The Ethiopian Extension and the Farmer: A View from the Farm

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Since the 1960s, Ethiopia has been experimenting with different agricultural extension programs (e.g. CADU and WADU projects). These extension approaches have been pushing in one way or another for increased use of chemical fertilizers to increase crop yield. In mid-1990s a new agricultural extension package program was introduced as the country’s main development strategy. Its features include: (1) package orientation; (2) stress on increased use of chemical inputs and (3) increased deployment of extension personnel.

Introduction

Since the 1960s, Ethiopia has been experimenting with different agricultural extension programs (such as the Maximum and Minim Package approaches of the CADU and WADU varieties of the 1960s and early 1970s and the Peasant Agriculture Development and Extension Project of the 1980s). These extension approaches have been pushing in one way or another for increased use of chemical fertilizers and associated extension inputs to increase crop yield.

In mid 1990s an agricultural extension package program was introduced as the main development strategy of the country and has become a pillar for government efforts to simultaneously develop the two economic twins – agriculture and industry – underpinning the government’s agriculture and industrial development policy, otherwise known as agriculture development-led industrialization. The extension package approach has been dubbed as “new agricultural extension package program” (though the word ‘new’ might not as such reflect a qualitatively different approach from its predecessors). Its main features include:

It is package-driven (main elements of the package include)
Physical inputs such as fertilizers, seeds
Government loan to buy inputs
Associated improved farm management practices
It stresses on increased intensification of chemical inputs and to this end:
National fertilizer agency was established (1992)
Fertilizer consumption increased from 15,000 tons in the early 1980s to over 300,000 tons recently
Currently 37 -50 % of farmers use fertilizer in contrast to not more than 20 % in mid 1990s
Another development, is the assignment of a DA to each kebele to facilitate the implementation of the package approach

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Farmers’ training centres staffed by extension personnel having three years of training from technical and agricultural training colleges have been set up in different parts of the country.

It was with the above in mind that I undertook a study in 2001-2002 as part of a PhD dissertation (and also updated in a study undertaken in 2005-2006) to see how effective has the agricultural extension package approach been (as seen in the eyes of rural households) in improving the food security situation at the rural household level. The socio-economic and agro-ecological aspects of the agricultural extension package program are examined in the context of a case study undertaken in north-central Ethiopia, north Shewa.

It is hoped that the issues and ideas raised in the paper will trigger some debates and discussions on an area of research which appears to be less researched by and discussed among social science researchers.

Conceptual framework and Methodology

Conceptual framework

The study employed a contextual approach which is suited for investigating both the human and physical side of agricultural extension. Contextual analysis is grounded in the belief that human conduct is explicable only if the contexts [both social and physical] within which it is embedded are systematically explored … (Little, 2000).

Hence, there are two aspects of context: social and agro-physical. Social context consists of social environment (e.g. sex and age composition of members of farm householders; skills and techniques of production) and social interaction processes (e.g. perceptions, attitudes and values). Agro-physical context concerns land, soils, climate and crops and their interactions.

Main characteristics of the contextual approach include:
- Takes the social and physical environment into account
- Combines social context and agro-ecological context analysis
- Draws on multiple (competing) perspectives
- Accepts a holistic understanding of the issue
- Focuses on micro-variations & their interrelations with macro-processes (e.g. regional weather patterns)
- Combines the methodological positions of constructivism (qualitative) and post-positivism (quantitative)

The corresponding analytical tools as used in the study are: social context analysis and agro-physical context analysis. Social context analysis is used to obtain farmers’ in situ perspective regarding agricultural extension program activities while agro-physical context analysis explores the interaction between farmers and various physical extension inputs as well as between them and the physical environment (e.g. soils, climate).

