

# SAFEGUARDING FOOD SECURITY IN VOLATILE GLOBAL MARKETS



EDITED BY  
**ADAM PRAKASH**



The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned.

The views expressed in this information product are those of the author(s) and do not necessarily reflect the views of FAO.

ISBN 978-92-5-106803-8

All rights reserved. FAO encourages reproduction and dissemination of material in this information product. Non-commercial uses will be authorized free of charge, upon request. Reproduction for resale or other commercial purposes, including educational purposes, may incur fees. Applications for permission to reproduce or disseminate FAO copyright materials, and all other queries concerning rights and licences, should be addressed by e-mail to [copyright@fao.org](mailto:copyright@fao.org) or to the Chief, Publishing Policy and Support Branch, Office of Knowledge Exchange, Research and Extension, FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy.

© FAO 2011

Cover design by Giancarlo de Pol

Cover photo (centre) ©FAO/Ami Vitale

Typesetting and layout by River Valley Technologies ([river-valley.com](http://river-valley.com))

# Safeguarding food security in volatile global markets

Edited by Adam Prakash

Food and Agriculture Organization of the United Nations, Rome, 2011

# Contents

Preface	xiii
Foreword	xv
Overview	xvii
<b>SETTING THE STAGE</b>	<b>1</b>
1 Why volatility matters — Adam Prakash	1
2 Commodity prices: theoretical and empirical properties — Matthieu Stigler	25
3 Rising vulnerability in the global food system: beyond market fundamentals — Adam Prakash and Christopher L. Gilbert	42
4 Rising vulnerability in the global food system: environmental pressures and climate change — Global Perspectives Unit (FAO) and Natural Resources Department (FAO)	64
5 The nature and determinants of volatility in agricultural prices: an empirical study — Kelvin Balcombe	85
6 Emerging linkages between price volatilities in energy and agricultural markets — Stefan Busse, Bernhard Brümmer and Rico Ihle	107
7 Grains price pass-through, 2005-09 — Christopher L. Gilbert	122
8 Price transmission and volatility spillovers in food markets — George Rapsomanikis	144
9 The world rice market in 2007-08 — David Dawe and Tom Slayton	164
10 Country responses to turmoil in global food markets — Mulat Demeke, Guendalina Pangrazio and Materne Maetz	175
11 International commodity agreements — Christopher L. Gilbert	202

12	The fallacy of price interventions: a note on price bands and managed tariffs — Brian Wright and Adam Prakash	231
<b>INFORMATION, EXPECTATIONS AND THE ROLE OF STOCKS</b>		<b>242</b>
13	The rise of commodity speculation: from villainous to venerable — Ann Berg	242
14	The economics of information and behaviour in explaining excess volatility — Adam Prakash and Matthieu Stigler	268
15	Storage arbitrage and commodity price volatility — Carlo Cafiero, Eugenio Bobenrieth and Juan Bobenrieth	288
16	The role of low stocks in generating volatility and panic — Matthieu Stigler and Adam Prakash	314
17	Global governance: international policy considerations — Panos Konandreas	329
<b>GLOBAL GOVERNANCE TOWARDS FOOD SECURITY</b>		<b>329</b>
18	Coping with food price surges — Christopher L. Gilbert and Alexandra Tabova	361
19	Using futures and options to manage price volatility in food imports: theory — Alexander Sarris, Piero Conforti and Adam Prakash	386
20	Using risk management tools to manage price volatility in food imports: practice — Morgan Stanley Commodities Group	405
21	The global grain contract: towards a new food security instrument — Ann Berg	430
22	Strengthening global food market monitoring — Jim Greenfield and Abdolreza Abbassian	441
23	Addressing the biofuels problem: food security options for agricultural feedstocks — Brian Wright	460
24	Targeting the most vulnerable: implementing social safety nets — Zoltan Tiba	472
25	Targeting the most vulnerable: implementing emergency reserves and other food security instruments — Agricultural Support Systems Division (FAO)	490
26	Targeting the most vulnerable: implementing input subsidies — Zoltan Tiba	510
27	Investing towards a world free of hunger: lowering vulnerability and enhancing resilience — Josef Schmidhuber and Jelle Bruinsma	543

# Targeting the most vulnerable: implementing input subsidies

Zoltan Tiba<sup>1</sup>

Input subsidy programmes are again on the agenda in donor policies after being ignored for at least two decades. The resurgence of interest in subsidies has been the result of several factors including failures of liberalization policies, stagnation of agriculture, declining soil fertility, deteriorating livelihoods of poor rural households as well as rapidly increasing food and fertilizer prices. This “new generation” of input subsidies includes so-called “smart” subsidies which favour market-based solutions and aim to promote development of agricultural input markets while targeting and enhancing the welfare of the poor. They have wider objectives than universal subsidies and focus on agricultural development, economic growth, social protection and food security. Subsidies generate interrelated impacts on prices of inputs, production and prices of staple crops, rural wages, market development, as well as growth and social development. However, smart subsidy programmes may have adverse impacts such as distortion of the market or leakage to better-off farmers, which should be avoided at any cost.

