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# Agricultural Extension

## The Kenya Experience

An Impact Evaluation



# OPERATIONS EVALUATION DEPARTMENT

## ***ENHANCING DEVELOPMENT EFFECTIVENESS THROUGH EXCELLENCE AND INDEPENDENCE IN EVALUATION***

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# Agricultural Extension The Kenya Experience

## An Impact Evaluation

Madhur Gautam



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## FOREWORD

The Training and Visit (T&V) system of management was introduced in Kenya by the World Bank in 1982 as a pilot, financed by the Second Integrated Agricultural Development Project. It has since been supported by the National Extension Project (NEP I), approved in 1983, and the Second National Extension Project (NEP II), which became effective in 1991.

The Bank projects had two objectives: institutional development of the extension service and sustained increases in agricultural productivity. The effectiveness of the extension approach adopted by the projects has been a subject of debate because of the perceived high cost and an apparent lack of impact on agricultural production.

This debate has been part of a broader disagreement on the effectiveness of the T&V approach to extension. The arguments have focused on its efficacy relative to alternative mechanisms for delivering extension advice. While it is generally agreed that the T&V system is costly, the controversy centers on its impact on agricultural production. Despite the intensity of the debate, however, there have been very few attempts to rigorously establish the impact of T&V projects.

This evaluation adopted a theory-based approach to gather a credible body of empirical evidence to rigorously establish the impact of the projects. Following a results-based management frame-

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## PREFACIO

El sistema de gerencia que se basa en la formación y las visitas (el sistema T&V) fue introducido en Kenia por el Banco Mundial en 1982 como práctico financiado por el Segundo Proyecto Integrado para el Desarrollo de la Agricultura. Desde entonces, ha sido sostenido por el Proyecto Nacional de Extensión (el NEP I), aprobado en 1983, y el Segundo Proyecto Nacional de Extensión (el NEP II), que entró en efecto en 1991.

Los proyectos del Banco tuvieron dos objetivos: el desarrollo institucional del servicio de extensión y unos incrementos sostenidos de la productividad agrícola. Se ha discutido la eficacia del enfoque sobre la extensión adoptado por estos proyectos a causa de sus altos costos percibidos y su falta de tener un efecto apreciable en la producción agrícola.

Este debate forma parte de un desacuerdo más amplio cuyo sujeto es la eficacia del uso del sistema T&V en la extensión. Los argumentos se han enfocado en la eficacia de este sistema relativa a los mecanismos alternativos para entregar avisos de extensión. Mientras que todo el mundo está de acuerdo en que el sistema T&V es caro, la controversia se concentra en su efecto en la producción agrícola. Sin embargo, a pesar de la vehemencia de este debate, pocos ensayos se han hecho para rigurosamente determinar el efecto de los proyectos T&V.

Esta evaluación adoptó un enfoque basado en la teoría para recoger una colección convincente de evidencia empírica para rigurosamente establecer el efecto de estos proyectos.

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## PRÉFACE

En 1982, la Banque mondiale a mis en place au Kenya le système de gestion basé sur la formation et les visites. À ses débuts, ce projet pilote était financé par le deuxième projet de développement agricole intégré. Depuis, il a bénéficié de l'aide du projet NEP I (approuvé en 1983) et du Projet NEP II (mis en œuvre en 1991).

Les projets de la Banque avaient deux objectifs : la consolidation institutionnelle des services de développement et l'augmentation soutenue de la productivité agricole. L'efficacité des services de développement est cependant controversée. Certains trouvent qu'ils coûtent fort cher pour le peu d'impact qu'ils ont sur la production agricole.

Cette controverse fait partie d'un débat plus large sur l'efficacité au Kenya du système formation-visites. Les discussions portent largement sur leur efficacité comparée à celle d'autres systèmes d'encadrement. Alors qu'on s'accorde généralement pour dire que le système formation-visites coûte cher, la controverse porte essentiellement sur leurs répercussions sur la production agricole. Malgré l'intensité de la discussion, on ne s'est guère efforcé d'évaluer avec rigueur l'impact des projets de type formation-visites.

