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Market-oriented Reforms, their Sustainability and Unintended Outcomes: The Case of Bangladesh Agriculture Sector

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Abstract

In the quest for sustainable development, developing countries have embarked on ambitious market-oriented reform policies mainly advocated by international development agencies (IDA) in varying proportions over the last three decades. These policies have been criticised as they have not succeeded in promoting sustainable development, as they are often associated with negative externalities or unintended outcomes. Drawing on the findings of an exploratory study undertaken during 2003-2004, this paper reports the unintended effects of the market-based reforms in agriculture sector - which are often claimed to be one of the success stories - in Bangladesh. It is concluded that although the reforms had some notable achievements, they have not achieved their expected outcomes and more importantly, in cases where they have been achieved, their sustainability is in question mainly due to their unintended effect on environment and lack of responsible business practices of private entrepreneurs involved in the trading of agricultural inputs like fertiliser, seeds, pesticides and irrigation equipment. As Bangladesh stands as an exemplar of developing countries, this paper provides implications and a testing ground to consider the contexts and practicalities of market-oriented reforms in other developing countries as well.

Key Words: Developing countries, market-oriented reforms, sustainable development, unintended outcomes

Introduction

A market-oriented development approach has been a dominant phenomenon of the last three decades adopted by both developed and developing countries in varying proportions. In developed countries, the market-oriented reforms have coincided with 'New Public Management' (NPM) which has followed an agenda of pro-market reforms, aiming to reduce the size and scope of the government by using market mechanisms (Hughes, 2003). In developing countries, the external pressure of the international development agencies mainly the World Bank (WB) and International Monetary Fund (IMF) played a more significant role than self propelling activities of market forces and the power of the rationality of the
market in implementing the market oriented approach.

Bangladesh has been pursuing decades of market-oriented reforms, supported by WB and IMF, with the prime objectives of achieving an efficient, cost effective service delivery through the increased involvement of private sector. As a result of these reforms pursued by international donors, Bangladesh has increasingly moved towards a market-based economy since the mid 1970s. Although various reforms have been attempted in various sectors, the success of these reforms remains elusive.

In this context, the reforms undertaken in the agricultural input management system appear to be somewhat different and interesting. Not only the reforms were undertaken in the most important sector of the economy, they were pervasive and are often termed as one of the success stories. There have been significant achievements in the agriculture sector in Bangladesh in the last two decades following the reforms. Despite a steady increase in population, the country has successfully changed its position as a food deficit country to one which is sufficient enough in food grain production to feed its population since 2000 (Centre for Policy Dialogue, 2001). Accompanying increased food production, food security has also improved. This is a remarkable achievement given the limited availability of land to increase agricultural production, the limited resources and the fact that natural disasters in the form of floods and cyclones are regular in Bangladesh which adversely affect agricultural production.

While some studies have reported the positive effects, attributing the achievement of self sufficiency in food production and food security to the market-based reforms in the input delivery system of agriculture sector (Ahmed, 1995; Ahmed, 2000; Hossain, Lewis, Bose and Chowdhury, 2003), other studies have reported the negative externalities of the reforms on the environment and decreased yield. They have argued that agricultural production has been achieved at the cost of adverse effects on the environment and natural resources (Pagiola, 1995; Toufique, 2000; Bhattacharya and Titumir, 2001). It is also argued that the reforms have opened up several new concerns in terms of the price, quality and availability of the agricultural inputs (fertiliser, seeds, pesticides) and particularly in the environmental aspects (Bhattacharya and Titumir, 2001). Recently the problem of mass Arsenic poisoning affecting a large area of Bangladesh has also been reported. More recently, frequent incidences have been reported of sale of low quality, underweight, contaminated...
agricultural inputs sometimes at high prices.

Of the three decades of reforms in the agriculture input sector, some studies have looked at isolated aspects of the reforms on environment. To date, there has been no comprehensive study investigating the unintended effects of the reforms, yet this is a highly significant issue, given the importance of the sector in the economy, especially in the wake of environmental problems that Bangladesh is currently facing. To address this gap, this paper draws upon the findings of an exploratory study to report the unintended effect of reforms.