This chapter focuses on “smart” subsidies and provides operational guidelines for methods of implementation. Under “inputs” I focus primarily on fertilizer and consider social protection and an increase in staple food production as the primary objectives. Smart subsidies differ from universal subsidies in several ways, therefore their implementation requires pursuing alternative objectives such as targeting the poor, harmonizing with other policies, setting the level of subsidy and not harming the private sector.

## Background

Economic prosperity and social development have long been linked to agricultural productivity in developing countries. Market-smart agricultural input subsidies can play a significant role in raising productivity of the agricultural sector by facilitating farmers’ access to technically and economically efficient inputs at reduced costs, thereby increasing profitability. Recognizing the role of agriculture in reducing rural poverty and stimulating economic growth, the need to facilitate access to agricultural inputs has long been on the agenda of policy-makers.<sup>2</sup>

<sup>1</sup> Agricultural Development Economics Division, (FAO).

<sup>2</sup> In this chapter I focus on fertilizer subsidies, although the concept of “input subsidy” can be interpreted more widely. For example, any kind of public investment promoting input use may be considered an input

Since the 1960s, African governments promoted the use of fertilizer through universal subsidies that dominated agricultural policies in sub-Saharan Africa. In addition to providing direct subsidies that reduced the prices of fertilizer below market-level for all producers, the distribution and procurement of fertilizer was controlled and managed centrally. State owned parastatals had a legal monopoly on importing and distributing fertilizer as part of agricultural credit schemes managed by the government. These policies were often implemented through pan-territorial pricing, which supported agriculture in remote and less market-integrated areas.

There was a significant change in ideology in the early 1980s as structural adjustment programmes were initiated. Under the liberalization agenda, universal subsidies came under heavy criticisms by donor institutions who highlighted several negative impacts of these subsidy programmes. It was emphasized that universal subsidies are not compatible with the principles of the free market, they are expensive, involve high implementation and transaction costs and constitute a heavy burden on government budget. In addition, they distort market and farmer incentives, slow down the development of the private sector and, most importantly, benefit wealthier farmers who are not eligible for such transfers. Following these arguments, donors withheld support to input subsidy programmes, subsidies were gradually abolished and government parastatals and institutions were dismantled and privatized. Consequently, the cost of fertilizer rose sharply, restricting access to small-scale farmers. The use of input subsidies was subsequently discouraged for two decades.

Since the mid-1990s there has been a resurgence of interest in agricultural input subsidies owing to several factors. First, the World Bank acknowledged the failure of liberalization policies in supporting agricultural and social development, having “resulted in significant reductions in overall levels of fertilizer use and increased food insecurity among many rural households” (Morris et al., 2007, p. 4). Political demands for fertilizer subsidies, stagnation of agriculture for decades, declining soil fertility and deteriorating livelihoods of poor rural households have contributed to a reassessment of policies and several new subsidy programmes have been designed (or expanded) in different countries.<sup>3</sup> Agricultural subsidies are now again considered a potentially useful way of promoting agricultural growth and food security.

Rising prices of food and fertilizer have also contributed to the renewed interest in input subsidies. High food prices have impacted poor rural economies in several ways. The most obvious negative impacts are on poor consumers, who are net food buyers. For them, a rise in staple food prices results in a decline in real income which affects expenditure, consumption and long-term welfare through reduced expenditure on health, nutrition and education. High prices of agricultural inputs reduce the profitability of input use, constrain access to inputs (which can lead to reduced application on staple crops) and result in lower food production and higher food prices. This suggests that in the context of high food and fertilizer prices, the potential benefits of input subsidy programmes increase significantly by addressing the problem of access to agricultural inputs.

The renewed interest in input subsidies, however, does not imply a return to the “old system” of universal subsidies that remain criticized in donor policies. Instead, a new generation of so-called “smart subsidies” has gained importance. The principles underlying “smart” subsidies are designed to address failures of the market, promote market

---

subsidy including provision of agricultural research, extension services, irrigation pumps, etc. This, however, goes beyond the purpose of this chapter.

<sup>3</sup> Countries in Africa include Ghana, Kenya, Mali, Malawi, Nigeria, Rwanda, Senegal and the United Republic of Tanzania.