La présente évaluation a adopté une approche théorique afin de réunir des preuves scientifiques qui démontreront avec rigueur les répercussions des projets. En utilisant un cadre de gestion axé sur les résultats, on y évalue les principaux indicateurs des résultats à diverses étapes du projet afin de déterminer le rendement du système de

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work, key indicators are evaluated at the various stages of the results chain to assess the performance of the Kenyan extension system.

The evaluation finds that the projects have had limited institutional development impact. They have had some beneficial impacts in increased geographical coverage, improved research-extension linkages (albeit belated), and improved staff quality through training. Overall, however, this evaluation found the current extension system to be ineffective and inefficient in delivering the needed services to farmers. The institutional design has lacked a focus on farmer empowerment. As such, inappropriate incentives have resulted in a lack of accountability or responsiveness to the clients' needs. Most important, the system is not financially sustainable.

A distinction needs to be maintained between the relevance of extension services *per se* and the relevance of the projects' design. The rationale for providing extension services is still relevant; however, several features of the projects' design proved to be inappropriate. The available evidence suggests that the extension approach applied in Kenya was not efficacious. The physical impact of the extension services also cannot be established with the current data. While it is likely that there was a positive impact on farmer productivity and efficiency in the initial years of NEP I, the benefits appear to have been short-lived, as even the 1990 data do not indicate any significant impact. This evaluation thus could not establish a

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Siguiendo un estilo de gerencia que se basa en los resultados, se evalúan los indicadores claves a varias etapas de la cadena de resultados para valorar el funcionamiento del sistema de extensión en Kenia.

La evaluación halla que los proyectos tuvieron un efecto limitado en el desarrollo de las instituciones. Tuvieron algunos efectos beneficiosos en cuanto al alcance geográfico más amplio, los enlaces más fuertes entre la extensión y la investigación (aunque con retraso), y la mejor calidad del personal gracias a la formación. Sin embargo, los resultados de esta evaluación indicaron que, en conjunto, el sistema de extensión corriente es ineficaz e incapaz de entregar a los campesinos los servicios que necesitan. Le ha faltado al diseño institucional un énfasis en apoderar a los agricultores. Como tanto, incentivos inapropiados resultaron en una carencia de contabilidad o sensibilidad a las necesidades de los clientes. Más importante, el sistema no se sostiene financieramente.

Hay que hacer una clara diferenciación entre la relevancia de los sistemas de extensión de por sí y la pertinencia del diseño de los proyectos. Aunque todavía vale la pena ofrecer servicios de extensión, algunas características del diseño de los proyectos resultaron ser inapropiadas. La evidencia disponible sugiere que el enfoque en la extensión que se llevaba a cabo en Kenia no fue efectivo. Tampoco se puede establecer el efecto físico de los servicios de extensión utilizando los datos corrientes. Mientras es probable que el NEP I rindió algunos beneficios tempranos, no parecen haber durado mucho, y aún los datos de 1990 no indican ningún efecto significativo. Como consecuencia, esta evaluación

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développement kenyan.

Les résultats de l'évaluation indiquent que les projets ont eu des répercussions limitées sur la consolidation institutionnelle.

Par contre, ils ont eu des effets positifs : ils ont étendu leur couverture géographique,

resserré (bien que tardivement) les liens entre le développement et la recherche, et amélioré la qualité du personnel par la formation. Mis à part ces quelques points positifs, l'évaluation a conclu que les systèmes de développement actuels ne sont ni efficaces ni rentables à offrir aux paysans les services dont ils ont besoin. Cependant, la conception institutionnelle, qui reflète les objectifs des projets, ne tenait pas suffisamment compte de la nécessité d'augmenter l'autonomie des paysans. De plus, des incitatifs inadaptés aux besoins ont engendré un manque de responsabilisation et de sensibilisation aux besoins des clients. Enfin, ce système n'est ni viable ni rentable.

Il ne faut pas confondre la pertinence des services de développement avec celle de la conception des projets. Par exemple, l'offre de services de développement aux petits exploitants du Kenya se justifie toujours. Toutefois, les données recueillies donnent à penser que l'approche adoptée manque d'efficacité. Ces mêmes données ne permettent pas de déterminer les répercussions physiques des services de développement. Même s'il est probable que le NEP I ait eu, à ses débuts, des répercussions positives sur la productivité et l'efficacité des fermiers, cela n'a pas duré. En effet, les données recueillies en 1990 n'indiquent pas de progrès notables. La présente évaluation n'indique aucune répercussion appréciable sur les résultats ni sur les indicateurs de

**E**NGLISH significant impact for either the key *outcome* or the *results* indicators; nor could it establish a positive rate of return to the expenditures on agricultural extension.

