The Training and Visit Extension System

An Analysis of Operations and Effects

Gershon Feder
Roger H. Slade
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WORLD BANK STAFF WORKING PAPERS
Number 719

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The World Bank
Washington, D.C., U.S.A.
ABSTRACT

The paper analyzes several aspects of the operation and effects of the T&V extension system. Specific questions related to the supply of, and demand for, extension agents (VEW) visits, the presence or absence of farm size bias in VEW visits, seasonal and longer-term variations in the pattern of VEW visits, the relative importance of the VEW as a source of information to farmers, and the crop yields obtained by farmers in relation to their main sources of agricultural advice are addressed in detail.

The analysis is based on extensive empirical evidence from India. In particular, data collected and reported by several state government monitoring and evaluation units are used in conjunction with data collected during a detailed case study of T&V extension conducted by the World Bank in collaboration with the Haryana Agricultural University at Hisar.

The paper draws the following main conclusions. Most (85%) contact farmers are visited regularly, and the majority of noncontact farmers also have some interaction with VEWs, suggesting that the supply of extension services is adequate. Although a statistically significant bias in favor of larger farmers is detected in the pattern of VEW visits, the absolute size of this bias is very small. VEWs appear to be more active in the dry season than in the rainy season, which may be attributable to the past tendency of the research system to concentrate on irrigated crop technology. As experience with the T&V system increases, contact farmers appear to receive fewer visits from VEWs, but visits to noncontact farmers increase. Overall there is an increase in the absolute number of farmers receiving visits from extension agents. VEWs play a more important role as disseminators of information in areas operating the T&V system than in areas relying on the older community development system of extension. The role of the VEW also increases in importance the more expensive or costly the recommended cropping practice. Finally, crop yields of farms that rely on the VEW as the main source of information are higher than of farms that rely mainly on other sources of information. The yields in farms that depend on other sources do not appear to differ greatly from one another, but information from any source, in terms of crop yields, appears to be better than none.
Le présent document analyse plusieurs aspects du fonctionnement et des effets du système de vulgarisation basé sur la méthode de formation et de visites. Il examine en détail les questions spécifiques concernant l'offre et la demande de visites d'agents de vulgarisation, la présence ou l'absence, au cours de ces visites, de distorsions fondées sur la taille de l'exploitation, les fluctuations saisonnières et à long terme et la structure des visites, l'importance relative de ces dernières en tant que source de renseignements pour les exploitants, ainsi que les rendements de cultures obtenus par les exploitants par rapport à leurs principales sources de conseils agricoles.

L'analyse se fonde sur l'examen d'un grand nombre d'exemples empiriques pris en Inde. En particulier, les renseignements rassemblés et publiés par plusieurs organismes publics de suivi et d'évaluation sont utilisés en conjonction avec des données réunies au cours d'une étude de cas détaillée portant sur la vulgarisation par la méthode de la formation et des visites, et réalisée par la Banque mondiale en collaboration avec l'Université agricole d'Haryana, à Hissar.

Le document présente plusieurs conclusions dont voici les principales. La plupart des agriculteurs de contact (85 %) reçoivent des visites régulières et la majorité des autres agriculteurs sont également en rapport avec les agents de vulgarisation effectuant les visites, ce qui tend à suggérer que l'offre de services de vulgarisation est adéquate. Bien que les statistiques fassent apparaître dans la structure des visites une distorsion marquée en faveur des gros exploitants, cette distorsion est minime. Il semble que les agents de vulgarisation effectuant les visites soient plus actifs au cours de la saison sèche qu'au cours de la saison des pluies, en raison peut-être de la tendance qu'avait dans le passé le système de recherche à se concentrer sur la technologie des cultures irriguées. A mesure qu'augmentent l'application du système de formation et de visites et l'expérience acquise, il semble que le nombre des visites aux agriculteurs de contact diminue, alors que les visites aux autres agriculteurs deviennent plus nombreuses. Dans l'ensemble, on note un accroissement du nombre absolu d'agriculteurs recevant des visites d'agents de vulgarisation. Ces derniers jouent un rôle plus important dans la diffusion de renseignements dans les zones où a été mis en place le système de formation et de visites que dans celles où le système de vulgarisation plus ancien, axé sur le développement communautaire, est utilisé. L'importance du rôle des agents de vulgarisation effectuant les visites augmente aussi en proportion du coût et de l'ampleur des pratiques culturales recommandées. Enfin, le rendement des cultures est plus élevé sur les exploitations qui s'en remettent, comme principale source d'information, aux conseils prodigués par les agents de vulgarisation au cours des visite que sur les exploitations qui comptent surtout sur d'autres sources de renseignements. Pour ces dernières, le rendement ne paraît pas fluctuer de façon sensible d'une exploitation à l'autre, mais il semble que, en termes de rendement des cultures, une information, quelle qu'en soit la source, vaut mieux que l'absence totale de renseignements.
EXTRACTO

En este documento se analizan varios aspectos del funcionamiento y efectos del sistema de extensión agrícola mediante capacitación y visitas. En él se abordan en forma detallada cuestiones específicas relativas a la oferta y demanda de visitas de los agentes de extensión, a la existencia o ausencia de un sesgo relacionado con el tamaño de las explotaciones agrícolas en las visitas de los agentes, a las variaciones estacionales y a más largo plazo en la modalidad de las visitas, a la importancia relativa de los agentes como fuentes de información para los agricultores y a los rendimientos agrícolas obtenidos por los mismos en relación con sus principales fuentes de asesoramiento.

El análisis se basa en abundantes datos empíricos provenientes de la India. En particular, los datos recopilados y transmitidos por las unidades de seguimiento y evaluación de varios gobiernos estatales se han usado juntamente con la información recogida durante un minucioso estudio práctico de servicios de extensión mediante capacitación y visitas llevado a cabo por el Banco Mundial en colaboración con la Haryana Agricultural University, en Hissar.