Table 26.1: Objectives of input subsidy programmes

Purchases through FPF	Recipient country	Prog. category	Country allocation	Price per mt - FPF	Revised price per mt - WCF Facility	Savings/losses	Days saved
Dec-08	Zimbabwe	PRRO	5 200	269.00	279.76	55 952.00	33
Dec-08	Kenya	EMOP	14 646	269.00	279.76	157 590.96	51
Dec-08	DR Congo	PRRO	1 639	269.00	279.76	17 635.64	63
Dec-08	Zimbabwe	PRRO	10 000	274.80	285.79	109 900.00	32
Dec-08	Zimbabwe	PRRO	1 950	274.80	285.79	21 430.50	33
Dec-08	Kenya	EMOP	1 550	274.80	285.79	17 034.50	54
Dec-08	DR Congo	PRRO	9 485	277.00	287.99	104 240.15	65
Dec-08	Kenya	PRRO	5 515	277.00	287.99	60 609.85	53
Dec-08	Zimbabwe	PRRO	3 150	281.00	292.24	35 406.00	34
May-09	Kenya	EMOP	10 000	290.00	275.50	- 145 000.00	61
May-09	Somalia	EMOP	8 532	290.00	275.50	- 123 714.00	63
May-09	Kenya	PRRO	9 941	290.00	275.50	- 144 144.50	52
May-09	DR Congo	PRRO	1 527	290.00	275.50	- 22 141.50	63
Jul-09	Kenya	PRRO	15 000	199.00	222.80	357 000.00	53
Oct-09	Somalia	EMOP	14 721	212.51	242.26	437 949.75	61
Oct-09	Kenya	PRRO	15 279	212.51	242.26	454 550.25	54
Oct-09	Somalia	EMOP	5 000	398.00	453.72	278 600.00	59
Nov-09	Somalia	EMOP	15 000	234.00	208.26	- 386 100.00	58
Oct-09	Somalia	EMOP	1 000	400.60	456.68	56 080.00	61

development, boost sustainable development of agricultural input markets and enhance the welfare of the poor. Smart subsidies should stimulate demand in private markets through lower prices of inputs and benefit private distributors by facilitating entry into input markets and by helping to achieve economies of scale. Smart subsidies are designed to target the poor and thus favour market-based solutions in input supply and aim to promote pro-poor economic growth through increasing competition, economic efficiency and empowerment of farmers (Morris et al., 2007:103-4).

## Objectives, impacts and “dangers” of subsidy programmes

Input subsidy programmes can have a variety of interrelated objectives and can benefit farmers in various ways. When implemented, subsidies will generate various impacts in the economy and will have several secondary spillover effects. The design and implementation of subsidy programmes, however, require special attention, because in addition to positive impacts, subsidies can also do as much harm as good. Below I review the objectives, impacts and the potential “dangers” of input subsidies.

The objectives of input subsidy programmes can be grouped into four categories including agricultural policy, economic growth, social protection and political objectives. Programmes often combine several of these, many of which are complementary in most of the cases, but some are mutually exclusive. They serve as criteria against which the programme can be evaluated, while the objectives of the subsidy in turn determine the key design and implementation elements of programmes. The possible objectives of subsidy programmes are summarized in the Table 26.1.

In a recent review of ten subsidy programmes implemented in Africa, Dorward (2009) finds that the three most popular programme objectives include increasing food production (food security objective), adoption of inputs (agricultural policy objective) and



welfare of producers (economic objective). While political objectives were involved in large programmes, other objectives were only included in an ad hoc manner. Beside the tendency to focus on production and producer welfare objectives, programmes have tended to ignore the objective of wider pro-poor economic growth. A single programme, however, should not be expected to achieve multiple objectives in a sustainable way; instead, prioritized objectives are needed for input subsidy programmes.<sup>4</sup>

Following the identification of programme objectives, the possible impacts of policies should be considered. The various impacts are interrelated.

*Impact on input prices:* Input subsidies, by definition, lower the prices of agricultural inputs. The subsidy reduces costs to farmers and indirectly increases income of poor farmers and consumers, while the policy is financed by less poor farmers and taxpayers. Owing to the income transfer, farmers can increase the use of inputs which in turn contributes towards increased output.<sup>5</sup>

*Impact on production and prices of staple crop:* Input subsidies replenish soil fertility and when applied to staple crops they can increase (and stabilize) the level of production at both the household and the national level.<sup>6</sup> Subsidies should encourage the production of those products where there is likely to be a substantial increase in supply and which have inelastic demand among the poor, mainly staple grains. Subsidies thereby have a potential to contribute to wider growth when applied to production of grains. The magnitude of increase in production depends on several factors including quality of the input, timing of delivery, complementary resources such as availability of seed, weather conditions, as well as technical skills of beneficiaries in using the inputs. By increasing output, subsidies can potentially lower the prices of staple food, especially if the country is isolated geographically from the international market and high transport costs cause domestic food prices to be higher than import parity. Increases in production may also shorten and reduce the magnitude of price upswings in the domestic market and thereby contribute to consumers' welfare and increase their real incomes. In order to impact producer prices, programmes should be large enough and be supplemented by complementary investments and policies to develop output markets.<sup>7</sup>

*Impact on rural wages:* If the subsidy affecting production pushes up demand for agricultural on-farm labour, there will be an increase in rural real incomes, which may benefit even those who are not recipients of the targeted subsidy programme. Increased incomes may further increase the demand for inputs, and the transfer to producers will be passed back to suppliers.

*Impact on input market development:* Because the policy (ideally) involves the private sector, it has the potential to contribute to the development of the input market in the country by facilitating investment in marketing systems and lowering transaction costs. As the market expands and volumes increase, new suppliers - both subsidized and unsubsidized - will enter business enterprise. Consequently, market margins will decline and competition, efficiency and the potential to realize economies of scale will increase.

