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Strategy of Agricultural Development
with a Special Reference to Pakistan

by
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STRATEGY OF AGRICULTURAL DEVELOPMENT
WITH A SPECIAL REFERENCE TO PAKISTAN

"There are two opposite kinds of stagnation to which
capitalist economies may be subject -- stagnation due to
technical poverty and stagnation due to society." [1], p. 707.

I. INTRODUCTION

The process of economic development involves substantial changes in the economy. A strategy of development provides a distinctive direction to the various economic changes and should be chosen after a careful examination of the alternatives available to attain the given objectives.

But for the purposes of designing and evaluating the various programmes and strategies for the development of an underdeveloped country, one needs a theory of economic development or at least an understanding of the basic process of economic development.

The theory (or understanding) about the phenomenon of economic development should, at its best, take the form of a "full explanation" or, at the minimum, assume the shape of a mere "characterization of the whole process or the important elements involved in it.

If one looks through the professional literature in the fields of economic development and growth, it can be found that most of the theories come from the purely theoretical work (e.g., dual economy and other growth-cum-development models of W.A. Lewis, Raitis and Fei, D. Jorgenson, Tsing, and others), or analysis of the
historical facts about countries which had a successful "take off" (e.g., Kostov), or iii) intercountry and country analysis to identify and underline certain relationships and patterns of development (e.g., Kuznets, Chenery, Adelman and Morris), and iv) any mixture of (i), (ii) and (iii).

The various theories available, however, are seriously deficient in enlightening about the basic process (or elements) of economic development particularly in the initial phase of it; and give little attention to the development of the agricultural sector as such. To elaborate on this point, a few words are said in the following:

1. Most of the theoretical models of economic development neither pose nor answer the question of how does the process of economic development initiate itself.

The dual economy development models of Arthur Lewis and Raut & Fei explain the initiation of the development process in a two sector economy in which the marginal productivity of labour in the industrial sector (MPL\textsubscript{I}) is higher than the marginal productivity of labour in the agricultural sector (MPL\textsubscript{A}). In addition to the sectoral differentials in the MPL, the wage rate in the industrial sector is equal to the MPL\textsubscript{I}, whereas in the agricultural sector it is higher than the MPL\textsubscript{A} (i.e., the phenomenon of surplus labour in the agricultural sector).\textsuperscript{1/}

\textsuperscript{1/} Lewis, U.A. \textsuperscript{139} \textsuperscript{1}; Fei, J.C.H., and Raut, G. \textsuperscript{19} \textsuperscript{1}; Raut, G. and Fei, J.C.H. \textsuperscript{154} \textsuperscript{1}; Heisz, G.M. \textsuperscript{142} \textsuperscript{1}; Islam, Nurul \textsuperscript{130} \textsuperscript{1}; and Norkse, B. \textsuperscript{51} \textsuperscript{1}.
Thus initiation of the process of economic development simply involves a re-allocation of labour from the agricultural sector to the more productive and surplus generating industrial sector.\textsuperscript{2}

These models though having something useful to contribute, fail to explain the sectoral difference in the HEI, are silent as to how the process of development could be initiated if HEI were equal to HEI to begin with, and give inadequate treatment to the development of the agricultural sector as such.

The same can be said about Jorgenson’s model\textsuperscript{3} although it does not assume surplus labour. The duality feature of the economy arises from the sectoral difference in the production functions used.

The emphasis of all the dual economy development models is heavily intersectoral which may be useful in understanding how the process of development can gain momentum or come to a stop, rather than how it gets initiated. In the case of the agricultural sector itself, no meaningful framework is provided by these models.

\subsection{1.2.}

There is another category of models popularly known as “growth models” (e.g., some classical models, Harrod-Domar type

\footnote{It is assumed that most of the surplus originating in the industrial sector is invested, thus leading to capital accumulation and further expansion of the industrial sector. This expansion of the industrial (modern) sector is the main engine of growth in the Model. Certain forces, of course, emerge to limit the process from going on indefinitely.}
Three models, with a few exceptions, identify capital as the main engine of growth. Because of the emphasis on the problems of general equilibrium of the economy and its stability, and a very high level of aggregation, the growth models fail to enlighten about the process of development itself. For example, the models do not tell whether it is capital per se which is important for growth or the ability to use capital successfully which is crucial in the process of development. Moreover, it is not made clear which type of capital will be of vital importance in initiating the process of development, and sustaining it at the various stages of development.

In connection with the development of the agricultural sector, the growth models are even more deficient than the development models in providing a meaningful framework because of their one-sector nature or the high levels of aggregation.

3/ The historical approach tries to study the economic and other facts about economies which have already shown self-sustained growth and builds analytical frameworks on this basis. The best known in this tradition is Mokov's stage theory of economic growth 79^8.

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In general it can be said that the historical approach has concentrated on the experience of countries which achieved economic development in the past, and hence makes conclusions heavily biased to the then prevailing conditions. Moreover, as Professor Fishlow pointed out, the stage theory of economic growth as given by Rostow suffers from analytical gaps and contains in it many empty boxes.

For agricultural development Rostow's stage theory or any other theory of similar type does not provide any meaningful framework.

1.2. Empirical research has been heavily oriented towards inter-country time series or cross-section analysis. The research has been extended to the analysis of individual countries also where data permits. The studies of Kuznets [38], Chenery [70], and Dorfman & Dorfman [24], and many others have been useful in underlining certain patterns (or aspects) of the process of economic development. Due to the lack of proper data, the complexity of the problem and the absence of a comprehensive analytical framework, the quantitative research has failed so far to identify "cause-effect" type relationships.

Thus whereas quantitative research has been useful in pointing out some regularities (or patterns) of economic development, the understanding of it has not yet contributed to the process of development. In the particular case of agriculture, the research has not been very rigorous.
1.5. The Purpose of the Study

The purpose of this study is to propose a plausible characterization of the phenomenon of economic development and test its soundness from the empirical evidence on farmer response to price in the various underdeveloped countries. In this way we hope to establish the usefulness of the proposed characterization of economic development for the development of the agricultural sector.

1.6. The Proposed Characterization of Economic Development

Leaving aside the problems arising from the interaction between the various sectors of the economy (which originate from the differences in technology, tastes, inputs and outputs, etc.) the phenomenon of economic development can be conceived in its essentials, as a function of two factors:

1) the propensity of the human agent to seek material advancement (i.e., the existence and strength of "economic incentives"); and

2) the ability of the human agent to take advantage of the economic opportunities within his mental horizon, and to create new opportunities.

In the context of the agricultural sector it means that ignoring the problems arising from the demand side and the existence of other sectors, farmers' economic performance is a function of their i) willingness, and ii) ability to understand and exploit given economic opportunities; and to create new opportunities.

The main purpose of this paper is to discuss the usefulness of the proposed characterization through providing empirical
evidence on farmers' economic performance in the various under-developed countries especially Pakistan.

At the very outset it should be made clear, however, that the empirical evidence is too narrow and specific to answer the big question of how economic development initiates itself. Nevertheless it is believed that the present attempt is a useful building block in this direction.

To begin with, Part II of this paper will accept the above proposed characterization of farmers' economic performance in the under-developed countries is due to the lack or absence of their willingness to benefit from the given economic opportunities, i.e., the problem of economic incentives.

In Part III some empirical evidence will be provided to verify the second part of the characterization: that the ability of farmers to understand and exploit given economic opportunities plays a crucial role in determining the level of farmers' economic performance.

At the end (Part IV) a few observations will be made on the nature of the agricultural development programmes and strategy adopted in Pakistan. Some tentative suggestions are also made.
Part II. The Problem of Economic Incentives

II.1. Economic incentives, meaning the urge (or willingness) to exploit the available and well understood opportunities for securing economic gains, are believed to be non-existing, perverse or very low in the agricultural (traditional) sector of the under-developed countries. It is not made clear by the holders of such a belief, however, whether economic incentives are thought to be low because the urge to exploit economic opportunities is low or whether the observable results of such an urge are poor.

The urge to exploit economic opportunities in itself is a psychological phenomenon, and it is hard to find that the beliefs about economic incentives have been based on meaningful direct tests.