This study combines both approaches as agricultural extension has both social and physical dimensions. This makes the study a holistic approach in which processes or events are studied in their interrelatedness (Kotze & Kotze, 1997; Eijk, 2000). As used in this study, contextual holism does not however mean a framework without boundaries. It is bounded by a carefully selected group of social and agro-physical factors impacting interactions between farmers and extension program activities (Figure 1).
Methods and research instruments
Taking into account the conceptual framework outlined above, the study has utilized both qualitative and quantitative research methods in the collection and analysis of data. This is because agricultural extension has both social & agro-physical dimensions.

Study site
The study was conducted in north Shewa. Within north Shewa, two weredas were selected for the study: Tarmaber (east) and Ensaro-Wayu (west) (see Map of the study weredas). The main selection criterion was level of fertilizer usage – for example, in the 2000/2001 meher Ensaro used twice as much fertilizer as Tarmaber.

From within each wereda, three kebeles (each representing highland, midland and lowland ecology zones to capture agro-ecological aspects of extension) were selected. The six kebeles were: highland Sina, midland Armany & lowland Asfachew from Tarmaber; and highland Dembi, midland Salayish & lowland Dalota from Ensaro-Wayu. From each kebele, 47 to 53 household heads were selected randomly and interviewed for the household questionnaire.

Research instruments
Qualitative data was collected using individual and focus group interviews as well as personal observation of the study communities (see below). A household questionnaire method was used in the collection of quantitative data.

A total of 88 depth interviews and 11 focus group discussions were conducted (Table 1). The participants included both men and women farmers; younger as well as older farmers; poor and relatively better off farmers; highland, midland & lowland farmers as well as male-headed and female-headed households. Some of the themes covered by individual and focus group interviews are: level of access to productive inputs, history of food insecurity in the household, program impact on the household and household profile.
The household questionnaire was administered to a group of 305 systematically selected household heads; that is, on average 51 respondents from each of the six study kebeles. The questionnaire was 8 pages long and divided into six sections: farm experience and knowledge; quality of extension service delivery; level of awareness about soil fertility; issues dealing with landholding and other productive assets; production parameters and personal and household profiles. Trained interviewers (most of them development agents) were deployed to complete the questionnaire by going from house-to-house or from farm-to-farm.

Table 1: Data gathering instruments and number of people/groups who participated

<table>
<thead>
<tr>
<th>Study area</th>
<th>#household interviews</th>
<th>#focus groups</th>
<th>#household questionnaire</th>
<th>#DA questionnaire</th>
<th>#DA interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tarmaber</td>
<td>23</td>
<td>4</td>
<td>156</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>Ensaro</td>
<td>65</td>
<td>7</td>
<td>149</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>11</td>
<td>305</td>
<td>22</td>
<td>13</td>
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</table>
The Ethiopian Extension and the Farmer

Agro-ecological data relating to rainfall and topography of the study localities was also collected from each of the six kebeles. Accordingly each kebele was classified as: high, moderate and low rainfall area and in terms of topography as: flat, undulating and steep. The data was used to compare extent of utilization of extension inputs along the highland, midland and lowland divide, with the corresponding high, moderate and low patterns of rainfall.

Selected findings of the study

In this part of the paper, main findings of the study are presented.

Majority of households studied, as expected:
- Had men as principal breadwinners (85 %)
- Only 19 % had primary education, grades 1-3 (Illiteracy has reconquered most of the adult population)
- 70 % had landholdings under 1.5 HA (major issue mainly in the highlands)
- Almost all use oxen as a means of draft power – in the case of difficult terrains the hoe is used to supplement the oxen plough
- 55 % had experience in using fertilizer (out of which 42 % were current fertilizer users at the time of the study)

Two principal rural household assets (identified by respondents):
- Land – almost all had access to a piece of land
- Livestock – majority owned 1-2 oxen. Some had a cow or a calf/or a heifer. A few owned small stocks (eg goats/sheep). Lowland farmers owned more livestock.