*Multiplier effects on other markets:* By increasing wages and real incomes of staple producers and consumers, subsidies can facilitate a long-term expansion of rural markets by boosting demand for products such as livestock, horticultural crops, non-farm goods as well as services. As productivity increases, land is released and supply capacity can develop. Through such multiplier effects,

<sup>4</sup> It is frequently argued that subsidies are not the best choice for attaining social safety net and poverty reduction objectives owing to the significant opportunity cost of input subsidies at the expense of other public goods, including infrastructure, education or health services.

<sup>5</sup> There are counter-arguments to this. If demand for fertilizer increases (owing to lower costs) prices may be pushed up, further neutralizing the impact of the subsidy (Salzburg, 2008). Thus, it is important that the government ensures the availability of fertilizers in the market.

<sup>6</sup> This argument has been challenged on two grounds. First, the supply response to fertilizer depends on exogenous factors such as rainfall and other risks to production, therefore the increase in supply is not guaranteed. Second, focusing on staple crops may crowd out the production of other crops such as cassava and overall supply in the country may actually decline.

<sup>7</sup> It should be noted that a fall in producer prices may incur loss for less poor producers who normally produce a surplus and sell it. To compensate, alternative activities should be open for them.

subsidies can facilitate changes in livelihoods over the long-run. There can be further spillover effects onto other markets as interlocking arrangements are made among input suppliers and other agents.<sup>8</sup>

*Social impact and growth:* Input subsidies provide social protection and strengthen food security at the household and at the national level by increasing staple crop production and lowering food prices, especially if the country is not fully integrated with international markets. Lowering food prices can have ambiguous consequences. On the one hand, lower output prices result in declining producer surplus and increasing consumer welfare, which is achieved from the transfer from producers. On the other hand, however, lower prices (and increased production) can lower returns and lead to farmer losses.

The above discussion points to potential impacts and outcomes of subsidy programmes that are difficult to analyse in practice as there is little evidence on them from recently implemented subsidy programmes in Africa (Dorward, 2009). It is challenging to estimate, measure or collect information on the extent to which subsidy programmes have influenced prices of staple foodstuffs, increased demand for labour in rural areas, leaked to non-eligible recipients, replenished soil fertility or whether they have generated economic growth in any respect. The limited attention devoted to estimate leakage and displacement may also be related to political issues.

An input subsidy programme can create large potential benefits if the programme is implemented effectively and efficiently. However, there is also potential for large economic losses and for generating adverse consequences in a free and liberalized market setting. Input subsidies involve high costs, especially during periods characterized by volatile food prices, and huge financial losses can be incurred if the policy is not implemented in the right manner. The potential “dangers” of subsidy programmes include the following:

*Market distortions and out private sector investment:* Subsidies may undermine the incentives for private investment in the input market if subsidized sales displace unsubsidized commercial sales. A decline in demand for commercial fertilizers can discourage the participation of the private sector. Subsidies may create risks and uncertainty in the market and private enterprises may incur losses.

*Subsidy used for political purposes:* Rationing and targeting subsidized inputs has a potential to be influenced by political factors. There are potential political interests in expanding subsidy programmes, but the pressure to control or reduce subsidies is usually weak. The subsidy may create opportunities for rent seeking and fraud.

*Subsidy not reaching intended beneficiaries - leakage of subsidy:* Though the intended beneficiaries of input subsidy programmes are poor farmers, part of the input subsidy may go to producers who would be using fertilizer even without the subsidy. In this case, the subsidy will not deliver additional economic gain as the product would be produced even without the subsidy. Another reason the subsidy may not be reaching the target population is that the poor may not be able to afford the inputs even at subsidized prices.

*Subsidy not applied to staple crops:* Input subsidies are intended to promote the production of staple crops, but fertilizers can be applied to a variety of crops including higher return cash crops. If fertilizer is not applied on staple crops, the intended outcomes may not be achieved. Higher return cash crops are often produced in large quantities by commercial farms, and therefore diversion away from staple crops towards the production of cash crops also implies that the poor will not benefit from the programme.

*Subsidy not used within the country:* The input subsidy should be used in the country in which the programme is funded. However, countries in sub-Saharan Africa have porous borders and cross-border leakages may happen if inputs are sold outside the country.

<sup>8</sup> For example, a network selling inputs can also specialize in other products.

*Exogenous factors:* All of the positive impacts of subsidies depend on exogenous factors including rainfall and soil fertility. Funding fertilizer subsidies is therefore a risky investment.

*Complementary measures:* The application of fertilizer requires technical knowledge of management practices and the right application methods. If this knowledge is missing in the target population, the impact of the subsidy programme will be significantly reduced. Beneficiaries may overuse inputs owing to easy access or artificially low prices and may not focus on labour-intensive production techniques. Therefore, the subsidy programme should include complementary policies.

*High variability of prices:* Prices of staple crops may fluctuate significantly, which may discourage investment in input markets. There is a seasonal time lag between fertilizer and staple crop prices as well. As fertilizer is purchased and applied several months before the crop for which it is used is harvested and sold, the economic returns of the input subsidy programme will depend on how input and output (staple crop) prices change during the production cycle.