En el documento se llega a las siguientes conclusiones principales. Casi todos (85%) los agricultores de enlace son visitados regularmente, y la mayoría de los demás también tienen cierto contacto con los agentes de extensión, lo que indica que la oferta de servicios de extensión es suficiente. Aunque en las visitas de los agentes de extensión se observa un sesgo estadísticamente significativo en favor de los agricultores más grandes, la magnitud absoluta de ese sesgo es muy pequeña. Los agentes de extensión parecen ser más activos en la estación seca que en la lluviosa, lo que puede atribuirse a la tendencia anterior del sistema a concentrarse en la tecnología de la agricultura de regadío. A medida que aumenta la experiencia con el sistema de capacitación y visitas, al parecer los agricultores de enlace reciben menos visitas de los agentes de extensión, en tanto que aumentan las visitas a los demás. En general, hay un incremento en el número absoluto de agricultores que reciben visitas de los agentes, los que desempeñan una función más importante en la difusión de información en las zonas con servicios de capacitación y visitas que en las que dependen del sistema de extensión más antiguo del desarrollo comunitario. Además, la función de los agentes es más importante cuanto más costosa o riesgosa es la práctica de cultivo recomendada. Por último, los rendimientos en las granjas cuya principal fuente de asesoramiento son los agentes de extensión son mayores que los de las que dependen principalmente de otras fuentes de información. Los rendimientos de estas últimas no parecen variar mucho de una a otra, pero, en términos de dichos rendimientos, es evidente que el disponer de algún tipo de asesoramiento es más eficaz que el no disponer de ninguno.
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I. INTRODUCTION

Agricultural extension has long been the handmaiden of agricultural research and usually a poor one. To some extent this has been due to the lack of conviction regarding the ability of extension to bring about the sharp increases in agricultural productivity heralded by the growing quantity of new or modified technology emerging from agricultural research institutions. Accordingly, increasing attention has been given, in recent years, to ways of improving the management and efficiency of extension systems. One result has been the emergence of the Training and Visit (T&V) Extension System which was originally tested in Turkey in the late sixties. This system which is comprehensively described in Benor and Baxter (1984) is being introduced in a number of developing countries often with the assistance of the World Bank. 1/ It has been most widely adopted, since 1977, in India where it has progressively replaced the prevailing system of multipurpose village level workers.

Our purpose in this paper is to analyze several aspects of the operation of the T&V extension system and some of the resulting effects. In the next section we delineate a number of questions worthy of study. In particular, we discuss three related matters: (i) the supply of, and demand for, extension services, (ii) the role of extension agents relative to other sources of agricultural information, and (iii) farm productivity in
relation to sources of information. The subsequent three sections of the paper address these issues in order and in some detail, drawing on a rich data base provided by Monitoring and Evaluation reports on the implementation of T&V extension issued by several states in India and a study undertaken by two of the authors in conjunction with the Haryana Agricultural University at Hisar, India. Finally, in section six we summarize our principal conclusions.

II. THE FOCUS OF THE PAPER

The early literature on T&V extension (von Blanckenburg et al. 1980; von Blanckenburg 1982; Cernea 1981; Cernea et al. 1983; Howell 1982a, 1982b; Jaiswal 1983; Moore 1984, Shingi et al., 1982; Singh 1983) has been mainly qualitative in nature and more often than not, a review of first experiences. Hence, there are several issues worthy of further study and we have chosen three.

First is the supply of and demand for extension services as measured by the frequency of VEW visits. Specific questions are:

(a) Is the supply of extension services close to its potential? Is demand as high as supply?

(b) Is there a difference in the extension agents’ interaction with farmers belonging to different farm-size categories?

(c) Is there a difference in the pattern of visits between the two major cropping seasons, namely, kharif, (rainy season) and rabi (dry season)?

(d) How does the pattern of interaction change as the new form of extension becomes more established?

Regarding the questions in (a), we presume that when the T&V system functions properly, there should be a high supply of extension services since
the system allows inter alia for effective supervision. Technically, we define "high supply" as being close to the designed frequency of agents' interaction with contact farmers. Demand, as measured by extension agent interaction with non-contact farmers, is bound to be lower than the observed level of interaction with contact farmers, since such farmers are less aware of the availability of extension services. Demand should, however, be higher in areas with T&V extension than in non-T&V areas. This is due to the fact that the cost to the farmer of information search and acquisition will be lower in an area of intensive extension coverage because agents are more numerous (Feder and Slade, 1984b). There may, however, be a demand-reducing effect because non-contact farmers under the T&V system are supposed to obtain information passed on from contact farmers and this could weaken their motivation to meet with the VEW (i.e., lower their apparent demand for extension services). In areas without T&V extension however, there are no formally designated contact farmers and hence this demand reducing tendency may not exist.

In examining question (b), evidence suggests that extension agents are traditionally biased towards the more wealthy and influential farmers (see for example, Howell 1982a; p. 10). The factors and motivations generating such a bias in the supply of extension services could still be present under the reformed extension system. On the demand side, the economics of information-acquisition suggest that demand by smaller farmers will be less than that by larger farmers (Feder and Slade 1984b).

Concerning (c) above, it is expected that the VEW will play a more significant role in the dry season (i.e., rabi) if there are a significant
number of farmers with access to irrigation. This is because agricultural research in countries like India has traditionally been directed towards improving technology for irrigated rather than rainfed crops. Hence, for irrigated crops there is a greater quantum of proven technology available for delivery to farmers by the extension service. However, as we hypothesize below, the greater riskiness of rainfed agriculture could serve to increase the demand for accurate and proven information during the wet (kharif) season.

In relation to question (d), it is conceivable that as initial enthusiasm and institutional support diminish, various aspects of extension operations, such as visits to farmers, slacken. On the demand side, any favorable experience with extension advice and increased awareness of extension availability will tend to increase farmers' interaction with extension, while disappointment with recommended practices may result in diminished demand.

These four questions are explored further in Part III below.

The second set of questions concerns the VEW as an information source in relation to other sources of information (e.g., other farmers, radio, etc.) and the extent to which the VEW is a preferred source for more expensive or complex agricultural practices. Specifically, we ask the following questions.

(e) How important is the extension agent as a source of information in relation to other sources in areas covered by T&V extension? How does this compare with the role of an extension agent in a non-T&V extension system?

(f) What is the nature of the interaction between extension agents and other sources of information?
(g) Is the T&V agent more important than other (non-personal and non-specialized) sources of information the more expensive/riskier an agricultural practices become?

Concerning (e), we expect the VEW, if the training and upgrading of staff skills called for under the T&V system are effective, to be the most important source of information, since he is a personalized and specialized means of information transmission to farmers while also being more readily available due to the schedule of frequent visits. We also hypothesize that the importance of the agent under the T&V system outweighs that of an extension agent in a non-T&V setting, because of superior training, more frequent availability and higher visibility.