Five main lessons emerged from this evaluation. First, there is a need for more efficient targeting of extension services to focus on groups and areas where the marginal impact is likely to be the greatest. This, in turn, calls for a more flexible and a “smart” system that can identify gaps between average and best practices, and allocate scarce resources more rationally.

Second, to guide the “smart” system and to target better, it is necessary to have timely flows of relevant management information and continuous evaluation to provide in-time feedback. Hence, there is a need for a reliable monitoring and evaluation system.

Third, commensurate with the pace of technology generation and the demand for advice, the intensity of the extension service needs to be suited for particular circumstances. In some areas, a leaner and less-intensive presence (in extension staff per farm household) would allow a wider geographical coverage and may be more cost-effective. This calls for a more demand-driven and responsive delivery system.

Fourth, a blanket approach using a uniform methodology in all circumstances is also unlikely to be effective. A more pluralistic approach that exploits the synergies among the extension service, low-cost modern communications, demonstrations, printed media, and partnerships with civil society and the private sector needs to be developed.

**E**SPANOL no podía establecer ningún efecto significativo para los indicadores claves del *desenlace* o de los *resultados*, ni tampoco era capaz de establecer una tasa positiva de rendimiento con respecto a los gastos para la extensión agrícola.

Cinco lecciones principales se aprendieron de esta evaluación. La primera lección es la necesidad de seleccionar más eficientemente las áreas y los grupos para los cuales el impacto marginal de los servicios de extensión va a ser el más importante. Para esto, se necesita un sistema más flexible e “inteligente” que pueda identificar las diferencias entre las mejores prácticas y las prácticas medias y asignar los recursos escasos de una manera más racional.

Segundo, para guiar el sistema “inteligente” hacia una selección más eficiente, se necesita un flujo oportuno de datos relevantes para la gerencia y una evaluación continua que pueda proveer información de vuelta en buena hora. Para esto es necesario un sistema fiable de monitoreo y evaluación.

Tercero, proporcionado con el paso de la generación de la tecnología y la demanda de avisos, la intensidad del servicio de extensión tiene que adaptarse a las circunstancias particulares. En algunas áreas, una presencia menos fuerte e intensa (en términos del número de personal de extensión por cada granja) permitiría un alcance geográfico más amplio y puede ser más rentable. Esto exigiría un sistema de entrega más sensitivo y empujado por la demanda.

Cuarto, un enfoque general que se fija de una metodología uniforme para todas las situaciones tampoco va a ser efectivo. Hay que desarrollar un enfoque de naturaleza más pluralista que se aprovecha de las sinergias entre

**F**RANCAIS résultats. Elle n’a pas non plus engendré un taux de rendement positif dans les dépenses de développement agricole.

Cinq grandes leçons ressortent de cette évaluation.

Premièrement, il est nécessaire de mieux cibler les zones et les groupes où l’impact marginal est susceptible d’être le plus important. D’où le besoin d’un système plus souple et plus « ingénieux », capable d’identifier le fossé qui sépare les meilleures pratiques de celles courantes et d’allouer de façon rationnelle les ressources limitées.

Deuxièmement, pour bien orienter le système « ingénieux » et mieux cibler l’action, les services de développement doivent disposer régulièrement d’information de gestion pertinente et procéder à une évaluation continue pour fournir de la rétroaction au moment opportun. Il est donc indispensable de mettre en place un système d’évaluation et de contrôle fiable.

Troisièmement, le service de développement doit s’adapter aux circonstances particulières en tenant compte du rythme du développement technologique et de la demande de conseils. Dans certaines régions, une présence réduite et modérée (nombre d’agents de développement par ferme) étendrait la couverture géographique et peut-être la rentabilité. Cela nécessite un système mieux adapté et axé sur la demande.