Recently, the sale of contaminated agricultural inputs has become quite common in Bangladesh. There are reports in local newspapers that dealers were selling contaminated agricultural inputs e.g. fertiliser mixed with cement granules, and low quality seeds and pesticides (Reporter, 2004). More recently, the Consumers Association of Bangladesh (CAB) reported that most of the fertilisers used by the farmers were contaminated and substandard (UNB, 2007).

An exploratory study was undertaken by the author during 2003-04, which had both quantitative and qualitative components to investigate the perception of the key stakeholders on the reform policies. A total of 154 surveys were conducted with public officials, private entrepreneurs and farmers in Dhaka-the capital city of Bangladesh. Sixteen semi-structured interviews were conducted with representatives of WB, United States Agency for International Development (USAID) and senior bureaucrats involved with reform policies.

This article uses Bangladesh as an exemplar as it stands as a typical representative of the developing countries in terms of a large population, poor resource base, low per capita income and a predominantly agro-based economy with problems associated with lack of responsive governance. The use of Bangladesh case study provides a testing ground to consider the contexts and practicalities of market oriented development approach in other developing countries.

The paper is organised in two sections. The first provides an overview of the market-based reform efforts in the agricultural input sector. Drawing upon the findings of the exploratory study, the second section examines the impact of these reforms with a particular focus on the unintended effects of the reform policies followed by conclusion and implications of the study.

**Market-oriented Reforms in Agriculture Sector of Bangladesh - An Overview**

Before the reforms started in mid 1970s, the agriculture input sector demonstrated an example of single channeled public delivery system. The Bangladesh Agricultural Development Corporation (BADC) -a government owned corporation- with branches all over the country was responsible for procuring and distributing agricultural inputs such as fertiliser, seeds,
pesticides and irrigation equipment to the farmers and therefore served as a virtual monopoly over the agricultural input market in Bangladesh (Ahmed, 2000). Besides the prohibition on the participation of the private sector in the input market, the government also provided heavy subsidies for fertilisers and other inputs (mainly irrigation equipment) which distorted the input market. In addition, the system was not very efficient and had problems of rent seeking and poorly motivated staff (Ministry of Agriculture, 2002).

According to the World Bank (1990) and United States Agency for International Development (USAID) (1996), the inefficient input delivery system and a weak institutional and policy framework were impeding agricultural growth and development throughout the 1970s and the public sector was seen as incapable of delivering increased quantity of inputs to a larger number of farmers.

Reforms were therefore pursued with the prime objective of achieving an efficient, cost-effective service delivery. The expected outcomes of the reforms can be grouped into economic and social aspects as explained in Figure 1. The intended economic outcomes included increased agricultural production to the point of achieving self sufficiency, better availability and access of inputs, better affordability and crop sector profitability, phasing out of subsidies, promoting greater involvement of the private sector in the management and distribution of inputs and improvement of system efficiency. It was assumed by the government and the donors that these benefits would trickle down, leading to improved food security and ultimately to improved socio-economic conditions of the farmers in terms of better living conditions (USAID, 1996).

Figure 1: Expected Outcomes of the Reforms

Economic Benefits of the Reforms:
- Increased food production
- Increased and easy access to inputs
- Better affordability of inputs and increased crop sector profitability
- Decreased burden of subsidy
- Increased efficiency
- Greater involvement of private sector

Social Benefits of the Reforms:
- Increased food security
- Improved socio-economic conditions of the farmers

Source: based on the information from WB (1990) and USAID (1996)
Reforms in the Input Market

The major reforms in the agriculture sector that have brought significant changes started in the late 1970s and continued into the 1990s and officially are still continuing. However, apart from some revisions, reform efforts have been minimal during 2000-2005. The international development agencies that were involved with the reforms in the input market were the WB, IMF and USAID. According to Dreze, Sen and Hussain (1995), the reforms in the agriculture sector mainly focused on:

- withdrawal of input subsidies
- distribution of fertiliser through private traders
- private ownership of irrigation equipments (all kinds of tube wells and power pumps) with large scale irrigation projects being executed by the public sector
- expansion of the private sector's role in the import, domestic manufacture, sale and servicing of irrigation inputs
- greater private sector involvement in the distribution of agricultural inputs, production, processing and distribution of seeds.