In considering issue (f), our approach is exploratory. We attempt to examine other information sources as either complements to or substitutes for personalized extension. For example, Orivel (in Perraton et al, 1983, p. 31) quoting another study related to India (Shore, 1980) states that although radio was the medium most equitably distributed, its use had no impact on the introduction of agricultural innovations. He suggests that it could, however, be complementary and if used as a means of transmitting information to VEWs it might also reduce training costs.

Finally, regarding question (g), the expected answer is positive, since the value of specific and accurate information should increase for riskier, more expensive, or complicated practices. Hence, risk, cost and complexity should increase the importance of the VEW, as he is a specialized and personal information source, with access to subject matter specialists in case of doubt or to assist him to answer additional enquiries from farmers.
The three questions reviewed above are explored further in Part IV below. Our third and final set of questions relates to farm productivity. Specifically:

(h) Are yields higher for farmers who report the extension agent to be their main source of information? Does this hold for irrigated as well as non-irrigated farms?

If extension is delivering a flow of proven and acceptable technology then the adoption of that technology is likely to be greatest amongst those farmers who depend most heavily on extension for information. Hence there should be a discernible and positive effect on crop yields for such farmers. Following the arguments above, we also expect this effect to be greater in irrigated than in rainfed farms. Moreover, we hypothesize that this will hold even if the information provided by extension in rainfed and irrigated areas had equal expected value as the inherent riskiness of rainfed agriculture is greater than that of irrigated agriculture. This question is explored further in Part V.

The data for our analysis pertain to India and are drawn from two main sources: primary data collected by the Haryana Agricultural University (HAU) in a case study in North India, sponsored and supervised by the World Bank between 1981 and 1983, and the Monitoring and Evaluation (M&E) reports produced by twelve of the thirteen states in India where T&V has been progressively instituted since 1977. Wherever relevant we indicate which source we have used.
III. SUPPLY OF AND DEMAND FOR EXTENSION AGENT VISITS

The interactions of the VEW with contact farmers can be viewed as a system determined "supply" of extension services. "Supply" is a relevant concept because the T&V system requires the VEW to provide these services to contact farmers regularly. Contact farmers, in turn, are expected to disseminate this information to non-contact farmers. Thus for non-contact farmers, the interactions between farmers and extension agents are likely to be "demand" determined -- i.e., non-contact farmer meetings with the extension agent may reflect the farmer "demanding" the information, since it is not a system imperative that the VEW visit regularly farmers other than contact farmers. The VEW is expected, however, to accommodate requests for information from all farmers. It is also expected that non-contact farmers will occasionally attend meetings between the VEW and contact farmers.

For the purpose of examining the broad differences in the quantum of visits by the extension agent to contact and non-contact farmers, data from M&E reports from seven states in India over a number of years are summarized in Table 1. These reports have been produced more-or-less regularly by the states where T&V has been instituted. The data are comparable across states because all M&E units use the same sampling design, definitions and questionnaire (for details, see Slade and Feder, 1981). The reference period for visit frequencies as reported in the Table is one month, but it is possible that non-contact farmers, since they do not receive regular visits, had a longer time horizon in mind, thus generating an exaggerated per mensem visit frequency.
The critical indicator is the percentage of farmers who report not seeing extension agents. For contact farmers, this ranges from 1.2 to 34.7 percent, while for non-contact farmers, it ranges from 21.6 to 59.2 percent. Across all seven states the average percentage of 'no-visits' reported by contact farmers is 15.4 percent (i.e., about 85 percent of contact farmers were visited at least once in the reference month), while 34.5% of the non-contact farmers reported no interaction with extension (see Table 2). The demand for T&V extension services as measured by non-contact farmers interaction with extension agents thus appears significant. Considering that some share of 'no-visits' must be due to factors such as agent illness, vacant posts, contact farmer non-availability, etc. (factors that Feder and Slade, 1984a, p.15, refer to as "normal friction") the actual supply of T&V extension services seems adequate relative to the potential supply.
### Table 1: FREQUENCY OF VIEW VISITS AND FARM SIZE

| States/Seasons and Groups | Monitoring or Evaluation | Small Farms | Large Farms | Small Farms | Large Farms | Small Farms | Large Farms | Small Farms | Large Farms | Small Farms | Large Farms | Small Farms | Large Farms | Small Farms | Large Farms | Small Farms | Large Farms | Small Farms | Large Farms | Small Farms | Large Farms | Small Farms | Large Farms | Small Farms | Large Farms | Small Farms | Large Farms | Small Farms | Large Farms | Small Farms | Large Farms | Small Farms | Large Farms | Small Farms | Large Farms |
|--------------------------|--------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Karnataka                | Kharif 1981-82            | N           | 251         | 202         | 232         | 219         | 64          | 64          | 2024        | 1143        | 86          | 159         | 1499        | 1133        | 307         | 235         | 1280        | 988         | 69          | 168         | 1157        | 944         | 503         | 328         | 298         | 237         | 527         | 308         | 208         | 184         | 498         | 337         | 394         | 332         |
| Haryana                  | 1981-82                  | M           | 17.1        | 13.9        | 16.4        | 10.0        | 7.8         | 8.5         | 15.4        | 12.3        | 17.4        | 11.4        | 10.1        | 10.9        | 13.0        | 8.9         | 13.0        | 14.0        | 8.6         | 12.0        | 20.1        | 20.8        | 23.9        | 14.6        | 8.6         | 12.0        | 20.1        | 19.3        | 24.3        | 20.1        | 20.1        | 23.2        | 24.1        | 15.9        | 20.3        | 17.9        |
| Summer 1982              |                         |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |
| Tamilnadu                | Summer 1982              | M           | 16.0        | 12.9        | 17.3        | 10.5        | 7.8         | 8.5         | 16.0        | 13.9        | 17.4        | 11.4        | 10.1        | 10.9        | 13.0        | 8.9         | 13.0        | 14.0        | 8.6         | 12.0        | 20.1        | 20.8        | 23.9        | 14.6        | 8.6         | 12.0        | 20.1        | 19.3        | 24.3        | 20.1        | 20.1        | 23.2        | 24.1        | 15.9        | 20.3        | 17.9        | 21.0        | 19.9        |