As one goes through the professional literature, it is easy to note that many social scientists including economists have acquired the belief about economic incentives being low in under-developed countries in general and in the agricultural/traditional sector of these countries in particular. These beliefs have been developed on the basis of a priori notions about the social and economic conditions that prevail in poor countries.

In addition to these a priori notions about the economic behaviour of farmers, some writers on the basis of faulty and inadequate evidence maintain that farmers' supply response to
price is perverse or non-existing.

The widespread appeal of the above mentioned notions stems from their plausibility but whether they are correct or not is a question for rigorous empirical testing.

Although direct observation of the existence and strength of economic incentives is not possible, indirect empirical tests can be easily designed since the results of the existence and strength of economic incentives are observable. For example, if fertilizers are available to farmers at a cost which makes their use highly profitable, and if we have reasons to believe that the farmers in question understand the use and the benefit of fertilizers, then we can say that the economic incentives exist or not, depending on whether the farmers are observed using fertilizers or not.

11.2. The Existence of Economic Incentives: Empirical Evidence

As noted above, if we have an economic opportunity set that is i) empirically identifiable; and ii) easily understood and falls within the ability of the farmers to exploit, then we have a meaningful and clear cut test for the verification of the existence of economic incentives through looking at the actual behaviour of the farmers in question.

In the context of the area allocation set, if economic incentives exist, one must observe the area sown to a crop to
increase when its profitability relative to the competing crops is expected to rise, and vice versa. In other words, for individual crops we should observe a positive area response to relative profitability when economic incentives exist. Thus the positive short-run area response to price in the case of individual crops would be a clear cut evidence for the existence of economic incentives.

Table 1 presents the results of many studies regarding the short-run area response to price. All studies that are referred to are based on a carefully examined and scrutinized area, price and other statistics. Most of these studies should be regarded as econometric in the sense that an attempt is made to deal with or be conscious of the various problems arising out of the regression analysis.

The short-run price elasticity of area response \( \left( \frac{\Delta A}{A} \right) \) though varying among crops, time periods and countries, is positive and statistically significant at the conventional level. In the

\[ \text{Table 1}\]

\( ^{5/} \) This is only true under the assumption that as relative price changes, the relative cost of production remains the same.

\( ^{6/} \) The number of studies conducted on Asian countries substantially exceed the number of studies done for the African and Latin American countries for the obvious reason of inadequate price and acreage data. Nevertheless, the coverage is wide enough to embrace countries/regions with sufficient economic, religious and cultural variation, and although the list cannot be regarded as "representative" of all the under-developed countries of the world, yet it is quite reflective of the diversity of economic life that prevails in such countries.

\( ^{7/} \) The conventional level of significance is 5% or less.
context of the economic opportunity set (i.e., area allocation among the competing crops) considered here, for which we have every reason to believe that farmers have the understanding and the ability to exploit, the observance of a positive $\Delta$ is a necessary and sufficient testimony for the existence of economic incentives.

The results on $\Delta$ listed in Table 1 are fairly wide in coverage over space, time, crops and cultures; and are sufficiently meaningful to reject the beliefs/motions held by some economists that economic incentives are absent or perverse in the agricultural sector of underdeveloped countries.

11.3. In order to emphasize the point made above, we move to another economic opportunity set for which the farmers, in most likelihood, do not possess the ability to understand or the ability to exploit.

Such an "opportunity set" could arise from the fact that farmers have a potential choice of increasing individual/aggregate crop yields per acre whenever it is profitable to do so. Under given technology, it means increasing the various inputs so long as the value of their marginal product is above their marginal cost.

In Pakistan, like most underdeveloped countries, we can never be sure of farmers' ability to understand and exploit the potential opportunity for increasing crop yields due to the fact

8/ In other words the economic opportunity set is not within the mental horizon of the farmers or the ability to exploit it is lacking.
<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Crop</th>
<th>Period 1</th>
<th>Period 2</th>
<th>Period 3</th>
<th>Period 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>India (Bengal)</td>
<td>Rice</td>
<td>1955-60</td>
<td>1965-70</td>
<td>1975-80</td>
<td>1985-90</td>
</tr>
<tr>
<td>United States</td>
<td>Oats</td>
<td>1955-60</td>
<td>1965-70</td>
<td>1975-80</td>
<td>1985-90</td>
</tr>
<tr>
<td>United States</td>
<td>Sorghum</td>
<td>1955-60</td>
<td>1965-70</td>
<td>1975-80</td>
<td>1985-90</td>
</tr>
</tbody>
</table>

**Table 1:**

Price Elasticity of Area, Response (Supply) of Specified Crops in Underdeveloped Countries/Regions.
<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>JAN 1</th>
<th>JAN 2</th>
<th>JAN 3</th>
<th>JAN 4</th>
<th>JAN 5</th>
<th>JAN 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjab 95-96</td>
<td>Jan 1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Punjab 96-97</td>
<td>Jan 2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Punjab 97-98</td>
<td>Jan 3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Punjab 98-99</td>
<td>Jan 4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Punjab 99-00</td>
<td>Jan 5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Punjab 00-01</td>
<td>Jan 6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Punjab 01-02</td>
<td>Jul 1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Punjab 02-03</td>
<td>Jul 2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Punjab 03-04</td>
<td>Jul 3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Punjab 04-05</td>
<td>Jul 4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Punjab 05-06</td>
<td>Jul 5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Punjab 06-07</td>
<td>Jul 6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Notes:**
- JAN = January
- JUL = July
- JAN-JUL = January-July

**Sources:**
- جہاں، ج.، "کمیتی کمیسیون کی دوسری چار گروپ اور ان کی جوابی رپورٹ"، اسلام آباد، 2000
- یو.س.ای.، "کمیتی کمیسیون کی دوسری چار گروپ اور ان کی جوابی رپورٹ"، اسلام آباد، 2000

**Table I - Continued**

(13)
that new insights into and extension of the existing technology has been well exhausted already; and the use and understanding of inputs other than land and simple unskilled labour is very low.

Consistent to our expectations, Falcon did not find a significant yield response to price during the period 1933-58 \[16,7\].

Farmers' ability to increase crop yields in East Pakistan is even lower than West Pakistan. It is of no surprise that no significant \(\hat{\eta}_Y\) for rice in East Pakistan was found during 1949-62 \[27, p. 93\]. Similarly no positive \(\hat{\eta}_Y\) was found for Thailand and Philippines \[6, 41\].

It should be noted, however, that the absence of a positive \(\hat{\eta}_Y\) is not inconsistent with the existence of economic incentives since the necessary and sufficient conditions to observe a significantly positive \(\hat{\eta}_Y\) do not exist.

II.4. The Case of Multiple and Complex Economic Opportunity Sets.

Many economists have indulged in empirical work which involves, in our terminology, more than one economic opportunity set. For example, in the case of output response to price the relevant opportunity sets are the area allocation set and the yield adjustment set, and the ability to exploit the former may exist with or without the ability to exploit the latter.

Similarly the price response of marketable surplus involves production decisions and the consumption decisions. In order to
derive any meaningful conclusions about the existence of economic incentives by looking at the sign of the price elasticity of marketed surplus (\( \eta_{m.s.} \)), one must determine a) to what extent and direction the consumption decisions made on the basis of utility maximization and survival considerations overshadow the real outcome of the production decisions.

Most research workers seem to be unaware of these complexities and have identified a positive \( \eta_{m.s.} \) with the existence of economic incentives; and a negative \( \eta_{m.s.} \) with the absence of economic incentives. It is obvious that such an inference could be misleading in cases where the results of the production decisions made on the basis of economic incentives are rendered unobservable or perverse by the consumption decisions when we look at the \( \eta_{m.s.} \).

A negative \( \eta_{m.s.} \) cannot be taken to reflect the absence of economic incentives unless it originates from a negative acreage or output response to price.

In addition to the former response to price studies, there are other studies that show farmers being motivated by economic incentives (or by profit maximization). Some of these studies are quite rigorous but cover relatively smaller but more homogeneous socio-economic units like a village or an ethnic community; others

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9/ In connection with the supply of labour, Klein Beem's study on Malawi shows that farmers had a positive labour response to relative earnings.
are less rigorous in their statistical and economic analysis. Nevertheless, they all make the point that farmers are rational in their production decisions.

