.04$ . Household heads with age below 30 years were less aware than household heads with age 30 and above. Age has been reported to be used as indicator of farming experience. Such experience makes certain information search and cost easier (Mpogole and Kadigi, 2012). In addition, aged male households have been associated with strong networks and better connection to community and village leaders. These findings imply that, sometimes farmers were equally treated in the voucher scheme. However, women and disadvantaged groups were not given priority as stipulated in the guideline.

### ***Monitoring the distribution of vouchers***

Strong security was maintained in distribution of voucher

from national level to district level. Observation from focus group discussions and key informants revealed that after submitting the vouchers to villages, there was no security force to take care of vouchers. This was a risk to village leaders who were responsible for handling the vouchers. Furthermore, voucher committees were not paid anything despite workload involved in voucher distribution. This could be one of the sources of temptation to cheat when bribed by unfaithful stockists. Furthermore, there were limited funds and facilities for monitoring the programme. Also, the training of committee members on their role in the scheme was not adequate and some were overpowered by village leaders. Additionally, key informants reported political interference in the system in which politicians especially councillors have more power in subsidy inputs than technical staff. They demanded equal share of vouchers regardless of land attributes in order to impress their voters.

Follow-ups interviews from Prevention and Combating of Corruption Bureau (PCCB) caused annoyance to Local Government Authority workers and threatened their work security during voucher distribution.

### ***Leakage and elite capture***

Leakages were reported to happen in various ways in the NAIVS. Agro dealers colluded with farmers and village committee members in some locations to cheat. Farmers were paid 10,000 Tsh and village committee 20,000 Tsh to sign the voucher without receiving the inputs. This was also reported by the politician in one of the study location (Luhwago, 2011). Such situation benefited agro dealers than intended farmers and hampered the intended programme objectives. Other reported strategies used for stealing the vouchers were: inclusion of names of children and dead people in the list of beneficiaries. Unfaithful village executive officers (VEOs) and village committees colluded with agro dealers and forged vouchers using fake signatures as if farmers had received payments. Hiding subsidy inputs during distribution and selling them later at full price was also reported. These problems were reported in Mbozi and

Bariadi. Also, unfaithful agro dealers mixed inputs with poor quality /cheap material and sold them as good quality inputs. Existence of ineffective pesticides and poor quality seeds was associated with bureaucracy in the framework. Agro dealers were claimed to arrange with input manufacturers/stockists to provide substandard inputs.

## CONCLUSION AND RECOMMENDATIONS

This study has assessed the operational framework of NAIVS in Tanzania. While in some locations the system operated well, challenges were encountered in other areas. The system reduced the cost of inputs to farmers. However, the top up contribution was still unaffordable by farmers. Distributions of inputs were done in lean season when farmers have no alternative source of income. In most cases the inputs were not distributed on time. Delayed input delivery was caused by lack of capital by agro dealers and long chain involved in the distribution of voucher. Bureaucracy existed in selection of agro dealers and independent monitoring and evaluation committee did not exist in the scheme. Generally, there were violations of guidelines in NAIVS framework. Therefore, we recommends establishment of credit institutions or system in the villages where farmers can obtain loans to purchase the inputs. Bureaucracy should be eliminated through provision of full mandates of agro dealer's selection to farmers. Ministry of Agriculture Food Security and Cooperatives should reimburse the vouchers in time to sustain agro dealers in input business. There should be established independent monitoring and evaluation system particularly at village level in order to control leakages and adulterated inputs. Programme awareness need to be raised to all farmers to enable them understand their rights and disciplinary measures to undertake for unfaithful leaders. Due to limited number of extension staff at village level, Ward Agricultural Resource Centres (WARC) should be strengthened by providing enough information regarding NAIVS.

Extension material such as leaflets, posters and magazines needs to be introduced into districts and villages to supplement the extension service. Public and private partnership collaboration in service delivery seems to be a promising option in extension service delivery which should be promoted. Generally, there is a need to establish and experiment a new short chain electronic vouchers delivery system to overcome the NAIVS inefficiencies.

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