Quatrièmement, une approche générale qui utilisera la même méthodologie quelles que soient les circonstances a peu de chance d’être efficace. Une approche imprégnée de pluralisme pour exploiter les synergies qui existent entre les services de développement, les moyens de communication modernes peu coûteux, l’organisation de

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And finally, the service delivery mechanism needs to fully incorporate client focus. This requires considering alternative options such as cost-sharing, farmer organizations, decentralization, and the like as an integral part of the delivery mechanism.

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el servicio de extensión, las comunicaciones modernas de bajo costo, las demostraciones, la prensa, y las asociaciones con la sociedad civil y el sector privado.

Finalmente, el mecanismo para entregar los servicios tiene que incorporar un enfoque en el cliente. Esto requiere la consideración de alternativos tales como la repartición de costos, el apoyo a los organismos que representan a los campesinos, y la descentralización, entre otros, como parte integral del mecanismo de entrega.

**F R A N C A I S**

démonstrations, le recours aux journaux et la création de partenariats avec la société civile et le secteur privé doit être mise au point.

Cinquièmement, le mécanisme d'offre de services doit intégrer des moyens pour les paysans de se faire entendre. Cela exige d'envisager d'autres options comme le partage des coûts, l'incitation à l'établissement d'organismes de paysans et la décentralisation



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Director-General, Operations Evaluation Department

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## EXECUTIVE SUMMARY

Kenya's extension services adopted the training and visit (T&V) management system in 1982, and the World Bank supported the system through the first and second National Extension Projects, NEP I and NEP II. The projects had two objectives: the institutional development of the extension services and sustained increases in agricultural productivity.

The effectiveness of the extension services has been subject to

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## RESUMEN

En 1982, los servicios de extensión de Kenia adoptaron un sistema de gerencia basado en la formación y las visitas ("training and visit" o "T&V"), y el Banco apoyó a este sistema en el transcurso de los proyectos nacionales de extensión, el NEP I y el NEP II. Estos proyectos tuvieron dos objetivos: el desarrollo institucional de los servicios de extensión y unos incrementos sostenidos de la productividad agrícola.

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## RÉSUMÉ ANALYTIQUE

Les services d'extension du Kenya ont adopté, en 1982, un système de gestion basé sur la formation et les visites. La Banque mondiale a appuyé ce nouveau système dans le cadre des deux premiers projets, NEP I et NEP II, qui visent la consolidation institutionnelle des services d'extension et l'augmentation soutenue de la productivité agricole.

L'efficacité des services d'extension est cependant controversée. Certains trouvent qu'ils coûtent fort cher et qu'ils ont peu d'impact sur la production agricole. Ce débat fait partie d'un différend plus large sur l'efficacité au Kenya des systèmes formation-visites. Les discussions portent largement sur leur efficacité comparée à celle d'autres systèmes d'encadrement. Alors qu'on convient généralement que le système formation-visites coûte cher, les retombées des gros investissements des pays emprunteurs et, par conséquent, leurs répercussions sur la production agricole animent la controverse. Malgré l'intensité de la discussion et les prêts importants de la Banque, on ne s'est guère efforcé d'évaluer avec rigueur l'impact des projets basés sur la formation et les visites.

En adoptant une approche théorique, cette étude a réuni de façon méthodique des renseignements qui ont permis de déterminer l'impact probable des projets. En utilisant un cadre de gestion axé sur les résultats, l'étude a essayé de relier les résultats observés dans les champs des fermiers



debate, however, because of its perceived high costs and apparent lack of impact on agricultural production. This debate is part of a broader disagreement about the effectiveness of the T&V approach. Arguments have focused largely on its efficacy relative to alternative mechanisms for delivering extension advice. While it is generally agreed that the T&V system is costly, the contro-

Sin embargo, se ha discutido la eficacia de los servicios de extensión porque existe la percepción de que cuestan mucho y tienen poco efecto en la producción agrícola. Este debate forma parte de un desacuerdo más amplio cuyo sujeto es la eficacia del uso del sistema T&V en Kenia. Los argumentos se han enfocado sobre todo en la eficacia de este sistema relativa a los mecanismos alternativos para entregar

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 versy centers on returns to borrowing countries' high levels of investment, and hence on its impact on agricultural production. Despite the intensity of the debate and the high volume of the Bank's lending, very few attempts have been made to rigorously determine the impact of T&V projects.