II.5. The Strength of Economic Incentives

In the previous sections we have discussed sufficient evidence to conclude that economic incentives exist in the underdeveloped countries. The next logical question is to know how strong they are. It is a very difficult problem to test from observed facts. In order to get some meaningful conclusions, we rephrase the question: Are economic incentive responses on the part of farmers in the underdeveloped countries as strong as they are in the developed countries?

In order to answer this question, we list in Table 2 the short-run elasticity of area response to price \((\eta_A)\) for some cash crops in U.S.A. and U.K. We can see that the \(\eta_A\) for cotton estimated by Krishna for Indo-Pak Punjab is higher than that estimated by Nerlove for U.S.A.

The overall range of \(\eta_A\) for developed countries is 0.27 to 0.68 for cash crops and it compares very closely to the range of 0.29 to 0.76 for some of the under-developed countries of Asia.

We conclude on the basis of this comparison that economic incentive responses on the part of farmers in under-developed countries are as strong as that of farmers in developed countries for an economic opportunity set about which we are reasonably sure that the ability of farmers to understand and exploit in under-developed
(12) Hussein: Strategy of Agricultural Development

is at least equal to that of farmers in the developed countries.

On the basis of the above discussions it can be concluded that the beliefs about farmers lacking economic incentives in under-developed countries should be dismissed, and the causes of low economic activity in the farm sector for the various opportunity sets must be sought in factors other than economic incentives.

III. Performance of Farmers in Underdeveloped Countries: Some Determining Factors

III.1. In the framework of Part I, there are two factors that determine the level of economic performance: (i) economic incentives, and (ii) ability to understand and exploit some given economic opportunities, and to create new opportunities.

After finding (i) of little concern, it is hypothesized that (ii) is of crucial importance in determining the level of economic performance of farmers. We think that farmers' ability to understand and exploit the various opportunity sets that may be available is low because of certain widespread constraints. The form and intensity of these constraints vary over space, time and the nature of agricultural activities involved, however.

11/ We have not attempted to compare \( \eta_{d} \), \( \eta_{O.S.} \), and elasticity of labour supply in under-developed countries with that of in developed countries for the simple reason that we are not sure of farmers' ability to exploit the relevant economic opportunity sets involved in both types of countries to be close to each other.
<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Verticle</th>
<th>Short-Term Dependence</th>
<th>Semi-Long-Term Dependence</th>
<th>Long-Term Dependence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deviation</td>
<td>0.65</td>
<td>0.46</td>
<td>0.06</td>
<td>0.01</td>
</tr>
<tr>
<td>Deviation</td>
<td>0.26</td>
<td>0.22</td>
<td>0.13</td>
<td>0.11</td>
</tr>
<tr>
<td>Deviation</td>
<td>0.33</td>
<td>0.37</td>
<td>0.23</td>
<td>0.18</td>
</tr>
<tr>
<td>Deviation</td>
<td>0.26</td>
<td>0.30</td>
<td>0.18</td>
<td>0.14</td>
</tr>
<tr>
<td>Deviation</td>
<td>0.20</td>
<td>0.24</td>
<td>0.14</td>
<td>0.10</td>
</tr>
<tr>
<td>Deviation</td>
<td>0.17</td>
<td>0.20</td>
<td>0.13</td>
<td>0.09</td>
</tr>
<tr>
<td>Deviation</td>
<td>0.15</td>
<td>0.18</td>
<td>0.11</td>
<td>0.08</td>
</tr>
<tr>
<td>Deviation</td>
<td>0.13</td>
<td>0.16</td>
<td>0.10</td>
<td>0.07</td>
</tr>
<tr>
<td>Deviation</td>
<td>0.11</td>
<td>0.14</td>
<td>0.09</td>
<td>0.06</td>
</tr>
</tbody>
</table>
To organize discussion, the various commonly found constraints are classified into three categories:

a) Physical constraints (e.g., climate, water availability, fixed land).

b) Technological constraints (e.g., lack of more productive technical knowledge and know-how).

c) Institutional constraints (e.g., the practice of subsistence farming) 12/.

We hypothesize that the economic performance of farmers varies directly with their ability to exploit economic opportunities within the horizon.

Since the ability to exploit economic opportunities within the horizon improves when certain existing constraints on it disappear or are relaxed, and vice versa; we will try to show that as the constraints on farmers' ability to exploit a given opportunity set tighten, economic performance deteriorates; and as they relax, performance improves. For a meaningful discussion, attention is given only to those economic opportunity sets that are within the mental horizon of the farmers.

One of the well understood opportunity sets is the allocation of land among competing crops on the basis of expected relative profitability (or price under certain assumptions).

12/ Institutional means established practices that have their origin in economic rationality and are established so long as the original rationale for them exists with some time lags permitted for adjustment.
Economic performance in this context means the degree of area adjustment for an individual crop in response to its expected relative price, measured by the price elasticity of area supply ($\eta_A$). Poor performance implies a lower $\eta_A$ in crop comparisons for a given region/country, or in a regional/country comparison for the same crop. Of course, due regard must be given to the factors that affect the relative profitability other than the area allocation decisions while making inter-crop and inter-regional comparisons.

In order to indicate the depressing effects of the various constraints on $\eta_A$, we present the following facts.

III.2. Economic Performance Within the Area Allocation Set

III.2.a. (i) Krishna [36] in Indo-Pak. Punjab and Falcon [35] in former Punjab of West Pakistan found that whereas the $\eta_A$ for irrigated wheat was significantly positive, the $\eta_A$ for unirrigated wheat was not significant.

Results similar to this effect were also obtained by Koul [37] for wheat in the Indian Punjab (1951-64). The obvious reason for the $\eta_A$ to be nil or low in the case of rainfed cultivation is the fact that farmers in this situation have not very little control on and certainty about the availability of water. Great uncertainty and lack of control over water supply is a constraint.

13/ In the following comparisons we expect the $\eta_A$ to be close to each other in the case of different crops (in the same region) or in the case of different regions (for the same crop); when various constraints on farmers' ability to exploit the area allocation set are equally binding. It may be noted that $\eta_A$'s referred to are estimated at the mean acreage for the crops involved.
(22) By Hussain: Strategy of Agricultural Development

(II) In most irrigated areas of Pakistan due to the seepage of the canal water, the groundwater table showed a rising trend. In the summer (kharif) season cotton and other competing crops like rice, sugarcane, maize, etc. are grown in West Pakistan. Relative to other crops, cotton has a deeper tap root system and penetrates to a depth of about 6 feet whereas the competing crops have shallow fibrous root systems penetrating to a depth of 2-3 feet. Thus a water table, rising to a depth of 5-10 feet should adversely affect the cultivation of cotton.

Ghulam Mohmed found in a searching paper on the physical and economic determinants of cotton production in West Pakistan, that in the canal colonies of the former Punjab the ground water table was rising since 1915 and by 1940 the water table had come within 10-15 feet of the ground surface in the major parts of this region and thus initiated a forced downward trend in the cotton acreage despite the fact that the total area available for cultivation showed an upward trend.

(iii) Hussain's study on farmer response to price in East Pakistan found that the $\Pi^A$ for jute in Dacca Division was 0.29 compared to 0.36 for the province as a whole. This could be attributed to the fact that Dacca Division has some chah and bil land where jute is generally sown instead of rice, because the latter would be washed or blown away. Hence the soil conditions reduce the competitiveness of jute with rice relative to other areas.
and acts as a constraint on the area allocation among competing crops leading to a lower $\gamma_A$ for jute.

(iv) Studies by Ghulam hussain \cite{22} and Falcon \cite{17} show that with the development of tubewells the water supply in the former Punjab increased. In addition, the tubewell water is relatively much more certain and subject to control. This led to improved land allocation and increased crop yields.