The shift towards marketisation as a result of the reforms has led to a complex, horizontal and networked structure of partnerships between state and non-state actors. The private sector and NGOs are now delivering agricultural inputs like fertilisers, seeds, pesticides, irrigation equipment which were once the responsibility of the state.

Review of the Reforms: Expected and Unintended Outcomes

Findings from both surveys and interviews of the exploratory study confirm that agricultural production increased following the reforms. However the increased agricultural production is dominated by one single crop - rice. The reforms have also increased the availability and access of inputs and as a result, the use of inputs has increased markedly. The efficiency of the system has increased after the reforms and the inputs are now much more easily available compared to the state-dominated era. However, there have been some problems with the timely availability of inputs particularly fertiliser, seeds and fuel for irrigation. There have been fertiliser crises almost every year during peak demand periods, with shortages of fertiliser supply, price hikes and sale of contaminated fertiliser (Azmat and Coghill, 2004). The condition is the same for seeds (Alamgir et al., 2004). In most cases, the crisis is artificially created with the motive of increasing profits. The lack of responsible business practices by the private entrepreneurs leading to artificial crises, although not very severe, is among the unintended effect of the reform policies as they are undermining the success of the
reforms, creating an adverse impression, mainly among the farmers who are the consumers.

Table 1 presents the views of public officials working in three main agricultural institutes in Bangladesh. It is clear from the table that the respondents perceive that reforms undertaken in this sector are leading to environmental problems in terms of decreased soil fertility, decreased yield mainly due to excessive use of fertilisers, intensive irrigation and mono-cropping. Also, more than half of the officials (59.3%) agreed that reforms have contributed to Arsenic poisoning. Interestingly, despite these problems, only 29.7% believe that the reforms are not sustainable which means that they believe that the non-sustainable practices can be overcome.

3 The three main agricultural institutes were the Ministry of Agriculture, Department of Agricultural Extension (DAE) and Bangladesh Agricultural Development Corporation (BADC).
Table 1: Perception of the Public Officials on Market-oriented Reforms and Environmental Problems (N=54)

<table>
<thead>
<tr>
<th>Issues</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reforms led to further environmental problems.</td>
<td>33.3</td>
<td>24.1</td>
<td>42.6</td>
</tr>
<tr>
<td>Mono-cropping is contributing to decreased soil fertility and yield</td>
<td>13.2</td>
<td>7.5</td>
<td>79.2</td>
</tr>
<tr>
<td>Reforms have contributed to Arsenic Poisoning</td>
<td>9.3</td>
<td>31.5</td>
<td>59.3</td>
</tr>
<tr>
<td>Ground Water extraction should be stopped.</td>
<td>24.7</td>
<td>22.6</td>
<td>52.8</td>
</tr>
<tr>
<td>Excessive use of fertilizers has resulted in decreased soil fertility and yields.</td>
<td>22.2</td>
<td>18.5</td>
<td>59.3</td>
</tr>
<tr>
<td>Reforms are not sustainable</td>
<td>57.4</td>
<td>13.0</td>
<td>29.7</td>
</tr>
<tr>
<td>Intensive irrigation leading to non sustainable environmental practices</td>
<td>29.6</td>
<td>31.5</td>
<td>38.9</td>
</tr>
</tbody>
</table>

Source: Study data

The increased availability and use of inputs, mainly fertiliser and irrigation, adoption of modern varieties and a shift to dry season irrigated rice have contributed to the increase in agricultural production to the end of achieving self sufficiency in rice production. There have been marginal increases in the production of other crops such as wheat, pulse, potato, oil and vegetables. Although Bangladesh has achieved self sufficiency in food grain production, sustainability of this self sufficiency remains uncertain with an increasing population. Bangladesh remains in a dilemma concerning rice-led production. It is also argued that while not highly profitable, rice contributes to improved food security and provides a spring board for both rich and poor farmers to move into non-farm income activities (Hossain et al., 2003). Nevertheless, there is a need for diversifying to non rice crops while increasing rice productivity. The main problems in crop diversification have been found to be a lack of marketing and storage facilities for vegetables and fruits, and the eating habits of most of the population who depend on rice as the major staple.