Based on the above framework, subsidy programmes should achieve their intended objectives, generate positive impacts and minimize the occurrence of potential “dangers” and negative impacts. A good subsidy programme will therefore:

- ▶ foster pro-poor economic growth and generate benefits for consumers by increasing the production of staple food;
- ▶ lower the prices of staple crops;
- ▶ target those producers who cannot afford to access inputs in sufficient quantities in a timely and cost effective way;
- ▶ support the development of commercial input markets; and,
- ▶ avoid leakages to non-poor households and discourage the development of secondary markets.

To implement smart subsidy programmes attention should be paid to targeting specific household types, determining the level of subsidy (rationing), avoiding negative impacts on the market and on economic growth, timing the programme, harmonizing with other policies and ensuring that adequate amount of inputs are available. These aspects are discussed in detail in the following section.

## Implementing “market-smart” input subsidies

### Targeting

There are several aspects of targeting input subsidies that must be considered when implementing the programme:

- ▶ The first question relates to the objectives of the subsidy: what is it that the subsidy programme is trying to achieve and, specifically, which crop(s) should the policy target in order to achieve its goals?
- ▶ The second question then follows, who should benefit from the programme: what categories of farmers (or institutions) should be targeted?
- ▶ Third, what are the possible targeting methods to reach these potential beneficiaries?
- ▶ Finally, how can targeting be improved and what are the potential “mistakes”?

Below I revisit these questions in the respective order.

As demonstrated earlier, recently implemented “smart subsidy” programmes, at least in Africa, have aimed to increase food security, welfare of the poor and agricultural production in the country. In order to achieve these goals, inputs should be applied on those products that have the potential to stimulate a substantial increase in food supply. Smart input subsidies should therefore encourage the production of staple food crops.

If the policy aims to increase the *food* supply, then input subsidies should be delivered to producers whose usage of input has been constrained by market failures. The subsidy programme should therefore target:

- ▶ those farmers who would either not use inputs in the absence of the subsidy (or use very little); or,
- ▶ who are likely to use substantially more inputs as a result of the subsidy.

There will be no economic gain if the subsidy benefits farmers who would purchase the inputs anyway, even without the subsidy. The primary, and generally only, focus of smart subsidies are resource-constrained but productive farmers who cultivate staple crops.<sup>9</sup> There are at least two powerful arguments to target the poorest among these farmers in order to facilitate incremental use of inputs by those who would otherwise not use those inputs. First, poorer farms are thought to be generally more efficient in cultivating labour-intensive *staple food* crops, while larger farms tend to be more efficient in producing capital-intensive higher value cash crops. If the aim of the programme is to promote staple crop production, increase welfare, reduce displacement and address market failures, then targeting the poor will deliver wider benefits. Second, there is no clear evidence of a relationship between farm size and efficiency (Dorward, 2009).<sup>10</sup> This constitutes a counter-argument that the poor usually make less efficient use of inputs and therefore the overall impact of the subsidy would be higher if it targets the less poor.

The most frequently used methods to target poor resource-constrained farmers have combined *geographical targeting* with *intra-community targeting* and *self-targeting*.<sup>11</sup> The assumption is that in remote regions fertilizer use remains lower because inputs cost more owing to higher cost of transport, while farm gate prices of staple crops are often lower than in other areas, for the same reasons. Input subsidies can be provided unconditionally using poverty criteria. Community-based targeting (intra-community targeting) has been the most widely used method. It is often difficult to ensure with this targeting method that the poor benefit from the transfer: an evaluation of the Targeted Input Programme in Malawi, for example, did not find evidence that beneficiaries would be poorer than non-beneficiaries. For this reason it is often recommended to introduce self-targeting, for example, by linking public works programmes with the distribution of inputs as better off farmers are less likely to participate in such programmes.

Another aspect of targeting is to find ways to get the inputs to farmers. It is often argued that the best means to deliver smart subsidies is through *input vouchers*.<sup>12</sup> Vouchers have been used extensively in recent years and are certainly more efficient than direct distribution of fertilizer. The voucher system functions in the following way: farmers receive vouchers which they take to suppliers to exchange for inputs (fertilizer, seed or pesticides) and the supplier gets reimbursed (sometimes including a handling fee) for the value of the coupon

<sup>9</sup> A subsidy can also be provided to input suppliers. In India, for example, fertilizer subsidies have been given to domestic producers to develop the local market and the fertilizer industry (Dorward, 2009). Given that only few African countries produce fertilizer, I do not discuss this option further.

<sup>10</sup> Recently implemented subsidy programmes in Africa widely differ in targeting. Some have focussed on the poorest (food insecure and vulnerable) households, but others have targeted the less poor, better-off, households in order to maximize production.

<sup>11</sup> For a detailed review of methods, costs and modes of implementation of targeting, refer to Chapter 24.