Carl K. Fischer in a study on Nigeria \cite{14} noted that the development of transport and communication facilities played a dual role: first, it provided economic incentives by linking Nigerian agriculture with the world market, and secondly it reduced the physical constraints on the development of Virgin land and better allocation of the cultivated land among various crops. This led to improved economic performance of the Nigerian farmers during the 1960-70 period.

III.2.B. Price Response of Cereal Supply: Inter-Crop Differences

It can be seen from Table I that the $\gamma_A$ for subsistence crops ranges from 0.00 to 0.23 whereas the $\gamma_A$ for cash crops ranges from 0.29 to 0.76 (excluding Argentina) and 0.29 to 1.10 (including Argentina). The pattern of very low $\gamma_A$ for subsistence crops compared with the $\gamma_A$ for cash crops prevails in India. A subsistence crop is a food crop which is used as a common cereal in diet, e.g., wheat in West Pakistan, rice in East Pakistan and Thailand. The list of subsistence crops can be broadened by including the subsistence crops for livestock.
Pakistan, Thailand, Philippines and many other underdeveloped countries. It is important to know why this differential exists, because in our scheme of thought a low \( \Pi \) implies poor economic performance.

The most basic reason for the \( \Pi \) to be low for the subsistence crops is the institutional constraint of subsistence farming that prevails in most underdeveloped countries. Given the large price differential between the sale price of food at harvest time and the purchase price of food throughout the off-harvest period, and the uncertainty about the future sale and purchase price of food, it is worthwhile for most farmers to grow food to meet subsistence needs on their own land rather than buy it from the market. Under the practice of subsistence farming, the farmers first allocate land to grow food for their family and then allocate the left over land between the various competing crops.

We can illustrate the effects of the constraint of subsistence farming on the \( \Pi \) for the subsistence crop through Graph 1.

\[ \text{Graph 1} \]

\[ \text{Graph 2} \]

15/ For an excellent discussion of the rationale for the subsistence farming, see: Falcon, W.T., L p. 18-23.
Supposing the farm sector has OR - OJ land that can be allocated between the two competing crops: jute and rice.

Under the constraint of subsistence farming, OS = OS' land is reserved for growing food for the family, leaving SW = S'J (left over land) for allocation between the competing crops on the basis of relative profitability (or prices). Depending on the year to year changes in the relative prices, the left over land will be allocated to rice or jute (if the relative yields are not a function of the size of allocated land), or to both rice and jute (when the relative yields vary with the size of the allocated land).

For time series data $\eta_A$ is computed on the observed mean acreage for the period covered. In the case of subsistence crops (i.e., rice in this case), the observed mean acreage will tend to exceed the acreage that actually responds to relative price and hence will depress the $\eta_A$ for it. The observed rice acreage is bound to exceed that acreage (i.e., OR) which responds to price because the land devoted to produce subsistence food requirements has little relationship with price changes. Further, the $\eta_A$ for rice will be lower, the higher the OS/OR ratio which indicates the intensity of the constraint of subsistence farming.

The OS/OR ratio is high in all those underdeveloped countries where the productivity of land is low and the population pressure on cultivated land is high, thus making a low $\eta_A$ for subsistence crops a generally observed feature of the farm sector.
On the other hand, in the case of cash crops (i.e., jute here), the observed acreage is tied with the left over land ($S^j = 0R$) which responds to price. Thus the $\eta_j$ for cash crops reflects the unconstrained farmers' response to price and hence exceeds in all cases, other things being equal, the $\eta_j$ for subsistence crops which is observed under the constraint of subsistence farming.

III.2. C. Price Response of Acreage Supply: Inter-Temporal Differences

In order to test the belief that the level of farmers' economic performance varies directly with their ability to exploit the opportunities within the horizon, a study was conducted to isolate the effects of the growing constraint of subsistence farming on the price response of jute acreage in East Pakistan $E^2 P^2$.

A mathematical model was developed about a farming unit for which the cultivable land is distributed between subsistence (rice) and cash crops, and the income derived is spent on food (rice) and non-food goods. Thus the farmer is an actual consumer and a potential producer of one of the competing crops (rice).

Assuming a logarithmic linear utility function, the following estimating equation is derived separating the effect of the growing constraint of subsistence farming.

$$A_j = e_0 + e_1 \left( \frac{P^j}{P^R} \right) - e_2 \left( \frac{U^j}{U^R} \right) - e_3 T$$

Where

$A_j$ = Jute acreage (in 000, acres)
\[ e_0 = \text{constant term} \]

\[ e_1 = \text{Coefficient of area response to the expected harvest price of jute relative to the expected purchase price of rice:} \left( \frac{P_{j}}{P_{r}} \right) \]

\[ e_2 = \text{Coefficient indicating the adverse effect of the constraint of subsistence farming growing in time.} \]

\[ e_3 = \text{Coefficient indicating the effect of time on} \, u_j. \]

\[ T = \text{Time} \]

\[ B = \text{The error term.} \]

The above mentioned estimating equation was fitted to the relevant data in East Pakistan for the period 1932-58.

Table 3 presents the results for the period 1932 to 1958 during which the subsistence food needs of the farm population as a whole and of the main jute growing areas in particular, were growing. In other words, the constraint on the ability of farmers to allocate land among the competing crops in response to price (or profitability) consideration was tightening. As a result, we expect the area response to price in the case of both the competing crops to decline. Due to the availability of data, only the price response of jute acreage is analyzed.

In the context of the hypothesis that farmers' jute area response declines in a time sample when the constraint (of subsistence farming) on farmers' ability to exploit the area allocation opportunity set tightens in time, the null hypothesis is that the coefficient \( e_2 \) in equation (1) is zero.
<table>
<thead>
<tr>
<th>Year</th>
<th>Area (km²)</th>
<th>Veg.</th>
<th>Forest</th>
<th>Number of Stations</th>
<th>Observations</th>
<th>Data Used</th>
</tr>
</thead>
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<td>13.626</td>
<td>23</td>
<td>-</td>
<td>1</td>
<td>9.07463</td>
<td>1.91415</td>
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<tr>
<td>1969</td>
<td>17.773</td>
<td>23</td>
<td>-</td>
<td>1</td>
<td>9.07463</td>
<td>1.91415</td>
</tr>
<tr>
<td>1979</td>
<td>17.773</td>
<td>23</td>
<td>-</td>
<td>1</td>
<td>9.07463</td>
<td>1.91415</td>
</tr>
</tbody>
</table>

**Note:** Data used in the calculations are from the years 1959, 1969, and 1979, corresponding to the areas of 13.626, 17.773, and 17.773 km² respectively.
| Year | Value | Value | Value | Year | Value | Value | Value | Year | Value | Value | Value | Year | Value | Value | Value | Year | Value | Value | Value | Year | Value | Value | Value | Year | Value | Value | Value | Year | Value | Value | Value |
|------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|
The results of the statistical analysis show through rows 1-6 of Table 3 that we can reject the null hypothesis, since \( \alpha \) is statistically different from zero.

The rejection of the null hypothesis and the negative sign of the estimated coefficient are consistent with the hypothesis that the level of farmers' economic performance within the area allocation opportunity set declines as the constraint on farmers' ability to exploit that set tightens.

Empirical evidence consistent to this hypothesis was also found in the case of rice and cotton in West Pakistan and for corn in Thailand [28]. The results are shown in Table 4 and Table 5.

In addition, some indirect evidence is also available from West Bengal (India) which could be regarded as consistent to the above mentioned hypothesis. [28, pp. 168-172].

III.4. Economic performance in the Yield (Productivity) Dimension

We mentioned in Part II that in the case of individual crops, the yields have not been found responsive to prices, because the farmers do not possess the necessary ability to do so.

We can extend this viewpoint to the agricultural sector as a whole by saying that the aggregate production (given the land) will not be responsive to the agricultural terms of trade in most underdeveloped countries unless the ability to raise crop yields improves.