* Significant at 5 percent probability level
n.a. - not available

Small farms were defined as less than 5.1 hectares in Maryana and Gujarat, 4.1 hectares in Tamil nadu and Karnataka, 3.1 in Madhya Pradesh and Bihar and 2.1 hectares in Assam.
Table 2: FREQUENCY OF VEW VISITS TO CONTACT AND NON-CONTACT FARMERS:
ALL STATES AND ALL CROPPING SEASONS /a

<table>
<thead>
<tr>
<th>Contact Farmers</th>
<th>Non-contact Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Visits</td>
<td>One or More Visits</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>15.39</td>
<td>84.61</td>
</tr>
<tr>
<td>(3,321) /b</td>
<td>(18,219)</td>
</tr>
</tbody>
</table>

/ a During the four weeks preceding the interview for contact farmers. For non-contact farmers the reference period may be longer.
/b Figures in parentheses indicate sample sizes.

Source: Monitoring and evaluation reports of State Governments in India.

As expected, the demand for extension services (measured by agent's interaction with non-contact farmers) is significantly lower than the supply (measured by agent visits to contact farmers). But the actual supply available to non-contact farmers must be less than that which is available to contact farmers, thus there is not necessarily a significant level of unused capacity. Further, the demand for extension services in a T&V area is far higher than the demand in a non-T&V area — data for a section of Muzaffarnagar district in the State of Uttar Pradesh, which is not covered by the T&V system, show that between 89 and 97 percent of the farmers were not visited by (or did not seek out) the extension agent during the reference period (Feder and Slade, 1984c, p. 16). Because a distinction cannot be drawn between contact and non-contact farmers in non-T&V areas, this could be the result of either low demand or low supply. It is known however that the extension agent/farmer ratio is lower in non-T&V areas than in areas with T&V and that in the former areas agents have many duties other than extension.
Hence it is possible that in areas without T&V extension the low supply of extension increases the cost to the farmer of acquiring information from extension and thereby reduces the amount of interaction between farmers and extension agents.

As a partial check on the accuracy of the data from the M&E reports we compared the M&E results with those from the HAU/World Bank study. Specifically, we compared the incidence of 'no-visits' to large and small, contact and non-contact farmers, in the whole of Haryana (all 12 districts) with those from the HAU/World Bank study in Jind and Karnal districts of Haryana for Rabi 81-82, the only season for which comparable data are available. The M&E reports indicate (see Table 1) that 17 percent of small contact farmers and 16 percent of large contact farmers are not visited, while the HAU/World Bank data (see Feder and Slade, 1984c, p. 16) show 17 and 14 percent, respectively. For non-contact farmers, the M&E figures are 49 percent for small farmers and 46 percent for large farmers, while the HAU/World Bank figures are 69 and 52 percent, respectively. These are comparable results although in the HAU/World Bank study area it seems that small non-contact farmers are visited significantly less frequently than their counterparts elsewhere. In addition, the definition of the reference period was quite strict in the HAU/Bank study, while it may have been less so in M&E reports.

Table 3 summarizes data on visits and 'non-visits' by farm size. Prima facie, there is remarkable similarity between large and small farms amongst both contact and non-contact farmers. Amongst contact farmers, 15.9 percent of the small farms and 14.5 percent of the large farms are not
visited, a difference of 1.4 percent. Similarly, for non-contact farmers, the difference is only 3.2 percent. While these differences are statistically significant at the 99 percent level (see Table 3), their size indicates that the bias in favor of large farmers is not great enough to warrant serious concern. Moreover, since non-contact farmers' interactions with extension agents are probably demand-driven, the difference between large and small farmers may merely indicate, as predicted by theory (Feder and Slade 1984b), the tendency of larger farmers to invest more in information gathering.

Table 3: FARM SIZE AND VIEW VISITS TO CONTACT AND NON-CONTACT FARMERS: ALL STATES AND ALL SEASONS

<table>
<thead>
<tr>
<th></th>
<th>Contact Farmers</th>
<th>Non-contact Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Visits</td>
<td>One or More Visits</td>
</tr>
<tr>
<td>Small</td>
<td>15.91</td>
<td>84.09</td>
</tr>
<tr>
<td></td>
<td>(2,098)</td>
<td>(11,000)</td>
</tr>
<tr>
<td>Large</td>
<td>14.49</td>
<td>85.51</td>
</tr>
<tr>
<td></td>
<td>(1,223)</td>
<td>(7,218)</td>
</tr>
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/a See footnote /a in Table 2.
/b See footnote /a in Table 1.
/c Figures in parentheses indicate sample sizes.

Tests of Significance for 'No-visits' (Large vs Small Farmers)

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<th>&quot;t&quot; Value</th>
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<tr>
<td>Contact Farmers</td>
<td>2.823</td>
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</table>
| Non-contact Farmers | 3.535     | Both significant at 99 percent

Source: Monitoring and evaluation reports of State Governments in India.
Further corroboration of the lack of substantial farm size related discrimination is provided by Feder and Slade (1984c). Using Logit analysis, they examined factors that explain the probability that a contact farmer will be visited by an extension agent. Amongst others "area of land owned" was entered as an independent variable and was found to be a positive though not significant explanator of the probability that a contact farmer would be visited.

Earlier, we hypothesized that visit frequencies would be greater in the dry (rabi) season compared to the kharif. Data for both contact and non-contact farmers (Table 4) indicate that the incidence of no-visits during the rabi season is significantly lower than in the kharif, although the absolute difference is small. This result is consistent with an analysis conducted by Feder and Slade (1984c, pp. 30-32), which shows that knowledge diffusion rates tend to be higher for dry season crops than for rainy season crops. These findings support the hypothesis that the extension agent plays a greater role in the dry season although the cause may be more closely associated with the available technology and the riskiness of rainfed agriculture than the efficiency of the extension system. Another explanation may be that the rainy season reduces the mobility of extension agents.
Table 4: CROPPING SEASON AND VISITS OF VEW TO CONTACT AND NON-CONTACT FARMERS: ALL STATES /a

<table>
<thead>
<tr>
<th></th>
<th>Rabi (dry season)</th>
<th>Kharif (rainy season)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent</td>
<td>Percent</td>
</tr>
<tr>
<td>No visits</td>
<td>14.45</td>
<td>16.25</td>
</tr>
<tr>
<td></td>
<td>(1,922) /b</td>
<td>(1,799)</td>
</tr>
<tr>
<td>One or more visits</td>
<td>85.55</td>
<td>83.75</td>
</tr>
<tr>
<td></td>
<td>(9,038)</td>
<td>(9,231)</td>
</tr>
<tr>
<td>No visits</td>
<td>32.60</td>
<td>36.00</td>
</tr>
<tr>
<td></td>
<td>(2,854)</td>
<td>(2,414)</td>
</tr>
<tr>
<td>One or more visits</td>
<td>67.40</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>(3,836)</td>
<td>(4,290)</td>
</tr>
</tbody>
</table>

/a See footnote /a in Table 2.
/b Figures in parentheses indicate sample size.