Regarding common methods of enriching the soils and improving crop yields, the most common ones were:
- Crop rotation (alternating cereals by legumes) – used intensively mainly in highland Dembi
- Green manure (combination of livestock manure, household and tree litter) – used intensively in the midland and lowland ecology zones
- Chemical fertilizers (DAP and urea) – largely used in Dembi and partly in Armany

A combination of crop rotation, organic inputs and chemical fertilizers

Figure 2: Frequency distribution of respondents by methods of land intensification across the study kebeles
As can be seen from the figure, crop rotation is the most commonly used method across the highland-midland-lowland ecology zones. This is followed by manure, with the exception of highland Dembi (Ensaro) where it is not used because of cold June weather which causes delays in the decomposition of organic matter contained in the manure. The use of tree litter (leaves, broken wood) is almost non-existent in Dembi where there is hardly any tree cover except eucalyptus tree. That is why all the 52 interviewed farmers indicated that they heavily depend on chemical fertilizers.

Regarding knowledge and practice of fertilizer use, it would seem that most of it must be gained in the last 10 years since the introduction of the new package approach. From results of household questionnaire, it was revealed that:

- Some have seen others farmers using fertilizers (10 %)
- Some have thought about using fertilizer (29 %)
- Some have used fertilizer in the past (13 %)
- Others are currently using fertilizer (42 %)
- Still others have considered using fertilizer in future (6 %)

The majority have heard from DAs about benefits of fertilizer use (72 %)

Of those who reported having used fertilizer (55 %; cf. similar findings of the Ethiopian Economic Association’s 2006 study covering 92 woredas and 4587 households in which 56 % of the households were found to have participated in the extension package program at different times)

- 33 % have used fertilizer since two years
- 30 % have used since 3-5 years
- 23 % have used for more than 5 years
- 14 % only once and then stopped applying fertilizer

Regarding quitting fertilizer use, the following reasons were mentioned:

- Unsuitability of packages (most midlands & lowlands would more urea, which is suitable for soil and rainfall conditions in the area)
- Land not suitable (too steep, or sandy soils) – mainly true of Sina
- Lack of money to buy fertilizer (younger, older, and female-headed households seemed to suffer from this problem)
- High fertilizer prices (in the last 2 and half decades fertilizer price rose by 300 % - older generation farmers who bought fertilizer with less than 40 Birr some 30 years ago found it very hard to believe that such skyrocketing prices are justifiable)
- Plots too small to benefit from fertilizer application (mainly in highland Sina where plots are very small)
- Falling off output prices (this occurs immediately after the harvest when most producers rush to the market to sell grains and pay off loans)

Some characteristics of fertilizer-using respondents:

- Male farmers, aged 31-50
- Farmers with primary level of education (Demi farmers)
- Farmers cultivating manageable plots, 1.50-1.99 ha (Armnaya)
- Farmers cultivating flat, moisture rich plots (Demi respondents)

Other factors affecting fertilizer use as highlighted by individual and focus group interviews included:

- Age of household head (older households unable to benefit) as fertilizer use requires hard work to make the soils more receptive
- Access to credit (lack of access to credit) – especially those not participating in the government extension package program
Input prices (high input prices and low prices for outputs)
Opportunities for production and use of organic inputs (eg Sina)
Households’ farming objectives (a farmer who plans to plant legumes in response to market demand may not require fertilizer)
Environmental vulnerability factors (drought, frost)
Availability of agro-ecological endowments (rainfall, forest cover)

Farmers’ Response

As indicated in the introduction, the government has been striving to make farming using chemical fertilizers the order of the day. However, farmers’ reaction has been mixed. In the study area, based on their reaction to the fertilizer intensive government extension program, farmers could be classified into different groups:

Those who have still refused to use chemical fertilizers (constitute a minority - may be less than 5 %)
Those who are contemplating to use fertilizer in the future (another minority group – under 5 %)
Those who stopped using fertilizer (10-15 %)
Those who are currently using (40-50 %; this group is sub-divided into those who participate in the government approved package program and those who buy fertilizer in cash and apply onto their fields on their own)
Those who do not have other options but fertilizer (e.g. highland Dembi).