Table 6 presents the yields per hectare for wheat, rice,
### Table 1

#### A. Area Response Function for Cotton and Rice in the 6 Cotton Growing Districts of West Pakistan (1936-1958)

| No. | Terms | \( P_{0}/\bar{P}_{1} \) | \( P_{0}/\bar{P}_{2} \) | \( P_{0}/\bar{P}_{3} \) | \( P_{0}/\bar{P}_{4} \) | \( \frac{P_{0}}{P_{2}} \) | \( \frac{P_{0}}{P_{3}} \) | \( \frac{P_{0}}{P_{4}} \) | \( \frac{P_{0}}{P_{5}} \) | \( \frac{P_{0}}{P_{6}} \) | \( \frac{P_{0}}{P_{7}} \) | \( \frac{P_{0}}{P_{8}} \) | Years Included | Years Excluded |
|-----|-------|----------------|----------------|----------------|----------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| 1   | 225.3 | 1.00           | 0.1760         | -              | 4191.4         | 21            | 7.57          | 2.0134        | -             |               |               |               |               |               |               |
| 2   | 63.4  | 1.3            | 0.1260         | 0.137          | 4172.6         | 21            | 7.57          | 2.0134        | -             |               |               |               |               |               |               |
| 3   | 31.4  | 3.1            | 0.1192         | 0.117          | 3221.6         | 18            | 7.57          | 2.0134        | 1943 1948 1949 |               |               |               |               |               |               |
| 4   | 131.6 | 3.6            | 0.1094         | -0.25          | 3206.1         | 18            | 7.57          | 2.1328        | 1943 1948 1949 |               |               |               |               |               |               |
| 5   | 15.9  | 3.1            | 0.1569         | 0.157          | 32.4           | 23            | 8.22          | 1.6995        | -             |               |               |               |               |               |               |
| 6   | 15.4  | 2.8            | 0.1590         | 0.0036         | 32.8           | 23            | 8.22          | 1.7152        | -             |               |               |               |               |               |               |
| 7   | 16.7  | 3.4            | 0.1599         | -0.1590        | 31.6           | 20            | 8.87          | 1.9566        | 1942 1948 1949 |               |               |               |               |               |               |
| 8   | 197.7 | 3.5            | 0.1610         | -0.1490        | 32.8           | 20            | 8.87          | 1.9577        | 1943 1948 1949 |               |               |               |               |               |               |
### Table 4:

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</table>

*Districts included are Multan, Montgomery, Lyallpur, Jhang, Shaplur, Lahore, Sheikhupura, and Gujrat.*

*These are abnormal years due to the impact of World War II or Partition of the Indo-Pakistan subcontinent.*

*Statistically not significant.*

*Source: Computed from the data shown in Appendix Table A - 4.*
<table>
<thead>
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<th>No.</th>
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<td>(0.0062)</td>
<td>(21.15)</td>
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<td>(0.0039)</td>
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<td>(2.48) (0.07)</td>
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<td>(0.0002)</td>
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<td>(4.62) (0.063)</td>
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<td>(0.0009)</td>
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<td>(4.55) (2.17) (0.052)</td>
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<td>(0.0277)</td>
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</table>
(PL) = price of corn relative to the competing crops at the local level, weighted by the area under each crop.

\( T(PL)_{t-1} \) = proxy for the growing constraint of subsistence farming at time \( t \).

\( (\Delta Y)_{t-1} \) = expected yield of corn relative to rice: \( (\Delta Y) = \frac{\text{relative corn yield}(t-1) + \text{relative yield of corn}(t-2)}{3} \).

\( M \) = malaria deaths in the previous year as a basis of the expected malaria deaths in year \( t \).

\( \lambda \) = risk indicator for the expected \( (PL) \): \( (\lambda(PL)) = \frac{\text{SLA}(t-1) + \text{SLA}(t-2) + \text{SLA}(t-3)}{3} \),

where SLA is the standard deviation for the \( PL(PL)(t-1), PL(t-2) \) and \( PL(t-3) \). \( \lambda \) = time.

All unmarked coefficients are statistically significant at the 5 percent or less level.

*Statistically significant at the 10 percent level.

#Statistically significant at the 20 percent level.

*Statistically significant at the 30 percent level.

*Not statistically significant at the 30 percent or less level.
sugarcane, cotton and jute in Pakistan and some other countries observed during 1962-65. It is clear that the yield for all crops is substantially lower than those found in relatively more developed countries.

In addition to the low productivity of the agricultural sector, it can be shown that the productivity does not respond to the sectoral terms of trade unless the incentives provided through the favourable terms of trade are matched by the enhanced ability to exploit various opportunities.

It is almost impossible for us to provide empirical analysis to prove our point, nevertheless it can be hypothesized that the basic cause of low productivity is the farmers' ability to raise crop yields which is reduced to a very low level by the high intensity of the physical and technological constraints.

Among the physical constraints one can list the inadequate water supply and the lack of control over and uncertainty about its use. Other physical constraints could be the size of the holding and the low fertility of soil.

But the most important of all is the technological constraints i.e., low technical knowledge and know-how on the part of farmers. This is due to the i) lack of proper general, technical and scientific education, ii) lack of transportation and communication facilities resulting into a very low degree of integration of the traditional sector with the rest of the economy at home or abroad, and iii) absence of experience and observation of more
productive technology and know-how thus keeping the 'technical spectrum' of farmers low and static.  

Although empirical evidence cannot be provided to support the above view, West Pakistan's experience on agricultural growth in the 1960's is illuminating and convincing for the line of thought that has been adopted here.  

Felder and Gotsch in addition to the increased cultivated land, have traced three sources of agricultural growth, i.e., increased cropping intensity and crop yields and the improved cropping pattern. This was caused by the removal/relaxation of certain physical and technological constraints on farmers' ability to exploit various opportunities. The constraints relaxed were water supply, non-familiarity and supply of fertilizers, etc. For a more detailed discussion, see: Hussain (28). Of course, adjustment in the government price and other policies provided proper incentives at the same time.  


Time series analysis on the behaviour of marketable surplus is not available due to the lack of the relevant data. Cross-sectional studies can, however, be used to test the main hypothesis that farmers performance in a particular opportunity set deteriorates 10/ The most sophisticated machine that a farmer may have ever seen in the old days was the British made 'crude' bicycle, or at best, a flying aeroplane which might confuse him rather than familiarize him with more productive farm inputs/or technology.
as the constraints on farmers' ability to exploit them tightens, and vice versa.

A cross-sectional study of the behaviour of marketed surplus was made by Raguibuzzaman using the National Sample Survey for East and West Pakistan. The results show that in the case of subsistence crops, the marketed surplus over owner farms varies directly with production and inversely with family size. Thus the family size, other things being equal, acts as the constraint on farmers' ability to market their produce.

The results of Raguibuzzaman's study can be taken as consistent with our general hypothesis.

Concluding Remarks: The limited but not inconclusive direct and indirect empirical evidence on East Pakistan, West Pakistan, Thailand, Philippines and India is suggestive that facts are consistent with our hypothesis that the economic performance of farmers within the economic opportunity set of area allocation among competing crops varies directly with their ability to exploit the relevant opportunities. Farmers who live in Pakistan, Thailand, Philippines and India though possess diverse cultures and religions, and face different social and economic conditions, seem to have uniform economic behavioural characteristics.
IV. Policy Implications; Strategy of Agricultural Development

The policy implications of our analysis for the purposes of economic development are obvious. The level of farmers' economic performance (i.e., productive capacity) can be raised by removing the physical, technological and institutional constraints on farmers' ability to understand and exploit the various opportunity sets.

IV.1. If the increase in the economic performance of farmers exceeds the population growth in the farm sector, we can say that economic development is taking place. Hence the minimum degree to which the constraints ought to be removed to initiate and sustain economic development in the farm sector, can be determined in the light of the population growth in the farm sector, and how it changes in response to any increase in the productive capacity of the farm sector. As a result the farmers' overall economic performance (PE) must grow at a rate greater than the rate of growth of the farm population (d/P) in order to achieve economic development.

In the light of our discussion, the increase in farmers' productive capacity (or income) in the farm sector can originate from three sources:

a) Increase in the land resources of the farm sector,

b) Increase in the crop yields of individual crops or all the crops/products of the sector, and

c) Improvement in the allocation of land and other resources among the competing outputs.
Source (a) is available if the potentially cultivable land exceeds the actually cultivated land, and if the intensity of cropping can be increased on a given land. Most common bottlenecks that might be found are of physical and technological nature. Institutional constraints like settlement policies, may also be found. Removal of the various constraints on farmers' ability to extend cultivated land and the intensity of cropping, should result in increased agricultural production.