Tests of significance for 'no-visits' (Kharif vs Rabi)

<table>
<thead>
<tr>
<th></th>
<th>&quot;t&quot; values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact farmers:</td>
<td>1.44 (significant at 90 percent)</td>
</tr>
<tr>
<td>Non-contact farmers:</td>
<td>2.31 (significant at 99 percent)</td>
</tr>
</tbody>
</table>

Source: Monitoring and evaluation reports of State Governments in India.

We next examine the trend in extension visits as experience with the T&V system increases. The results, summarized in Table 5 and Figure 1, form a mixed picture. The proportion of contact farmers not visited goes up significantly: amongst projects which are four or more years old nearly one in five contact farmers are not visited. This may, in part, be due to the VEW replacing those contact farmers who are deemed inadequate with other farmers without formally notifying the original contact farmers of the change. On the other hand, the proportion of non-contact farmers not visited declines equally significantly, from about 48 to 36 percent. This may be due
to the fact that as projects mature, knowledge about the availability of regular extension visits spreads and more non-contact farmers take advantage of the service. As mentioned earlier, in the T&V extension system the VEW is expected to respond to all farmers who approach him with queries (Benor and Baxter, 1984). Remembering that contact farmers form only about 10 percent of the farming community, the most important finding is that the proportion of farmers visited is the greater, the older is the project.
Figure 1

PROJECT LIFE AND FARMERS NOT VISITED BY VEW
Table 5: PROJECT LIFE, FARM SIZE AND VEW VISITS: /a ALL SEASONS AND ALL STATES /b

<table>
<thead>
<tr>
<th>Project Life</th>
<th>Visits</th>
<th>Small Farms /c</th>
<th>Large Farms</th>
<th>All Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent</td>
<td>Sample Size</td>
<td>Percent</td>
<td>Sample Size</td>
</tr>
<tr>
<td>Contact</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 1 year</td>
<td>0</td>
<td>5.01</td>
<td>96</td>
<td>7.50</td>
</tr>
<tr>
<td></td>
<td>≥ 1</td>
<td>94.99</td>
<td>1,819</td>
<td>92.50</td>
</tr>
<tr>
<td>Non-contact</td>
<td>0</td>
<td>48.65</td>
<td>162</td>
<td>45.65</td>
</tr>
<tr>
<td></td>
<td>≥ 1</td>
<td>51.35</td>
<td>171</td>
<td>54.35</td>
</tr>
<tr>
<td>Contact</td>
<td>0</td>
<td>17.13</td>
<td>830</td>
<td>13.93</td>
</tr>
<tr>
<td></td>
<td>≥ 1</td>
<td>82.87</td>
<td>4,016</td>
<td>86.07</td>
</tr>
<tr>
<td>2 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-contact</td>
<td>0</td>
<td>32.34</td>
<td>607</td>
<td>36.27</td>
</tr>
<tr>
<td></td>
<td>≥ 1</td>
<td>67.66</td>
<td>1,270</td>
<td>63.73</td>
</tr>
<tr>
<td>Contact</td>
<td>0</td>
<td>14.26</td>
<td>592</td>
<td>14.06</td>
</tr>
<tr>
<td></td>
<td>≥ 1</td>
<td>85.74</td>
<td>3,560</td>
<td>85.94</td>
</tr>
<tr>
<td>3 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-contact</td>
<td>0</td>
<td>28.08</td>
<td>980</td>
<td>26.75</td>
</tr>
<tr>
<td></td>
<td>≥ 1</td>
<td>71.92</td>
<td>2,510</td>
<td>73.25</td>
</tr>
<tr>
<td>Contact</td>
<td>0</td>
<td>22.18</td>
<td>344</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>≥ 1</td>
<td>77.82</td>
<td>1,207</td>
<td>85.74</td>
</tr>
<tr>
<td>≥ 4 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-contact</td>
<td>0</td>
<td>38.83</td>
<td>783</td>
<td>28.14</td>
</tr>
<tr>
<td></td>
<td>≥ 1</td>
<td>61.17</td>
<td>1,233</td>
<td>71.86</td>
</tr>
</tbody>
</table>

/a See footnote /a in Table 2.
/b Excludes Bihar because of great diversity in project initiation dates for different districts. For all other states, the most predominant starting date (in terms of number of districts covered) has been chosen.
/c See footnote /a in Table 1.

Source: Monitoring and evaluation reports of State Governments in India.
IV. EXTENSION AGENTS IN RELATION TO OTHER SOURCES OF INFORMATION

It is reasonable to presume that farmers tend to prefer direct, specialized, personal and easily accessible sources of information, provided that they see such sources as being reliable and professional. Therefore, in areas with a large supply of professional extension agents we expect the role of extension as a means of information dissemination to increase. Thus, we pose the following questions (i) are T&V agents the most important information source in areas covered by T&V extension? and (ii) do extension agents play a more important role in such settings compared to those operating where a less intensive system of extension is present? We also wish to examine how the role of the extension agent changes in relation to other information sources as farmers gain increasing "access" to extension. Finally, we hypothesize that extension becomes more important to the farmer the riskier, the more complex or the more expensive an agricultural practice becomes.