Bangladesh faces greater challenges in preserving the environment as it faces the problems of poverty, increasing population, illiteracy and scarcity of resources; all these factors contribute to environmental degradation. Ahmad and
Hassanuzzaman (1998) argue that there is a vicious circle through a positive correlation between poverty, population and deterioration of the environment. Studies have also reported the environmental problems as a result of the reform policies (Toufique, 2000; Pagiola, 1995). Reforms have led to excessive and indiscriminate use of fertilisers, particularly urea, leading to decreased soil fertility, creating the need for use of more fertilisers and thus creating a vicious circle. These problems are further aggravated by the sale of contaminated agricultural inputs which has become quite common and is also decreasing soil fertility and yield.

Findings of this exploratory study also suggest that reforms have aggravated the environmental problems which include decline in fertility, yield and probably Arsenic poisoning. These unintended effects are mainly due to their pronounced effect on the use of irrigation and fertilisers as a result of the reform policies which are also supported by the existing literature (Bhattacharya and Titumir, 2001; SAPRIN, 2002). According to Daitoh (2003), externalities arise when certain actions of producers or consumers have unintended external (indirect) effects on other producers or/and consumers. In this case the effects of the reforms on the environment are unintended but have the potential to undermine the positive effects achieved so far. These negative externalities of the reforms are therefore threatening the sustainability of the positive effects of the reforms particularly increased production, food security, affordability and the socioeconomic conditions of the farmers.

The reforms in the input delivery system have led to increased availability of agricultural inputs which in turn has led to a series of actions which are unintended and adversely affect the environment and the consumers as discussed below. Table 2 summarises how the reform policies are leading to environmental problems. The possible impact of the reforms on irrigation, fertiliser, and pesticides is discussed below.
Table 2: Impact of the Reform Policies on Environment

<table>
<thead>
<tr>
<th>Policy</th>
<th>Action / Consequences</th>
<th>Impact on Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigation</td>
<td>Increased use of minor irrigation equipment</td>
<td>Monoculture leading to decreased soil fertility</td>
</tr>
<tr>
<td>Privatisation of the distribution, procurement and operation of minor irrigation equipment</td>
<td>Random and unregulated use of equipment without a balanced strategy</td>
<td>Excessive extraction of groundwater leading to drying of aquifer beyond the natural capacity of the aquifers to recharge</td>
</tr>
<tr>
<td></td>
<td>Increased cultivation of rice</td>
<td>Probable cause of Arsenic problem</td>
</tr>
<tr>
<td>Fertiliser</td>
<td>Private sector participation in procurement and distribution of fertilisers</td>
<td>Land degradation</td>
</tr>
<tr>
<td>Withdrawal of subsidy except the economic subsidy on urea</td>
<td>Excessive use of fertilisers particularly urea</td>
<td>Nutrient content of soil reduced</td>
</tr>
<tr>
<td>Privatisation of the procurement and distribution of fertiliser</td>
<td>Use of spurious fertilisers</td>
<td>Fertility of land eroded</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Decreased agricultural yield</td>
</tr>
<tr>
<td>Pesticides</td>
<td>Increased use of unregulated Pesticides</td>
<td>Mono culture of rice</td>
</tr>
<tr>
<td>Involvement of private sector in the import and distribution of pesticides</td>
<td></td>
<td>Loss of bio diversity</td>
</tr>
<tr>
<td>Seeds</td>
<td>Quality of seed not ensured effectively</td>
<td>Decreased effect on productivity</td>
</tr>
<tr>
<td>Involvement of private sector in the production, import and distribution of seeds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source: Study data</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Irrigation**

It is reported that of all the vulnerabilities characterising irrigated agriculture today, none looms larger than the depletion of the underground aquifers more rapidly than they are being replenished (Brown et al., 2000). Brown et al. (2000) also report that the groundwater used about half the level of natural replenishment on annual basis in Bangladesh. There has been a sharp increase in irrigated area
following the reforms and this has been associated with multiple problems as discussed below.