Source (b) is always available so long as the relaxation of the various physical and technological constraints results into increased crop yields. We think that the physical and technological constraints on farmers' ability to exploit this source are very intense. Removal of these constraints (e.g., inadequate water supply, poor technical knowledge and know-how, and its application), can greatly help to raise the crop yields.

Source (c) is found to be not available under the constrained ability of farmers to allocate land and other resources. However, if the various constraints (e.g., subsistence farming, poor know-how) are removed, the allocation of resources among the various alternative uses will improve and the value of the farm output will increase.

The removal of the existing constraints on farmers' ability to understand and exploit given economic opportunities should be supplemented by the creation of new economic opportunities as well.
The introduction of high-yield varieties of a given crop, say rice or wheat, amounts to creating new economic opportunities.

The removal of the various constraints on farmers' ability to understand and exploit given economic opportunities and the creation of new opportunities (i.e., extension of the opportunity space) are the basic elements of a development strategy implied by our analysis.

IV.2. We must add a few reservations to the above recommended strategy for the development of agricultural sector.

Firstly, a continuous removal of the physical, technological and institutional constraint does not guarantee that we will always be able to attain a high rate of growth from the sector. Of course, the likelihood of bringing about a high growth rate for a fairly long period exists due to the relatively large and useful stock of available technical knowledge and know-how that can be used/adapted in the under-developed countries. The limits on the agricultural growth rate will ultimately show up, however, because of the biological processes and natural inputs involved in the agricultural industry. On the other hand, theoretically speaking, manufacturing (industrial) sector should be able to show high rates of growth for relatively long time periods since the use of reproducible inputs and the somewhat non-localized nature of the industry are more favourable to growth.
Thus the efforts on agricultural development should not steal our attention from the economically feasible and desirable development of the industrial and other sectors.

Secondly, we have completely ignored the problems that can and will arise from the balancing of demand for and supply of agricultural products, and problems arising from the interactions between the sectors. The reason for ignoring these problems is that this study is designed to deal with the supply side only as the literature is relatively abundant and enlightening on the problem of demand and other problems of inter-sectoral nature. Instead of discussing the possible problems we would like to emphasize that they exist and policies must be designed to solve them in a proper way so that the growth of the agricultural sector may not be retarded on their account.

IV.3. A Brief Statement

By way of a brief statement on the process of economic development envisaged in the light of our study, we can say that (a) the process of economic development could be initiated by the removal of physical, technological, institutional and other constraints on the ability of the farmers to take advantage of the given economic opportunities, (b) the process of economic development can be successful only if the relaxation of the constraints is significant (i.e., of "minimum critical effort" as given by Professor Leibenstein) and it could be self-sustained only if
(c) it is supplemented by the ability to create new economic opportunities on a continuing basis, and (d) the problems arising from the balancing of demand and supply, and the interaction between sectors do not seriously impede the momentum of the process of economic development.

IV.4 A Comparison of the Envisaged Strategy of Agricultural Development with Other Strategies or Theories

Just to see the nature and usefulness of our characterization of the phenomena of economic development and the implied strategy of "remove constraints - extend opportunity space" for the agricultural development, we will make three brief comparisons with other theories/strategies.

(1) The usual moral from the various growth and development methods, apart from their inter-sectoral and general equilibrium insights, is that the inputs (i.e., capital, technological progress, labour) included in the assumed production function should be increased to attain a higher level of production in a sector or the economy as a whole. Supposing that a growth model tells us that if the rate of capital accumulation, technical progress, technological change, etc. is increased, the production of the agricultural sector will show higher growth rates. The big question that would bug the policy makers engaged in the development effort is that what type and to what extent the recommended crucial inputs be used. Such qualitative but very important information is needed. The growth
models and other theories fail to elaborate on this matter.

Our envisaged strategy of "remove constraints - expand opportunity space" shows the way in which the problems of policy should be studied and the direction to which the development effort be oriented. The growth model-strategies being at a highly aggregative level and interested in different type of problems, are more useful in matters of inter-sectoral nature and the equilibrium problems of the economy than in handling the problems of strategic economic change peculiar to a sector.

(11) The development theories of A. W. Lewis and Raisis Fei type, which make the process of development a result of the structural change involving a transfer of labour and wage fund from the agricultural (traditional) sector to the industrial (modern) sector, provide some insights for the development of the economy. Raisis and Fei, for example, think that economic development is essentially a process of the continuous improvement of the way certain basic economic functions are performed. The institutional arrangements that affect the labour and wage fund allocation between sectors, and output productivity in the agricultural sector are the most crucial links. Thus strengthening of these links through the inter-sectoral markets (e.g., commodity, financial and labour markets linking the two sectors) and the learning process through education and experience etc., are the basic elements in the strategy of development.
It is obvious that under the assumptions of surplus labour in the agricultural sector and the marginal productivity of labour being low in the agricultural sector relative to the industrial sector, their characterization of the development problem and the development process is an oversimplification.

Strengthening of the various institutional arrangements linking the sectors can, of course, help but it cannot be regarded as a sufficient condition for initiating and sustaining the development process.

In our framework the improvements in the various basic economic functions are helpful in the sense that the growth originating from the growing ability of farmers to understand and exploit given economic opportunities, and to create new opportunities, will not be frustrated if the various intersectoral markets and institutional arrangements linking the sectors are functioning efficiently.

(iii) On the agricultural development as such, John N. Meller has given some thoughts. He has distinguished between the three phases of agricultural development, namely the traditional agriculture (phase I), technologically dynamic agriculture -- low capital technology (phase II) and technologically dynamic agriculture -- high capital technology (phase III). According to him, these phases are diagnostic rather than historical, and are based on the nature and relative intensity of the various
inputs used in the production process. To him agricultural development means moving from Phase I to Phase III, and this movement or process can be called agricultural modernization. We quote Nellor on how the process of agricultural modernization takes place:

"Agricultural modernization occurs through shifting of production functions so as to increase the productivity of resources already in use and even more important, through developing substitute forms of inputs for which the supply is highly elastic." (p 288)

Nellor's idea of making an increasing use of substitute forms of inputs for which the supply is highly elastic in order to accelerate the agricultural development is very useful. The idea is also consistent with our framework since the increasing use of inputs for which the supply is highly elastic (e.g., chemical fertilizers instead of or in addition to the organic manures) implies that the constraints on farmers' ability to exploit the economic opportunities (i.e., crop yield potential) are removed. Here the supply of inputs is emphasized as a possible constraint. In the traditional agriculture the use of inputs for which supply is inelastic or without control, is very high. Such inputs are, for example, rain supplied water, use of manures, low technical know-how, etc.

Although Nellor's point is important and useful, his characterization of the development process is too narrow and somewhat vague. For example, at a given point of time in the context of a given problem, his characterization does not provide
a framework in which one could decide which of the two or more equally supply-elastic inputs should be introduced first.

In our framework, on the other hand, one can find out the order of priorities through the cost-benefit analysis of removing various constraints. In principle, our framework also implies that the use of supply elastic inputs compared to the use of inputs for which the supply is less elastic, is growth promoting, provided the cost-benefit ratio is the same for both.

IV.3. Planning for Agricultural Development

Mans S55 J has identified two basic functions of the planning effort towards development, namely planning for resources and planning for strategy change.

This study provides useful insights for improving both of these basic functions of development planning. Regarding the planning for resources, for example, our emphasis on the matching of economic incentives by the removal of constraints on farmers' ability to exploit the given economic opportunities, can be useful in raising farmer response to price policies designed to mobilize resources.

On the more crucial aspect of strategy change, our framework provides an operational strategy of "remove constraints - extend opportunity space." The governments can accelerate the process of agricultural development through removing the most crucial (binding) constraints for which farmers of any given region may not have the
ability, resources and organization to remove. This will help to unleash the energies and abilities of the farmers in their economic efforts.