<sup>12</sup> Other instruments used to target smart subsidies include matching grants to producer organizations (used for example in Mali and Nigeria) and partial loan guarantees to support the establishment of an input dealer system (Malawi and Kenya). Direct distributions implemented by government institutions or input suppliers can be more controversial and general price support is not considered a “smart” subsidy. In the following I focus on vouchers as the most widely-used means to target smart subsidies.

by a bank or a designated agency. The voucher system satisfies the requirements of smart subsidies in that it uses private sector suppliers for targeting. This system stimulates the development of the private-sector input market as suppliers get a guaranteed demand and profit margin for their supply, which reduces risks and uncertainties in their business.

The voucher system has several advantages over other methods for transferring the benefits of the programme. In addition to supporting the private sector, and hence being market-smart, the voucher itself is a flexible asset which can be converted or modified. It is possible to convert the voucher into another type of subsidy (for example to a production credit which can be repaid at harvest time) or reduce the value of the voucher to facilitate exit from the programme, which is often a major dilemma in subsidy programmes. On the other hand, vouchers can be criticized for incurring relatively high administrative costs (printing, management, targeting smallholders). The opportunity cost of using vouchers may therefore be relatively high compared with investments into infrastructure, education or health.

Based on the discussion above, several recommendations can be made to increase the efficiency of targeting and reduce leakage of input subsidies. They include the following:

*Discourage the sale of subsidized input by recipients:* The subsidized input should be kept and used by those poor beneficiaries who were initially targeted. If they sell the inputs instead of applying them on their own crops, it will end up benefiting better-off farmers. As larger farms often produce higher value cash crops, staple food production may not increase at the national level to the same extent, and there will be no reduction in output prices that would benefit poor net food buyers. At the same time, the subsidy will not increase food entitlements (through increased production) of poor households.

*Ensure that input suppliers are situated locally:* If farmers are targeted through vouchers, the costs of exchanging vouchers for inputs can increase significantly if there are no input suppliers situated locally. The areas targeted by vouchers should have sufficient amount of suppliers who will exchange the voucher for inputs.

*Ensure that the type of fertilizer “ matches ” the crop:* Certain crops are responsive to certain types of fertilizers. The type of fertilizer which is supported by the system should be ‘compatible’ with the crop which is targeted by the subsidy.

*Try to make the system competitive:* In order to facilitate the development of the input market, vouchers should be redeemable at private input suppliers. Using several private dealers as suppliers of fertilizer, instead of relying only on the government or on a few selected private entities, will make a significant contribution to the development of the private distribution network.

*Sustain the system over time and stay consistent:* Once a voucher system has been developed, try to keep it functional in a consistent manner for at least five years. This will allow sufficient time to develop the system further, boost the development of the private market and increase efficiency of fertilizer use by farmers. It is often challenging to sustain programmes for longer periods owing to shorter funding cycles of donors and government, but every effort should be made to make the programme sustainable, especially if it has achieved significant gains.

*Identify intended beneficiaries clearly and introduce control systems:* The programme should identify clear criteria to target beneficiaries and should include mechanisms to control and verify the efficiency of targeting. For example, land size is one such aspect that has been used in recent subsidy programmes.

*Increase targeting efficiency by limiting ration size:* It has been found in some subsidy programmes that an effective way to increase the efficiency of targeting is to limit the quantity of subsidized inputs to a level that is too small to interest better-off farmers but sufficiently large to benefit poorer producers. This means essentially introducing a self-targeting element in the programme.

*Minimize political interference in the programme:* Despite the importance of keeping the subsidy programme apolitical, this may be challenging to achieve, especially during elections.

However well targeting is managed, it will never be perfect and there will always be inclusion and exclusion errors. The final distribution of the subsidy and the effectiveness of targeting will be influenced by social, cultural and political factors and formal targeting criteria (geographical and intra-community targeting) will differ from the de facto criteria which is actually implemented. In the case of input subsidies, however, contrary to other types of social protection measures, mis-targeting may be less of a problem for several reasons.

- ▶ First, if there is leakage of inputs to non-poor producers, poor net-food-buyers may still benefit from the programme if it results in decreasing staple food prices.<sup>13</sup>
- ▶ Second, even if recipients resell vouchers on the market, the targeted group still benefits from the cash income. Therefore, as long as poor farmers receive the vouchers initially, the existence of a secondary market does not necessarily indicate that targeting has failed.

The latter argument implies that targeting matters in input subsidy programmes only if the programme has social objectives, such as enhancing household food security or reducing poverty.

### *Rationing, cost and availability of inputs*

The subsidy is an income transfer to the farmer through which the cost of the input is reduced by the value of the transfer. Under a free market setting with no subsidies, the price of the input would be the import parity price, while the level of the subsidy would be the difference between the import parity price and what the participant farmer actually pays. There are several methods to determine the appropriate level of the subsidy, both at the micro and at the macro level.

At the micro (household) level, the general rule is that the subsidy should bring fertilizer prices down to an affordable level for low-income poorer farmers. The right level of subsidy can be estimated both in absolute and relative terms.