The reforms have led to the intensification of irrigation which in turn is leading to a series of chain reactions adversely affecting the environment. Figure 2 shows the probable effects of irrigation on environment. It has been reported that the current practice of irrigation in Bangladesh through flooding of land promotes the cultivation of rice and due to the absence of appropriate field design channels, the cultivation of other minor crops along with rice is not practised (Bhattacharya and Titumir, 2001). As a result, intensive irrigation is promoting the monocropping of rice. It is reported that monocropping of rice decreases soil fertility, depleting micronutrient and organic matter in the soil which in turn leads to increased and excessive use of fertilisers to compensate (Mahmud, 1998; Bhattacharya and Titumir, 2001). Despite the problems of monocropping of rice, the cultivation of rice is also important as is explained by one of the interviewees,

In Bangladesh, we are in a dilemma. We have a huge population which is increasing at the rate of 1.4% each year and the land is decreasing everyday. So at one hand, the government has to ensure self sufficiency in cereals and produce enough rice and on the other hand, we talk about crop diversification. The only thing that can happen is to have breakthrough in yields otherwise it will not be sustainable.

Intensive irrigation is also associated with the excessive use of urea as it is the main fertiliser used for rice production rather than other fertilisers. The excessive use of urea is leading to imbalance in soil nutrients and decreased soil fertility. The unintended and adverse effect of the reforms on the environment is evident from the perceptions of the public officials (See Table 1). A majority of the public officials think that monocropping of rice is contributing to decreased soil fertility and yield and more than half of them think that reforms are contributing to arsenic poisoning. In addition these unintended effects on environment are further compounded by the sale of poor quality fertilisers, seeds and pesticides, further leading to decreased fertility, yields and production. Commenting on this issue, one of the respondents commented that,

(The) quality of fertilisers is much inferior and some people are working behind the scene. There are complaints from the farmers that they are paying high price but are
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not getting the quality in return. That needs to be controlled by the government. If government can effectively control, the reforms will be cost effective. Corruption may be there but government needs to find out measures for combating corruption.

Intensive irrigation has also promoted the random and uncontrolled use of irrigation equipment with drying of the aquifers which is possibly a contributing factor to Arsenic poisoning and loss of biodiversity. Findings from both the surveys and interviews of the study also confirm that after the privatisation of irrigation equipment, there has been an increase in the random and unregulated use of irrigation equipment and this has resulted in the excessive extraction of ground water beyond the capacity of the aquifers to recharge, exposing the population to harmful minerals like Arsenic, Manganese, Lead, and Nickel. This is also supported by Bhattacharya and Titumir (2001), who have reported that the reform policies in irrigation have led to excessive extraction of ground water, which might be the possible cause for Arsenic contamination of drinking water.

Similarly, Abdullah, Hasanullah and Shahabuddin (1995) have also reported the concerns of the possible impact of increased groundwater extraction as a result of the reforms leading to lowering of ground water levels, and drying up of drinking water pumps and surface water sources. Respondents of exploratory study in their interviews were also divided on their views about the possible links between reforms in the irrigation sector and Arsenic contamination of drinking water. While about half of them stated that there was great deal of controversy surrounding this issue, the other half held the view that the water resources were being over exploited and that the Arsenic problem was a by-product.