IV.6. Application of the Levaged Development Strategy

The application of the above outlined strategy of agricultural development, requires a thorough study of the agricultural conditions at some level of aggregation (say a homogeneous region) in order to identify the various physical, technological and institutional constraints and their level of intensity. Then the shadow prices for the various constrained resources be estimated and compared to the cost of removing the constraints. From such an analysis the constraints that ought to be removed first and their timing can be worked out. Government should help farmers to remove, as a first priority, those constraints for which they are not in a position to do the job. This will minimize the resource cost of initiating and sustaining agricultural development.


We characterised the phenomenon of agricultural development as a function of farmers' (i) willingness (or economic incentives), and (ii) ability to understand and exploit given economic opportunities; and create new economic opportunities.

1) The Economic Incentives: Although the various Plans and documents dealing with the development effort are not clear as
to their position on farmers possessing economic incentives, the official policies of the 1950's give an impression that the executive machinery of the government did not believe in the initiative, rationality and economic incentives on the part of farmers. The policies adopted to raise agricultural production were of the 'spoon-feeding' type. The extensive use of price and procurement controls shows that farmers were not trusted in responding to economic incentives.

Since 1959-60 the government of Pakistan has adopted a policy of gradual decontrol to rationalization of the various controls.

It should be noted, however, that although the official thinking and practice since 1959-60 show that the government has developed a faith in the existence of farmers' response to economic incentives, the extent of economic incentives provided through subsidies on certain inputs and support prices for certain products is not being critically examined in relation to the various alternative policy instruments that could be available under our framework.

As it was pointed out earlier the agricultural production can be raised through strengthening economic incentives or through removing the various physical, technological and institutional constraints on the ability of farmers to understand and exploit given economic opportunities. To what extent we should use economic incentives or remove constraints is a serious policy question. It
seems to us that the government does not see these choices. After
the success of Second Plan, there is a tendency on the part of the
government to adopt policies oriented towards 'economic incentives',
which may extend beyond the necessary level.

ii) The Official Development Strategy for the
Agricultural Sector

Pakistan's plans and various documents seem to adopt a general
strategy of economic development which says: 'provide infrasturcture
and remove the critical bottlenecks/scarcities'.

For the agricultural sector, the Plans at its thinking as well
as practical level, envisage that the production will increase from
two sources:

i) additional land brought under cultivation, and

ii) increased crop yields per acre.

In our terminology, the Plans are conscious of the area and
yield opportunity sets only. We have not come across any mention
about the economic opportunities provided by the optimal allocation
of land and other resources among the various crops. This indicates
the neglect of an important source of increasing the economic value
of agricultural output.

On the strategy of development, it is clear that increasing the
area under cultivation by providing water, roads, and
colonization facilities and services, does not involve any strategy.
Of course, it extends the opportunity space in a sense, but such an
effort will lead to agricultural growth though not development since it does not add to the productive capacity of farmers over the long-run.

On raising the crop yields per acre, all the early plans (Six-Year Development Programmes, First and Second Five Year plans) list the missing inputs/factors in the Pakistani agriculture compared to the agriculture in the developed countries of Europe, North America, Japan, etc. The list usually reads as fertilizers, plant protection, mechanization, improved seeds, extension service, water, credit, and so on. Of course, through time the list is getting refined in the light of the critique by the local agricultural experts, successes and failures of the various programmes. The revision of the list of missing inputs/factors has narrowed down to water and fertilizers being the crucial factors in the Third Five Year Plan because of the lessons learned during the Second Plan. Nevertheless, in the absence of any analytical framework at the theoretical level or empirical level, the hangover of having no agricultural development strategy can still be found in the Third Five Year Plan.

iii) The Lack of Optimization of the Development Effort Within the Agricultural Sector

An examination of the plans shows that an optimal use of the allocated resources is not being made. It is our belief that the best that the government may be doing is to examine each development project on the basis of its own costs and benefits. However, it
seems that given the sectoral allocation of resources, no attempt
is made to choose the projects with the highest rate of return or
with the highest role in bringing a strategy in the sector itself
or the economy as a whole.

The Plans and other documents do not elaborate on the
planning procedures adopted at the sectoral level. For example,
Tims referring to the making of the Third Five Year Plan, says:

"Even less use was made of the model with regard to the third
stage, the sectoral detail. Sectoral plans and project lists
are largely prepared outside the Planning Commission, and
the decision on the inclusion of proposals depends sometimes
as much on the organizational talent and persuasiveness in
the exposition of their sponsors as on the economic justifi-
cation."\[63, p. 157\].

Nevertheless, if one reads the various Plans it is easy to discover
optimization is completely ignored within the sector. For examples,
every Plan envisages huge expenditures on irrigation and coloni-
ization in order to bring new land under cultivation. The resource
expenditure is usually enormous in relative terms, and the area to
be brought under cultivation runs into millions of acres.

It seems that, given some resources, the choice between
bringing new land under cultivation or providing additional water
and other services on the old lands is seldom considered. Our
impression is based on the fact that each Plan allocates a large
part of the sectoral resources on new land without explaining any
'special merit' of doing so. The impression changes into a belief
when we find that despite the fact that actual settlement of
farmers on new lands seriously lagged behind. The effort at bringing more new land under cultivation continued.

We quote Японек on this point:

"The government's direct investment programme still left much to be desired in the 1960's -- water use continued to lag behind water engineering works, road maintenance behind construction, and land settlement behind land availability."

In general the plans list a number of development programmes which seem sound on the face of it. But it is never clear whether the planning Commission has chosen a set of programmes/projects considering the whole list as alternatives at some level.

If the optimal selection is not made subject to the constraint of some given sectoral budget, as is obviously the case, one can say that a substantial waste is taking place in the development effort in the sense that larger benefits could be derived if an optimal selection of the various projects were made.

(iv) It may be noted, however, that our observations exclude the efforts made in the private sector and only cover those development programmes and strategies that were adopted by the government, and as revealed through the various planning documents and their evaluation reports.

17 In the case of India S.R. Sen also notes that heavy bias in the development effort towards irrigation, colonisation, etc., exists. It could be due to the vested interests (i.e., engineering firms, contractors,) that benefit from such programmes directly. However, we have to conjecture in the case of Pakistan, unless a detailed study is made of the whole decision making process in the relevant government agencies. See Sen, S.R. /62/, Chapter 1.
At the evaluation level, very often the growth experienced in any given Five Year Plan period is correlated with the programmes undertaken within the same plan period. On the basis of such a correlation, a plan is praised or blamed. This kind of analysis could be seriously misleading since there are substantial time lags involved between the time a programme is undertaken and the time the returns are actually realized. Moreover, certain important factors that are exogenous like weather conditions, private efforts, etc., are neglected and such improper evaluations may lead to misleading conclusions.

IV.6. Some Suggestions

1) The Need for the Recognition of Farmers' Initiative and Rationality: It is strongly suggested that it should be recognized that farmers possess initiative and respond to economic incentives. Although they may be illiterate and poor, they are conscious of economic gains and do their best to secure such gains wherever it is feasible. Economic incentives provided through price policy or input subsidization and other uncharged services, are powerful policy instruments in encouraging production.

1f) The Need for Extensive Empirical and Experimental Research to Identify Constraints: The Country may be divided into more or less homogeneous units on the basis of agronomic and other conditions that affect cropping pattern, yields, cultural practices, etc., and for each unit at least one research station be established.

The research stations should be staffed with experts in
agriculture, economics, sociology, etc., and equipped to conduct empirical and experimental research of good quality. The purpose of research would be to study the 'actual level' of farmers' economic performance (i.e., cropping pattern, intensity of cropping, efficiency of resource use, crop yields, non-farming occupations, etc.), and the 'potential level' and pattern of economic performance in the region. By the potential level and pattern of economic performance, we mean that feasible level and pattern of economic performance when the various constraints on farmers' ability to understand and exploit economic opportunities are relaxed.

Since the experimental research is conducted under conditions in which various constraints can be relaxed because of the relatively easy availability of expert technical knowledge and know-how and other resources; feasible potential performance can be easily identified.