We first examine how important the extension agent is as a source of information, in T&V and non-T&V areas. Table 6 summarizes primary data from the RAU/World Bank study which was collected from geographically contiguous T&V and non-T&V areas in 1982.
### Table 6: RELATIVE IMPORTANCE OF SOURCES OF AGRICULTURAL INFORMATION

<table>
<thead>
<tr>
<th>Main Information Source</th>
<th>Karnal District (State of Haryana)</th>
<th>T&amp;V District</th>
<th>Muzaffarnagar District (State of Uttar-Pradesh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>Contact Farmers</td>
<td>Non-Contact Farmers</td>
<td>Small</td>
</tr>
<tr>
<td>(N=59)</td>
<td>(N=101)</td>
<td>(N=160)</td>
<td>(N=93)</td>
</tr>
<tr>
<td>Percent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extension Personnel</td>
<td>42</td>
<td>45</td>
<td>44</td>
</tr>
<tr>
<td>Demonstration Days</td>
<td>2</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Other Farmers</td>
<td>27</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>Radio</td>
<td>16</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>Sales Personnel</td>
<td>9</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Research Personnel</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Other /b</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>All</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

/a Larger farmers were defined as those owning ten or more acres.
/b Includes written materials, demonstrations, group meetings and miscellaneous.

**Source:** HAU/World Bank Study, 1982.

There is a dramatic difference between the two districts. In Karnal (a T&V district) 44 percent of the contact farmers and 13 percent of the non-contact farmers indicate that extension agents are the main source of information. In Muzaffarnagar (a non-T&V district) only 2 percent of the
farmers (all large farmers) are of the same opinion. For non-contact farmers in Karnal, and for all farmers in Muzaffarnagar, "other farmers" are the most important source of information, followed by the radio. "Other farmers" are an important source of information for contact farmers as well; slightly more so than radio. Sales personnel of firms marketing agricultural inputs also constitute a significant source of information for all farmers.

Since other farmers are the most frequently cited source of agricultural information, and given the impracticality of reaching all farmers directly by extension, it is logical to base an information dissemination strategy on the principle of a two-step flow, whereby some farmers initially get continuous and frequent extension visits. Through the natural process of information diffusion, these farmers may subsequently be expected to transmit this information to other farmers.

These data also reveal the relative shares of different information sources (see Figure 2). Ranking farmer categories by access to the T&V agent we see that the share of the VEW goes up from 2 to 44 percent with increasing access to T&V extension. It is then of interest to know which sources decline in importance. Among contact farmers, as the importance of the VEW increases, the importance of "other farmers" declines sharply. This is as expected, since contact farmers are in a position to obtain information first-hand rather than through intermediaries. Among non-contact farmers, however, "other farmers" continue to play a significant role, which is again as expected. This relationship between VEWs and "other farmers" as sources of information is consistent with the two-step communication flow characterizing the T&V system.
The share of radio remains more-or-less constant regardless of access to extension services. This is compatible with the hypothesis that radio is a source of information that complements the role of the VEW (as suggested by Orivel in Perraton et. al., 1983).

The lowest ranked sources of information are "sales personnel" and "demonstration days". The former seem to be an important source for farmers in non-T&V areas suggesting that they serve as a partial substitute for visits by extension agents. These five sources of information account for a little over 90 percent of the information needs of all classes of farmers.

To examine whether there may be differences related to farm-size, a similar analysis was conducted for large and small farmers separately. As can be seen from Figure 3, the results are almost exactly the same for both classes. There is a slightly higher preference among larger farmers for information from extension agents (irrespective of whether they were contact or non-contact farmers in T&V areas or farmers in non-T&V areas) but the differences are not statistically significant.
Figure 3

a) CUMULATIVE SHARE OF INFORMATION SOURCES - LARGE FARMERS

b) CUMULATIVE SHARE OF INFORMATION SOURCES - SMALL FARMERS
We also examine data on the T&V system drawn from seven states in India. These data are taken from the ME reports produced by the State Governments and record the main source of information, namely the "VFW", "other farmers", "other sources", and "no advice" for contact and non-contact farmers. We presume that the category "no advice" means "minimal advice" or the acquisition of information through observation or casual conversation.

From Table 7, we see that 80 percent of contact farmers and 54 percent of non-contact farmers claim extension agents to be their main source of information. Those who claim to take "no advice", comprise about 9 percent of contact farmers and nearly 19 percent of non-contact farmers. "Other farmers", are the main source of information for 20 percent of non-contact farmers, but less than 7 percent of contact farmers. These data support the finding that extension agents are the most important source of agricultural information in areas with T&V extension.

Table 7: Farmer’s Main Source of Information in States with the T&V Extension System

<table>
<thead>
<tr>
<th>Main Sources of Information</th>
<th>Contact Farmers</th>
<th>Non-contact Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>VFW</td>
<td>79.66</td>
<td>53.58</td>
</tr>
<tr>
<td>Other farmers</td>
<td>6.87</td>
<td>19.92</td>
</tr>
<tr>
<td>Other sources</td>
<td>4.66</td>
<td>7.81</td>
</tr>
<tr>
<td>No advice</td>
<td>8.81</td>
<td>18.69</td>
</tr>
</tbody>
</table>

| All | 100.00 | 100.00 |

Source: Monitoring and evaluation reports of State Governments in India.
In contrast, data from a study in a non-T&V setting on the socio-economic constraints to rainfed agriculture in Thailand (Hutanuwatr et. al., 1982) indicate that extension officers are the 4th ranked source of information -- the most important being "relatives and neighbors" (equivalent to our category of "other farmers") followed by radio programs and community leaders. The authors also report that "... more than half of the farmers sampled felt that extension officers could not help them solve any agricultural problems" (p. 25).

We next examine the question of whether extension agents become more important as information sources the more expensive or complicated a practice becomes, by calculating "information source ratios" for two increasingly expensive categories of agricultural practices. /7/ "Expensive" means the opportunity loss resulting from wrong application of the practice as well as the simple financial cost. The information source ratio is an indicator of the relative importance of two information sources: the VEW and "other farmers" (i.e., first-hand versus second-hand sources).