- ▶ Integrated household surveys usually provide representative data on the average income of the poor and the ultra-poor and the level of the subsidy which is required to compensate beneficiaries can be calculated from the difference between the import parity prices of fertilizer and the average income level of the poor. In other words, this method indicates the rate at which the target population can afford the input.
- ▶ Another possible benchmark in determining the level of subsidy is to compare the cost of inputs with the prices of food. The subsidy should increase the profitability of poor farmers' agricultural production to the level that it offsets the decline in income that is generated by the higher costs of inputs. The prices of food (output) will indicate this level.

At the macro level, the total cost of the programme is determined by the number of farmers who benefit from the programme and by the level of subsidy per beneficiary. The following points should be taken into account when determining the total cost of the programme.

- ▶ The basic condition for the subsidy is that the value of the additional output generated should be higher than the overall cost of the input distributed to and used by farmers, including administration costs. A programme should achieve this goal in order to create a positive economic return at the macro level and to be cost-effective.
- ▶ The total cost of implementing the input programme, in addition to budgetary costs, includes various opportunity costs. It is important to take into account the potential benefits that may be achieved if the resources used in the subsidy programme were channelled into alternative

<sup>13</sup> On the other hand, net sellers will lose in cases of lower product prices, but the poor are usually net buyers of food.



policy instruments, such as investments into public goods with productive value or various social programmes. It may be challenging to calculate because the subsidy programme, as discussed earlier, can potentially generate wider impacts through multipliers and the total benefit that it can generate is, therefore, not constrained to income transfer to producers.<sup>14</sup>

The amount of the subsidy should neither be too low nor too high. If the level of transfer is set too high, the influence of political factors will increase over economic considerations and so will the possibility of large farms benefiting from the programme. In general, larger programmes are more difficult to manage and their higher budgetary costs are difficult to control. They also have the potential to crowd out complementary investments. On the other hand, small programmes are unlikely to be able to achieve economy-wide impacts and foster market development.

During the 2007-08 price swing, the world prices of food, fertilizer as well as ocean freight and transport costs all increased substantially. This reduced the potential returns to input subsidy programmes and increased the burden on national budgets. Nevertheless, the majority of subsidy programmes recently implemented in Africa have been quite significant and have subsidized input prices by at least 50 percent in order to make inputs affordable for producers (Dorward, 2009).

Finally, financial support for fertilizer subsidy programmes can be obtained from various sources including government, donors and aid agencies. In Malawi, for example, input subsidy programmes were initially funded by donors, but recently donor funding stopped and the government took over financing the programme.

### *Avoid harming the private sector*

Fertilizer is imported in most countries of sub-Saharan Africa, often by private companies, and markets are usually small and geographically dispersed. These markets are therefore sensitive to drastic interventions. The effects of the subsidy on the input market will depend on several factors including the nature of the subsidy, the structure of the input supply system, and the scale of the subsidy programme. Only if the subsidy programme is implemented on a sufficiently large scale will there be impact on output prices and markets.

As discussed earlier, subsidy programmes can harm the private sector in many ways. However, recent subsidy programmes in Africa have mainly used private companies to provide fertilizer. In order to avoid negative effects, smart subsidy programmes should operate along the following lines.

*Avoid creating risk and uncertainty in the market:* Market development requires clear and stable policies that should be sustained over time. Aim to achieve long-term structural changes instead of implementing short-term and ad hoc policies with unexpected changes.

*Develop trust between the private and public sector and set clear rules on government contracts:* As private companies participate in the subsidy system, they will develop an interest to benefit from government contracts to provide subsidized inputs. As a result, their incentives may change from expanding profitable sales on the market towards dependency on government contracts. The conditions for companies to benefit from such contracts should be clear and transparent.

*Keep market opportunities open for potential new suppliers:* As the market expands with increased volumes, new suppliers of inputs will express interest in joining the programme. If they are left out from the programme they may shortly go out of business. Their participation and entry to the market should be encouraged and facilitated in order to increase competition and realize economies of scale.

<sup>14</sup> In fact, input subsidies are less efficient in delivering income transfers owing to high administration costs and because of the need for complementary services.



*Encourage the evolution of spillover effects in related markets:* Interlocking arrangements will gradually develop among input suppliers and other agents in the market. This is a positive sign of market expansion which needs to be encouraged.

*Promote efficiency:* Make sure that subsidized sales do not displace existing commercial (unsubsidized) sales or private sector dealers.

### *Timing of delivery*

As agricultural inputs are linked to agricultural production cycle (rains), timing is of particular importance for the success of the programme. The subsidy programme should be implemented well before the time inputs are applied to field crops. If the programme is implemented too late, the entire basis for investment may be lost. Late delivery of inputs owing to delays in decision-making and budgeting has been a frequent problem in recent input subsidy programmes in sub-Saharan Africa.

It is frequently argued that subsidies “cannot go on forever” and should eventually be phased out. There are at least three reasons for this.