However, the main purpose of the experimental research is to identify the physical, technological, institutional and other constraints that prevent the actual performance of farmers to reach its 'potential' (i.e., observed under the various experiments). Also the purpose would be to estimate the cost and benefits of removing the identified constraints in the region.

A carefully worked out benefit-cost type studies of moving from the actual performance to the various levels of potential performance through alternative means should become the basis for the development programmes and strategy to be followed by the government.
The Need for Development Strategy

In order to follow the suggested strategy of 'remove constraints extend opportunity space', empirical and experimental research is essential. The government should adopt those programmes and projects which will have the effect of removing the various constraints identified through the empirical and experimental research, for which the farmers do not possess the understanding/ability/organization to remove themselves. Moreover, among the constraints that ought to be removed in order to bring the actual performances of farmers to its potential level and pattern, priority should be given to the removal of those constraints for which the benefit-cost ratio (or the rate of return) is the highest or the removal of which can bring about a quick and widespread self-sustained growth (i.e., strategy change) in and outside the sector.

In evaluating all issues and policies concerning the development of the agricultural sector like land reforms, mechanization, etc., attention must always be given to the question: whether the adoption of a particular policy in some specific form will result in enhancing farmers' ability to understand and exploit the given opportunity space or to extend opportunity space, or not. If answer is in the negative, then such policies may be adopted on other considerations, e.g., social justice, national prestige, political reforms, etc., but the planners should neither expect nor propagate that such policies will bring about an agricultural revolution.
iv) The Need for the Farming Education and Training to Play Its Crucial Role.

The actual performance of farmers in most under-developed countries is found to be at a low level since their ability to understand and exploit opportunities is kept low by the various constraints of physical, technological and institutional nature. Among the various types of constraints, we believe that the technological constraint occupies a key role, since technical poverty can cause other constraints to mount up in intensity also.

The main reason for the technical poverty of farmers is the lack of farming education and training through formal institutions or experience from the environment in which they live.

There has been a good many observations on the general educational system of Pakistan. It is said to be of extremely poor quality, wasteful and not fulfilling the new realities of a sovereign state.

The quality of education is poor because of the low quality of teachers, lack of teacher training, defective teaching methods, poor library and other facilities, etc. The system is wasteful because there is a large proportion of students who 'drop out' at the primary and higher levels, and the products of the education industry are unable to acquire those qualities and skills which they are supposed to get.

We quote Muzum Haider who recorded the impressions of farmers about their educated children in some of the villages of
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Utter Pradesh, India

'Edocted boys - well, they are of no use to me in the field' says Bhim Singh, referring to his own sons. 'But when I go into a government office no one will even look at me or pay any attention, to that I have to say. If I take my sons with me, however, the work gets done in no time. They are useful there. That is why we are educating them even though we have to incur debts to do so'. Ten boys from this village are studying 'Englis', as they put it. No one of them has gone back to work on the land, and even after they have completed their studies they expect to be maintained at some standard they become accustomed to as students. Bandon Singh for example, who failed in the tenth class this year and is doing no work at present went to his father recently with a big stick and threatened to beat him unless the latter gave him 70 rupees to make a cont. ₹ 48, pp. 74-75.

The products of the education industry in Pakistan are almost the same as in India. The fitness of the educated young men to live and engage themselves in productive work in their immediate environment is very poor due to the weak and poor education that they receive.

We want to raise still an additional point about the meaninglessness of the whole educational effort. To elaborate, we want to point out that whereas the bulk of the population (70-80%) lives in the rural areas and engages itself in the main occupation of farming, school education at the primary and secondary level does not impart any specific knowledge and training in the field of agriculture. This has always been the case in the Undivided India as well as in Pakistan. The neglect is extremely serious when we realise that most of the children from the rural areas seldom receive education beyond the secondary level of schooling,
and those who find the opportunity/privilege to receive college and other higher education rarely return to the village life.

We suggest that the 'farming education' and 'practical training' should be incorporated as a compulsory subject in the curriculum of all the schools of rural and semi-rural areas. Primary and secondary school facilities already exist and the introduction of such education will only require teacher training and well written textbook for all levels. As a direct consequence, the farming education and training will improve farmers' ability to understand and exploit given economic opportunities, and extend the opportunity space. One of the indirect benefits will emerge from the fact that the farming education and training at the school level will strengthen the basis for the diffusion of agricultural knowledge, know-how and skills which some other government programmes are trying to provide through extension service, radio and other media.

Extending this theme, one can find that in most of the underdeveloped countries, among other deficiencies of the educational effort, the investment component of education as opposed to the consumption component is almost non-existing. To help economic development, it is essential that the investment component of education which raises economic productivity, should be enhanced.

The Pakistan approach to increase the investment component of education has been to open a few polytechnics, patronize a few technical institutions, and expand agricultural education at the
college level and recommend agriculture as an optional subject in a couple of schools for the ninth and tenth classes. We feel that the educational effort in this particular direction has been inadequate and deceptive. A much more imaginative approach with a manifold increase in the resource effort is overdue. A good beginning can be made by making farming education and training compulsory for those students who will live and work in the agricultural sector. In this way a sense of direction and purpose can be given to the educational effort and the process of agricultural development can be strengthened.

We also suggest that the resource expenditure on farming education, training and research at all levels should be treated and evaluated (on the basis of benefit-cost analysis) like other development programmes in the sector, because after all, it is an input like other inputs.

Let us hope that the new Educational Policy will bring about the necessary changes.

v) The Need for a Concerted Effort at Resource Mobilization

One of the main reasons given for not doing too much in the agricultural sector is that resources available for development effort are not enough.

We note that whereas a large number of programmes, i.e., irrigation, subsidised fertilizers, plant protection, extension services, etc., have been undertaken during the last 15 years or
so, no equal effort is made to tax those farmers who have
benefited most from them.

For future, it is suggested that only those projects be
undertaken which benefit somebody in the agricultural sector and the
agricultural taxation system should be revised in such a way as to
put the burden of taxes on those who benefit from the development
effort. In this way the resources available for agricultural and
non-agricultural development can be increased substantially.

vi) The Need for attending to the Small Farmers on an
Equal Basis

Due to miscellaneous reasons, the government initiated
programmes (i.e., irrigation, subsidized fertilizers, plant
protection, credit, extension services) have tended to benefit (or
reach) to the farmers with relatively large holdings, and hence
the programmes are not oriented to serve the needs of the smaller
farmers at an equal basis.

Apart from social justice considerations to which Pakistan
is committed, the development effort should be directed to those
farmers who can make an efficient use of the government sponsored
programmes and facilities. If the small farmer due to his lack
of touch with the cities and government, and because of his
status, is unable to get water, credit, fertilizers, seeds, etc.,
though he can make an equally or even better use, the pace of
economic development will be adversely affected.
The government and other public agencies should consciously make an effort to provide facilities especially credit, water and fertilizers to the small farmers if they make an efficient use of them.

vii) The Need for a Recognition of the Value of Scientific Knowledge and Productive Workers

In Pakistan, like most under-developed countries, the respect for and the recognition of scientific knowledge and productive workers is very low. The politician in command and the government servants run the show putting the value of using knowledge and productive workers to a secondary place. This is what most of the under-developed countries have inherited from their feudal/colonialistic past.

The realities of the times ahead demand that rewards in terms of resources, status and recognition must be based on merits of the individual.

It is frustrating to note that research workers, field workers and other productive staff engaged in agriculture is given low salaries and poor recognition. It is very essential that the persons engaged in agricultural education, research and field work must be properly paid, recognised and consulted when the development programmes are being designed. Efforts should be made to raise the quality of the productive workers and their participation in the development effort.
In general, the attitude of the government and society needs to be changed in favour of those who contribute most towards economic development.

viii) The Need for More Research

Our study could concentrate only on the constraint of subsistence farming and its effects on farmers' actual performance in the context of the area allocation among competing crops. The reason for this narrow-based study has been the poor data availability.

We suggest that as data improves, more empirical studies should be conducted. Research should extend to other constraints and opportunity sets both at the time series and cross-section level. Such studies will contribute a lot to the understanding of the actual performance of farmers in various situations.
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