Adopting a theory-based approach, this study systematically gathered a credible body of evidence to establish the likely impact of the projects. Following a results-based management framework, the study sought to relate the results observed in the farmers' fields to the projects' inputs. In addition, intermediate output and outcome indicators were measured in order to assess the performance of the extension system along the results chain to confirm the potential for impact.

### Principal Findings

#### *Institutional Development*

Institutional development under NEP I and NEP II was limited. NEP I introduced T&V as "first and foremost a management system." After 17 years, however, the effectiveness of extension services does not appear to have improved appreciably. A strategic vision for the future development of the extension system is lacking, and management continues to be weak, with virtually nonexistent information systems. Inadequate financial management disrupts the timely flow of operational funds. The prolonged ineffectiveness of the extension services recently led Kenya, with the help of the Bank and other donors, to try to rationalize them with alternative approaches.

The projects, having established a national system based on the T&V

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 avisos de extensión. Mientras que todo el mundo está de acuerdo en que el sistema T&V es caro, la controversia se concentra en el rendimiento de las altas tasas de inversión de los países que piden préstamos y así en su efecto en la producción agrícola. A pesar de

la vehemencia del debate y el gran volumen de los préstamos concedidos por el Banco, pocos ensayos se han hecho para rigurosamente determinar el efecto de los proyectos T&V.

Adoptando un enfoque basado en la teoría, este estudio sistemáticamente recogió una colección de evidencia empírica para establecer el efecto probable de estos proyectos. Siguiendo un estilo de gerencia que se basa en los resultados, el estudio intentó relacionar los resultados observados en los campos de los agricultores a los ingresos de los proyectos. Además, se midieron los indicadores intermedios de productos y resultados para evaluar el funcionamiento del sistema de extensión a lo largo de la cadena de resultados para confirmar el potencial del sistema de tener un impacto.

### Conclusiones principales

#### *Desarrollo institucional*

El desarrollo institucional bajo los NEP I y II fue limitado. El NEP I introdujo el sistema T&V como "un sistema de gerencia ante todo." Sin embargo, después de 17 años, la eficacia de los servicios de extensión no parece haberse mejorado apreciablemente. Se falta una visión estratégica para el desarrollo futuro del sistema de extensión, y la gestión continúa a ser débil, con una carencia casi total de sistemas de información. La ineficiencia prolongada de los servicios de extensión recientemente motivó a Kenia, con la ayuda del Banco y de otros donantes, de tratar

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 aux intrants des projets. De plus, des indicateurs intermédiaires de la production et des résultats ont été mesurés afin d'évaluer le rendement du système d'extension par rapport aux résultats.

### Constatations principales

#### *Consolidation institutionnelle*

Les projets NEP I et NEP II ont abouti à une consolidation institutionnelle limitée. Le projet NEP I a introduit le concept formation-visites comme étant « d'abord et avant tout un système de gestion ». Dix-sept ans plus tard, l'efficacité de ces services d'extension ne semblent pas avoir fait de progrès notables. Il leur manque une vision stratégique pour l'avenir, et leur gestion demeure insuffisante et presque dépourvue de systèmes d'information. Une mauvaise gestion financière empêche les capitaux d'exploitation d'être disponibles à temps. L'inefficacité persistante des services d'extension pousse le Kenya, appuyé par la Banque et d'autres bailleurs de fonds, à tenter de les rationaliser en adoptant d'autres méthodes.

Une fois lancés à l'échelle nationale grâce au système de gestion formation-visites, les projets ont étendu leur couverture géographique, resserré (bien que tardivement) les liens entre l'extension et la recherche, et amélioré la qualité du personnel par la formation. Cependant, la conception institutionnelle, qui reflète les objectifs des projets, ne tenait pas suffisamment compte de la nécessité d'augmenter l'autonomie des paysans. De plus, des incitatifs inadaptés aux besoins ont engendré un manque de responsabilisation et de sensibilisation aux besoins des clients. Enfin, la structure hiérarchique de ces projets décourageait l'innovation, le

**ENGLISH** system of management, did increase geographical coverage, improve the links between extension and research (although belatedly), and raise staff quality through training. But the institutional design, reflecting the projects' objectives, lacked a focus on the critical issue of empowering farmers, with inappropriate incentives leading to a lack of accountability or responsiveness to the clients' needs. Furthermore, the projects' hierarchical structure yielded disincentives for innovation, partnerships, and efficiency, and the top-down extension system has been supply-driven and nonparticipatory.