- ▶ The first argument is that with increased volumes, market prices of fertilizer will eventually fall to the “true economic prices” and the need for subsidies will disappear.<sup>15</sup>
- ▶ Second, with time the market infrastructure will develop and markets will be functioning efficiently and subsidies will no longer be needed.
- ▶ Third, the risks and potential “dangers” of subsidies such as diversion of resources and political influence will increase over time, therefore programmes should not be maintained for too long.

These arguments contradict our recommendations that the subsidy system should be sustained in a consistent manner in order to build capacity and knowledge over time. While it is true that sustained and repeated interventions may distort the market, targeted “smart” subsidies, if well implemented, can indeed be maintained and improved over time with constant revision and monitoring of impact. Well-managed smart subsidies will not influence “true” prices and if sufficient control is introduced in the system, leakage and political influence will not divert resources from intended beneficiaries.

### *Harmonization with other complementary policies*

The input subsidy programme is part of a holistic agricultural policy that pursues several other aims in the agricultural sector. These complementary policies include, among others, the provision of extension services (e.g. information to farmers on soil management techniques), financial services to farmers such as credit and price insurance, stabilization of food prices, supply of complementary inputs, supporting intermediate actors in the input market and the development of market infrastructure.

While the implementation of the subsidy programme should be harmonized with complementary programmes, an important question is the balance between them. If the aim is to maximize returns from agricultural development, food security and poverty reduction policies, what proportion of the total expenditure should be spent on input subsidies and what proportion on other investments? In other words, in order to improve access to fertilizer over the long-run, should targeted input subsidies be used or would other policies achieve better results?

<sup>15</sup> This argument raises some compelling questions. First, is there a “true” price for fertilizer if rural markets are so unintegrated? Second, how long would it take to develop markets to the level that they indeed become competitive? And third, how sustainable would this market be with fluctuating food and fertilizer prices?

Table 26.2: Evaluation indicators of input subsidy programmes

Impact on	Criteria
Programme characteristics	Timing
	Monitoring of performance
	Cost-benefit analysis
Economic impact	Changes in prices of output
	Changes in prices of input
	Impact on labour market
	Impact on growth and consumer welfare
Production	Increase in production
	Increase in productivity
	Replenishing soil fertility
Input market	Leakage of subsidy
	Displacement of commercial sales – impact on markets
	Increase in input use

The answer to this question depends on the functioning and development of other sectors in the economy which are context-specific. If, for example, farmers have reasonable knowledge about farm management, less investment is needed in extension services, but more is needed in other areas. There is also a geographical dimension to this question. In areas where markets are better developed and function well (for example near tarmac roads and trading centres), less investment may be needed in developing market infrastructure. However, in more remote rural areas greater achievement can be made by investing into development of road networks, communication services to facilitate market development or improving agricultural technologies.

## Evaluation of subsidy programmes

Whether or not the subsidy programme has achieved its goals depends on the programme's initial objectives and justifications. Impact indicators can be grouped into four categories including programme characteristics, impact on economic development, impact on production and impact on the input market. Table 26.2 summarizes the various indicators that can be used to evaluate input subsidy programmes.

There are no clear-cut benchmarks with which the individual criteria can be confronted in order to decide whether the programme has achieved its objectives. Table 26.2 includes a list of indicators that can be compared across different programmes or within the same programme over time in order to monitor impact and development.

## Conclusion

This chapter has demonstrated that the implementation of input subsidies is a rather complex exercise that involves targeting, rationing, timing, harmonization and complex methods of evaluation. Several methods have been reviewed and some of the “do’s and don’ts” of implementation have been discussed.

The real complexity in implementing input subsidy programmes arises from the fact that smart subsidies have multiple objectives that interlink in various ways. There has been little experience with these kinds of programmes to date that would allow a comprehensive evaluation of the various methods. Methodological challenges hamper the analysis of potential impacts and it is difficult to estimate *ex ante* what the likely impact will be on different sectors of the economy.

The importance of political factors should be emphasized separately. Large-scale subsidy programmes can be heavily influenced by political interests and be used for such purposes, not only because they provide subsidized resources, but more importantly because they support the production of staple food crops which have a low elasticity of demand and are vital for the survival of millions of poor farmers around the world. The impact of a carefully designed and well implemented subsidy programme can be distorted by political factors. [Chinsinga \(2007\)](#) summarizes this argument succinctly: “No matter what the technical arguments for or against particular policy positions are, it is ultimately the configuration of political interests that determine policy outcomes on the ground” ([Chinsinga, 2007](#)).

## References

- Chinsinga, B.** 2007. *Reclaiming policy space: Lessons from Malawi’s 2005/2006 fertilizer subsidy programme*, Future Agricultures, Zomba, University of Malawi.
- Dorward, A.** 2009. *Rethinking agricultural input subsidy programmes in a changing world*, School of Oriental and African Studies, London.
- Morris, M., Kelly, V. A. & Kopicki, R. J.** 2007. *Fertilizer use in African agriculture lessons learned and good practice guidelines*, The World Bank.
- Salzburg** 2008. *Fertilizer subsidies convening synthesis*, Fertilizer Subsidy Meeting, Salzburg, Austria, April 29-30. Mimeo.