As shown in Figure 2, increased irrigation has been associated with mono-cropping and drying of aquifers. The excessive use of fertiliser due to mono-cropping of rice has led to soil erosion, decreased yield and productivity, thus creating a vicious circle. Findings of the exploratory study also suggest that there are probable links of the intensive irrigation with the problems of Arsenic contamination of drinking water. In addition, mono-cropping is also leading to rice-led growth and non diversification of crop.
Figure 2: Probable Effects of Intensive Irrigation on the Environment

Market-oriented Reforms

- Increased Irrigation
  - Monoculture
  - Drying of Aquifers
- Non diversification of Crop
- Decreased Soil fertility
- Arsenic Problem (?)
- Rice led Growth
- Decreased Yields
  - Excessive use of imbalanced fertilisers
  - Soil Erosion
- Loss of biodiversity


Fertilisers, Seeds and Pesticides

Table 1 shows the impact of fertilisers, seeds, and pesticides on the environment, following the reforms. Findings from both surveys and interviews of the exploratory study report that reforms had led to an unwise and indiscriminate increase in the use of pesticides and fertilisers which was having an adverse impact on the environment, contributing to decrease in soil fertility. In addition, the sale of poor quality, contaminated fertilisers, seeds and pesticides are also having an adverse effect on soil fertility, affecting the micro-nutrient component of soil and decreasing the yield.

Pagiola (1995) has studied the environmental problems that have been raised from the increased use of fertilisers, irrigation and adoption of modern varieties as a result of the reform policies. The study concludes on the basis of increasing evidences that intensive agricultural practices are degrading the natural resource base for agricultural production.
Similarly, based on secondary data, Toufique (2000) in his study has reported that pressure to increase food grain production has led to excessive emphasis on increasing yield and the withdrawal of subsidies leading to policies that have resulted in excessive and inefficient use of poor quality fertilisers.

The perceptions of the respondents of the study reinforced the findings that the sale of contaminated inputs at inflated prices and their associated environmental problems further threatened the sustainability of the positive effect of the reforms. The lack of good governance, adequate market information, and awareness were the main factors leading to the lack of responsible business practices of the private entrepreneurs involved in the sale of agricultural inputs.

In summary, the reforms in the input delivery system led to increased availability of agricultural inputs which have led to a chain of actions which include intensive irrigation, mono-cropping, lowering underground water tables, indiscriminate excessive and unbalanced use of fertilisers and pesticide, and use of lower quality contaminated agricultural inputs, contributing to environmental degradation.

**Conclusion and Implications**

Market-oriented development approach is being attempted by the developing countries in an effort to improve sustainable development. However, in most of the cases, the results of the reforms remain far from satisfactory. Bangladesh - a developing country has been attempting the market-oriented development approach for more than three decades and these reforms have been most pervasive in the agricultural sector. The paper draws upon the summative findings of an exploratory study to investigate the unintended effect of market-based reforms undertaken in the agricultural input sector on the environment. Findings conclude that although these reforms have been successful to some extent, they have not lived up to their expectations mainly as a result of their unintended effect on environment. Whatever the claims of economic efficiency, the reforms have been only partly successful in meeting the test of efficiency in the delivery of the sustainable social benefits which were, after all, their ultimate objective.

The negative externalities of the reforms have posed a serious threat to the environment and the sustainability of the reforms. The adverse impact on environment due to mono-cropping, and excessive and unbalanced use of fertilisers is leading to a decrease in soil fertility, loss of biodiversity which in turn is having a significant adverse impact on agricultural yields. Although the cause of the Arsenic poisoning is still being investigated, the intensive irrigation
promoted by the reforms and the resultant drying of aquifers cannot be ruled out as its probable cause. The lack of socially reasonable business practices of the private entrepreneurs and the sale of the poor quality of agricultural inputs are also contributing to negative environmental impacts, preventing the reforms from reaching their potential and threatening the sustainability of the positive effect of the reforms.

The negative externalities of the reforms are leading to the decline in yields and productivity, thus questioning the sustainability of increased production, self-sufficiency and food security and therefore need immediate attention.

The study provides implications for donor agencies and government that they need to address the unintended effects of reforms for the success and sustainability of the reform policies. As Bangladesh is a typical representative of the developing countries, these observations apply for other developing countries as well who have adopted a market-oriented development approach.

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