#### *Sustainability*

The system is neither financially sustainable nor cost-effective. It is significantly more costly, and no more efficient, than the system it replaced. The government's allocations for extension, as for other public expenditures, continue to decline, leaving the system heavily dependent on donor funding.

An overwhelming proportion (80 percent) of the operational budget is consumed by staff salaries. As a result, many of the problems that limited the effectiveness of the previous system have persisted, and staff have reverted to the methods of dissemination used earlier.

The projects' approach of high-intensity contact with a limited number of farmers has been costly and unwarranted, given the inadequate stock of messages for dissemination and the slow pace in generating new technology.

#### *Relevance*

A distinction is needed between the relevance of extension services and

**ESPAÑOL** de racionalizarlos utilizando enfoques alternativos.

Después de establecer un sistema nacional basado en el sistema de gerencia T&V, los proyectos sí aumentaron el alcance geográfico, fortalecieron los enlaces entre la extensión y la investigación (aunque con retraso), y perfeccionaron al personal por medio de la formación. Pero al diseño institucional, que reflejaba los objetivos de los proyectos, le faltaba el enfoque en el asunto crítico de apoderar a los campesinos; además, los proyectos proporcionaban incentivos inapropiados que condujeron a una falta de contabilidad o sensibilidad a las necesidades de los clientes. Además, la estructura jerárquica de los proyectos no favoreció a las asociaciones, la innovación, o la eficiencia, y el sistema de extensión, que funciona de arriba en abajo, ha sido impulsado por el aprovisionamiento y no ha sido participatorio.

#### *Sostenibilidad*

El sistema no es ni financieramente sostenible ni rentable. Es significativamente más caro, pero sin ser más eficiente, que el sistema que reemplazó. Las afijaciones del gobierno para la extensión, como las para otros gastos públicos, continúan a ir en declive, dejando el sistema excesivamente dependiente del financiamiento por donantes.

Un porcentaje asombroso (unos 80%) del presupuesto operacional es consumido por los sueldos del personal. Como resultado, muchos de los problemas que limitaron la eficacia del sistema anterior han persistido, y el personal ha revertido a los métodos de disseminación que se empleaban antes.

La estrategia de contactos intensos y frecuentes con un número limitado de campesinos que

**FRANÇAIS** partenariat et l'efficacité, et le modèle d'extension à partir du sommet était axé sur l'offre et non sur la participation.

#### *Viabilité*

Ce système n'est ni viable ni rentable. Il est beaucoup plus coûteux et pas plus efficace que le système qu'il a remplacé. L'État continue de réduire les fonds qu'il alloue à l'extension, de même que ses autres dépenses, rendant ainsi le système très dépendant des bailleurs de fonds.

Les salaires du personnel absorbent la majeure partie (80 %) du budget de fonctionnement. Par conséquent, nombre de problèmes qui limitaient l'efficacité du système précédent subsistent, et le personnel en est revenu aux anciennes méthodes de diffusion de l'information.

Les contacts fréquents avec un nombre limité de paysans coûtent cher et ne sont pas justifiés, car les messages à transmettre sont peu nombreux, et le rythme d'introduction des nouvelles technologies, lent.

#### *Pertinence*

Il ne faut pas confondre la pertinence des services d'extension avec celle de la conception des projets. Par exemple, l'offre de services d'extension aux petits exploitants du Kenya se justifie toujours. Par contre, plusieurs aspects de la conception des projets se sont révélés inadéquats. Les paysans apprécient l'accès à ces services au point d'être disposés à payer pour, mais la demande n'est pas satisfaite. Les solutions de rechange aux services publics d'extension sont rares, bien qu'une offre se dessine de ce côté.