Relevant data are shown in Table 8. We note that in areas without T&V extension the VEW plays a very minor role in relation to both groups of practices -- the ratios for less expensive practices and more expensive practices are 0.04 and 0.09 respectively. In areas with T&V extension the comparable ratios for non-contact farmers are 0.27 and 0.47, while those for contact farmers are much higher at 3.98 and 5.14. Reflecting the more favorable "supply" conditions, the ratios become higher as access to extension increases.
Table 8: WEIGHTED AVERAGE INFORMATION SOURCE RATIOS FOR WHEAT PRACTICES

<table>
<thead>
<tr>
<th></th>
<th>Non-T&amp;V Farmers</th>
<th>T&amp;V Non-contact Farmers</th>
<th>T&amp;V Contact Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less Expensive</td>
<td>More Expensive</td>
<td>Less Expensive</td>
</tr>
<tr>
<td>Small</td>
<td>0.00</td>
<td>0.0</td>
<td>0.20</td>
</tr>
<tr>
<td>Large</td>
<td>0.07</td>
<td>0.16</td>
<td>0.36</td>
</tr>
<tr>
<td>All</td>
<td>0.04</td>
<td>0.09</td>
<td>0.27</td>
</tr>
</tbody>
</table>

The "Source Ratio" is the ratio of the number of times that a VEW is cited as the main source of information to the number of times that "other farmers" is cited.

"Expensiveness" refers to the opportunity loss resulting from the incorrect application of the agricultural practices as well as their cost, or complexity.

Less expensive (variety choice, seeding rate and spacing).

More expensive (use of phosphate, potash and zinc, seed treatment against termites, seed treatment against disease, timing of nitrogen application).


There is also a distinct pattern with respect to farm size -- the source ratios are consistently higher for larger farms. This may result from larger contact farmers having somewhat greater access to the VEW (see Table 3) and larger non-contact farmers investing more in information acquisition. Moreover the VEW is likely to be a more expensive source (in terms of time taken to locate and meet him) than "other farmers". In short, irrespective of farm size the data show that all classes of farmers prefer to receive advice about the more "expensive" practices from the VEW. Similar views are expressed by Howell (1984, pp. 174, 175).

We also examined evidence contained in a detailed report on a study of T&V extension operations in the Indian State of Madhya Pradesh conducted by the National Council for Applied Economic Research (NCAER, 1983). Data in the report (pp. 49-51) generally support the contention that V&EWs play
an important role as sources of knowledge about recommended practices for both contact and non-contact farmers. Further, the NCAER data suggest that the importance of the VEW rises as the riskiness or complexity of agricultural practices increases.

V. INFORMATION SOURCES AND FARM PRODUCTIVITY

The process by which extension influences crop yields involves a wide range of intervening variables. The effect is indirect and not easily measured. However, if extension efforts are successful, this success must eventually result in an increase in output per unit input and/or reduced costs per unit of product.

Since the contact point between the extension system and the farmer is the village extension worker, it is essential that the VEW, as a first-hand information source, be "better" than other second-hand or non-personal sources of information. It would be hard to justify the expense of an intensive agricultural extension system under any other circumstances. A testable hypothesis is therefore implied, namely, that farmers whose main information source is the extension agent will have higher productivity than those who rely on other information sources, ceteris paribus. Of course, there may be some systematic relationship between farmers who are more inclined to utilize extension as a main source of information and other inherent attributes (e.g. intelligence) which make them better farmers who obtain higher yields. Unfortunately, the data do not permit all other relevant attributes to be held constant and therefore the analysis below is suggestive rather than definitive.
Drawing again on the state H&Z reports in India, we use data on crop yields in the kharif and rabi seasons disaggregated by information source. For kharif, we use rice yields and for rabi, wheat, under both irrigated and unirrigated conditions.

State average yields were calculated by applying weights based on the sample sizes for irrigated and unirrigated farms and contact and non-contact farmers. The resulting overall average for each state was set equal to 100. Subsequently, each subset of yields was expressed as an index number relative to the overall state average. This conversion permits rice and wheat yields to be compared (since they differ in absolute magnitudes) and heavily damps differences in agro-climatic and socio-economic factors between states. The net result of this conversion is a series of index numbers that is comparable across states, crops and cropping seasons. A summary of the data for irrigated, unirrigated and all farms, disaggregated by main source of farmer information, is shown in Table 9.
Table 9: YIELD INDICES BY MAIN SOURCE OF INFORMATION

<table>
<thead>
<tr>
<th>Main Source of Information</th>
<th>VEW</th>
<th>Other Farmers</th>
<th>Other Sources</th>
<th>No Advice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigated</td>
<td>116.25</td>
<td>89.52</td>
<td>92.64</td>
<td>93.22</td>
</tr>
<tr>
<td>(13)</td>
<td>(13)</td>
<td>(13)</td>
<td>(13)</td>
<td></td>
</tr>
<tr>
<td>Unirrigated</td>
<td>114.75</td>
<td>101.90</td>
<td>103.29 /c</td>
<td>79.88</td>
</tr>
<tr>
<td>(13)</td>
<td>(13)</td>
<td>(13)</td>
<td>(13)</td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>114.50</td>
<td>99.08</td>
<td>95.77</td>
<td>86.11</td>
</tr>
<tr>
<td>(15)</td>
<td>(15)</td>
<td>(15)</td>
<td>(15)</td>
<td></td>
</tr>
</tbody>
</table>

/a The actual sample base in terms of numbers of farmers is more than 1,500; the sample sizes in the table refer to the number of average yield index figures and hence represent a mean of means.

/b Figures in parentheses indicate sample size. Sample sizes differ because, for two states, data disaggregated by irrigated and unirrigated farms were not available.

/c One state, in one cropping season, had an unduly high yield figure and the sample base was extremely low in relation to the rest and hence was insignificant in the computation of weighted average yields for "all" farms. However, in computing the average across unirrigated farms in all states, this number receives equal weighting. Hence this particular figure should be considered an overestimate.

Source: Monitoring and evaluation reports of State Governments in India.

Farmers whose main source of information is the VEW have the highest yield index of 114.5. This is followed by those whose source is "other farmers" and their yield index is close to the average. "Other" sources (e.g., radio, demonstration days, sales personnel, etc.) have a lower yield index of 95.77 and those farmers who receive "no advice", 86.11. Prima facie, it would appear that those using the VEW as the main source of information have yields that differ substantially from all other sources, but the difference between "other farmers" and "other sources" is much less marked.
All three, however, appear to be better compared to those farmers receiving "no advice".

We test these results more rigorously in a multiple regression framework (equivalent to an analysis of variance since all explanatory variables are categorical), suppressing the variable against which we test for significance. We specify the dependent variable (yield) in its logarithm as conventionally done in production analysis. The first set of results, for irrigated and unirrigated farms and all farms, are shown separately in Table 10. In these results we have controlled for "other sources", that is to say the coefficients of the remaining explanatory variables represent deviations from the effect of "other sources".