Regarding the first group, there is an attitude that may be characteristic of this group – hands off fertilizer. One Sina farmer said I will not let fertilizer touch my land. It is not suitable for fertilizer as it requires flat plots which are protective of their soils. Such group of farmers seem to cultivate small and risk-prone (erosion) plots mostly characterized by steep topography. Such households also tend to be older households (e.g. Sina) who lack labour to prepare the soils adequately and make them receptive for fertilizer.

The second group tend to be dominated by younger households who are likely to be constrained by shortage of land, oxen & cash to make effective use of chemical fertilizers.

The third group consists of those who have tried fertilizer unsuccessfully and hence are scared to use fertilizer in the future. Their failure might be due a combination of factors such shortage of rain, unsuitable recommendations, and pest infestation. Members of this group might have been forced to repay fertilizer loans by selling their livestock assets (e.g. an ox). A lowland Dalota farmer who unsuccessfully tried fertilizer on tef said; because of shortage of rain the tef crop was completely wilted. I became very angry and decided not to touch fertilizer again. Such farmers are bitter about fertilizers. Lowland farmers mainly belong to this group.

The current fertilizer-using group is mostly those farmers who cultivate flat or undulating plots located in the highland and midland ecologies. Some members of this group participate in the government extension program (though, most of them do not accept standard recommendations in their entirety but modify them to fit their resource and plot conditions – farmers call this practice ‘stealing’ as they are acting against the advice of the extension staff). The other group applies fertilizers on its own without

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2 In the Ethiopian Economic Association’s study (2006) only 39 % of the farmers participating in crop packages used the recommendations in full package as suggested by extension staff.
following standard recommendations and seems to also use green manure in addition. Midland farmers mostly tend to belong to this group.

The last group consists of those farmers who are helplessly dependent on fertilizers (e.g. highland flat Dembi). A 26-year-old farmer from Dembi said; *If I sow this plot without fertilizer, I will have to be prepared to leave the area.* Another farm said *without fertilizer Ethiopia’s children would be starved to death.*

*Comparison of the food security situation of respondent households*

In Ethiopia where ensuring food security at the rural household level is of paramount importance, the effectiveness of an extension program must be gauged by its contribution to improving the food security situation of farm households. In this regard, it is important to see the extent to which the current agricultural extension program has contributed to improving the food security situation of rural households. This can be done by comparing fertilizer-using and non-fertilizer-using respondents.

It needs to be noted that since time series data on fertilizer consumption by sample households was not available, the comparison is based on amount of fertilizer consumption reported by respondents during the 2000 crop season.

As can be seen from Table 2, the majority of fertilizer-using respondents rated their food situation in the last five years as somewhat adequate with food shortages lasting on average for 1-5 months in a given year. It is interesting to note that fertilizer-using respondents who rated their food situation as *not adequate* purchased more fertilizer than those who said they had a *very adequate* or *somewhat adequate* food situation.

<table>
<thead>
<tr>
<th>Food situation</th>
<th>Mean fertilizer purchased (kg)</th>
<th>Std.deviation</th>
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<tbody>
<tr>
<td>Not adequate</td>
<td>121.33 (15)</td>
<td>89.04</td>
</tr>
<tr>
<td>Somewhat adequate</td>
<td>102.70 (103)</td>
<td>77.16</td>
</tr>
<tr>
<td>Very adequate</td>
<td>89.73 (11)</td>
<td>58.30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>103.76 (129)</strong></td>
<td><strong>77.02</strong></td>
</tr>
</tbody>
</table>

*Note: Numbers in brackets refer to frequencies*

Similarly, respondents who experienced relatively longer periods of food shortages also purchased more amounts of fertilizer (Table 3). This suggests, at least two, points: Firstly, most rural households have increasingly become prone to food shortages, regardless of their use of fertilizers, and Secondly, increased fertilizer usage might not lead to or be a result of improved food situation in the household.