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Parameter Estimate (t-values in parentheses)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All (-)</td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.061 (-1.419)</td>
</tr>
<tr>
<td>VEW</td>
<td>0.190 (3.119)</td>
</tr>
<tr>
<td>Other Farmers</td>
<td>0.044 (0.721)</td>
</tr>
<tr>
<td>No Advice</td>
<td>-0.107 (-1.750)</td>
</tr>
</tbody>
</table>

| F²                   | 8.418 | 6.425 | 5.059 |
| R²                   | 0.266 | 0.2953 | 0.2402 |

All three regressions have significant F values (at > 99 percent levels), suggesting reasonable overall explanatory power. As surmised, yields for farmers receiving information from VEWs are significantly higher than those for farmers who depend on "other sources". There is significant
difference at the 99 percent level for all farms; for unirrigated farms the difference is significant at a little less than 90 percent and for irrigated farms at 95 percent. "Other farmers" do not constitute a source of information that has a productivity effect significantly different from "other sources" for all farms and unirrigated farms. Receiving "no advice" is significantly worse than receiving advice from "other sources" for all farmers and unirrigated farmers, but not significantly worse (though the direction of the relationship is negative) in the case of irrigated farms.

Table 11: YIELD INDEX AND INFORMATION SOURCES, CONTROLLING FOR "NO ADVICE"

<table>
<thead>
<tr>
<th>Dependent Variable: Log (YIELD INDEX)</th>
<th>Parameter Estimate ('t' values in parentheses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent Variable</td>
<td>All</td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.168 (-1.536)</td>
</tr>
<tr>
<td>VEW</td>
<td>0.297 (4.870)</td>
</tr>
<tr>
<td>Other Farmers</td>
<td>0.151 (2.471)</td>
</tr>
<tr>
<td>Other Sources</td>
<td>0.107 (1.750)</td>
</tr>
<tr>
<td>( F^2 )</td>
<td>8.418</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.3039</td>
</tr>
</tbody>
</table>

Similar results, when "no advice" is the control variable, are presented in Table 11. In this set of regressions the coefficients of the explanatory variables represent deviations from the productivity effect of "no advice". VEW advice is significantly better than "no advice" in all three cases. "Other farmers" and "other sources" come out significantly better than "no advice" for all farms and unirrigated farms, and better, but not significantly so for irrigated farms. 9/
VI. CONCLUSIONS

The foregoing analysis of an extensive set of aggregate and farm level data mostly pertaining to T&V extension operations in India permits the following conclusions to be drawn.

(a) Approximately 85 percent of contact farmers are visited at least once a month, suggesting that "supply" of extension services, taking normal "friction" into account, is reasonable. Amongst non-contact farmers 65 percent have interacted with extension workers at least once during the reference period, suggesting that demand is substantial.

(b) The data indicate that there is a statistically significant bias in favor of visits to large farmers; however, the absolute size of this bias is very small.

(c) T&V agents appear to be more active and in higher demand in the dry as opposed to the rainfed cropping season; this is probably explainable by the fact that research has traditionally emphasized dry-season cropping technology and this has resulted in more reliable advice in the rabi season.

(d) Visits to contact farmers decrease with the age of the project, while they increase for non-contact farmers. With lengthening project life, there is a sizeable increase in the absolute number of farmers meeting with extension agents.

(e) VEWs play a more important role in the dissemination of information in areas covered by T&V extension than they do in non-T&V settings; in both situations they are relatively more important to large farmers than to small.

(f) The VEW and radio are probably complementary information sources.

(g) "Other farmers" qua information sources appear to play a role consistent with a two-step communication flow. In a non-T&V setting they are the most important information source. In areas covered by T&V extension they are the major information source for non-contact farmers and a relatively minor one for contact farmers. These results hold for both large and small farmers.

(h) VEWs become increasingly important information sources the more expensive or complicated an agricultural practice becomes; their role is somewhat greater in the case of large farms.
(i) Yields in farms that rely on the VEW as the main source of information are higher than in farms that rely mainly on other sources of information. The other sources do not appear to differ greatly from one another, but any source of information appears to be better than receiving no advice.

As more information starts to emerge from T&V projects in other countries, future research should focus on comparisons between experiences in differing socio-economic and cultural environments. Such comparisons may provide insights into the ways in which extension systems may be further adapted and improved.
FOOTNOTES

1/ By 1984, it had been adopted by about 40 countries in Eastern and Western Africa, South and Southeast Asia, the Middle East, Europe, Central and South America (Benor and Baxter, 1984, p. 4).

2/ The terms "extension agent" and "village extension worker (VEW)" are used interchangeably throughout the remainder of the paper.

3/ Two geographically adjacent areas - one with VEW and one without - in the Indian states of Haryana and Uttar Pradesh, respectively, were chosen. A sample survey amongst 972 farmers was conducted. For details, see Feder and Slade, 1984a, pp.7-8.

4/ In a recent case study of extension in India [Howell (1984)], a similar distinction between supply and demand is made. However, the indicators used for supply and demand are different, and no distinction is maintained between contact farmers and other farmers.

5/ The statistical test used is based on the large sample normality of the test statistic:

\[ Z = \left( \frac{p_1 - p_2}{\sqrt{\frac{n \cdot (1 - n)}{(N_1 + N_2)}}} \right) \]

where \( p_1 \) is the proportion of farmers with a certain characteristic within sample 1, \( N_i \) is the sample sizes, \( n \) the population proportion.

6/ This can be verified by calculating the weighted average for all farmers (contact and non-contact) of the proportion of farmers with "no visit", using the weights .1 and .9 for contact and non-contact farmers, respectively.

7/ The "information source ratio" is merely the ratio of the number of times a VEW is cited as the main source of information to the number of times "other farmers" is cited.

8/ This transformation does not at all alter our results; the same regressions run for non-logarithmic data produced identical results.

9/ A test of the difference between the mean yield indices from farmers who depended on the VEW and farmers who depended on "other farmers" for advice produced a "t" statistic of 3.14, which was significant at 99 percent, suggesting that yields are significantly higher for farmers who depend on VEWs as opposed to "other farmers".
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