<table>
<thead>
<tr>
<th>No. of food shortage months</th>
<th>Mean fertilizer purchased (kg)</th>
<th>Std. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-8 months</td>
<td>150.00 (4)</td>
<td>54.01</td>
</tr>
<tr>
<td>3-5 months</td>
<td>109.42 (67)</td>
<td>78.71</td>
</tr>
<tr>
<td>No food shortage</td>
<td>107.27 (11)</td>
<td>84.56</td>
</tr>
<tr>
<td>1-2 months</td>
<td>90.20 (46)</td>
<td>74.59</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>103.59 (128)</strong></td>
<td><strong>77.30</strong></td>
</tr>
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</table>
Comparing respondents’ food situation using mean total gross farm output of the three major cereal crops may also give clues about the food security status of fertilizer-using respondents (rates of fertilizer applications for the three crops varied from the fertilizer-intensive wheat to the moderately fertilizer-intensive tef and to the non-fertilizer-intensive sorghum). From the data in Table 4, I note that only 14 of the tef, 6 of the wheat and 9 of the sorghum producers indicated they have had very adequate food situation for the last five years. Although each of these figures represented a small proportion of each of the three crop category respondents, their relative importance is highlighted by the size of the mean.

Table 4: Mean output (kg) of selected crops produced in 2000-01 by respondents’ food situation last five years

<table>
<thead>
<tr>
<th>Food situation</th>
<th>Mean output of selected cereals (kg), 2000/01</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Tef</td>
</tr>
<tr>
<td>Very adequate</td>
<td>475.00 (14)</td>
</tr>
<tr>
<td>Somewhat adequate</td>
<td>375.11 (190)</td>
</tr>
<tr>
<td>Not adequate</td>
<td>321.88 (32)</td>
</tr>
<tr>
<td>Total</td>
<td>373.81 (128)</td>
</tr>
</tbody>
</table>

Note: Numbers in brackets refer to frequencies.

For example, mean tef output was highest among respondents with very adequate food situation, suggesting that the adequacy of the food supply may be related to increased tef output. But this increase might not be expected from fertilizer intensification. The role of tef can also be seen from the fact that most respondents (77 %) produced it. In Armany and Asfachew, tef is intensively cultivated using labour and organic inputs supplemented by a reduced rate of fertilizer applications. It also has another advantage – the ability to grow in all three ecologies.

Sorghum appears to be the second most important crop with good yield potential. Eighty-six percent of the 183 sorghum growers seemed to have enjoyed a somewhat adequate food situation in the last five years compared to 80 % of the 70 fertilizer-intensive wheat growers. Wheat, which is dependent on fertilizer intensification, appeared to be a major crop among Dembi respondents. Generalizations based on sampled cases could be misleading but this group appeared not to be in any better food-security position than non-program-participating respondents.

In a study conducted by the Ethiopian Economic Association (EEA, 2006: 44), only 33.3 % of the program participating farmers interviewed indicated that their food security status has improved as a result of participating in the extension package program and 36.3 % witnessed an increase in their income. The same study found that about 56 % of the sample households (sample size = 4587) have been involved in the extension package program at different times. This shows that the findings of this study find support from a recent large scale study conducted by the Ethiopian Economic Association.

In general, combining results of household questionnaire and qualitative interviews, it became clear that a constellation of social, economic and agro-ecological factors would seem to influence rural households’ decision to use or not to use chemical fertilizers. Most farming decisions take the form of:
What to farm (i.e. what crops to cultivate on what soils or plots)
When to farm (i.e. which crop to plant and when – meher or belg season as the different crops have different moisture requirements
How to farm (i.e. Which methods of soil intensification to use, as determined by household resources)
These decisions influence amount of crop production in a given household, which in turn affects rural household food security.

Summary
For extension to be effective and useful to farmers, it needs to adopt an integrated approach that takes the small family farm and its socio-economic and agro-physical environments as points of entry for improving existing extension programs or designing future ones. This means: there will have to be diverse extension systems to meet disparate needs, and that the new extension approaches will become more purpose-specific, target-specific, and need specific (Norton, 2004: 388).

Reference