La plupart des paysans, y compris ceux qui assurent la liaison avec les services d'extension, ne veulent pas rencontrer les agents trop souvent, ce qui porte à s'interroger sur la

**E N G L I S H** the relevance of project design. While providing extension services to smallholders still has a rationale in Kenya, several features of the projects' design have proved inappropriate. The farmers value access to extension services enough to be willing to pay for them, but their demand is unmet. The alternatives to government-provided extension are few at present, although some providers are emerging.

Most farmers, including the contact farmers, do not want to meet extension agents often, which questions the relevance of a biweekly—or even monthly—visit schedule. Even the staff are wary of the repetitiveness and ineffectiveness of the visits.

Blanket coverage of the majority of the production areas with a single approach and standard messages has proven inefficient and unproductive. Limited experience from pilot initiatives under NEP II confirms the potential usefulness of alternative and more responsive approaches.

#### *Efficacy*

The farmers did not have adequate access to extension advice in 1982, and it appears that they do not have it now. All methods of applying the available data indicate that the current institutional arrangements for delivering services are ineffective. This is partially a reflection of the poor enabling environment in which the extension services have operated in recent years. The poor performance, however, is not entirely a function of these external factors, as evidence suggests that the current situation differs little from that of 1990.

Both qualitative and quantita-

**E S P A N O L** practicaban los proyectos ha sido cara e injustificada, dado el inventario inadecuado de mensajes para diseminar y el paso lento de la creación de nueva tecnología.

#### *Pertinencia*

Hay que distinguir entre la relevancia de los servicios de extensión y la pertinencia del diseño de los proyectos. Aunque es todavía lógico ofrecer servicios de extensión a los minifundistas en Kenia, se ha probado la impropiedad de algunas características del diseño de los proyectos. Tanto valen los graneros el acceso a los servicios de extensión que están dispuestos a subvenirlos, pero no se satisface la demanda. Actualmente, hay pocos alternativos a la extensión proporcionada por el gobierno, aunque algunos proveedores alternativos están comenzando a aparecer.

Visto que la mayoría de los agricultores, incluso los campesinos que se contactaron, no quieren reunirse con los agentes de extensión muy a menudo, la relevancia de un programa de visitas que tienen lugar cada dos semanas, o aún cada mes, es dudosa. Aún el personal se da cuenta de la repetitividad y la ineficiencia de estas visitas.

La tentativa de proveer un alcance general para la mayoría de las áreas de producción utilizando un sólo enfoque y mensajes convencionales ha resultado ser ineficaz e improductiva. La experiencia limitada de las iniciativas pilotas del NEP II confirma la utilidad potencial de enfoques alternativos más sensibles.

#### *Eficacia*

Los campesinos no tuvieron acceso adecuado a los avisos de la extensión en 1982, y parece que todavía no lo tienen. Todos los métodos de aplicar los datos

**F R A N C A I S** pertinence de rencontres bimensuelles, voire mensuelles. Même les agents des services remettent en question le caractère répétitif et l'inefficacité de leurs visites.

L'utilisation pour presque toutes les zones de production d'une approche générale et de messages passe-partout se révèle inefficace et improductive. Les quelques expériences tirées d'initiatives pilotes du projet NEP II confirmeront la nécessité d'adapter les actions aux besoins.

#### *Efficacité*

En 1982, les paysans ne pouvaient pas accéder aux services d'extension comme ils l'auraient dû, et c'est encore le cas aujourd'hui. Toutes les données accessibles démontrent l'inefficacité des dispositions institutionnelles actuelles pour fournir des services aux paysans. Cela reflète en partie le contexte peu favorable dans lequel les services d'extension ont dû fonctionner ces dernières années. Toutefois, leurs piètres résultats ne découlent pas uniquement de facteurs externes, puisque tout indique que la situation a très peu changé depuis 1990.

Les évaluations qualitatives et quantitatives indiquent que le système d'extension ne fournit pas aux paysans le type d'information qu'ils veulent. Elles montrent aussi que les conseils prodigués à nombre d'entre eux sont discutables. Les services d'extension continuent de privilégier la diffusion de messages agronomiques simples portant notamment sur le maïs. Leurs activités dans le cadre des projets NEP I et NEP II n'encouragent guère la prise de conscience des paysans et l'adoption par ceux-ci des recommandations. L'incapacité à leur offrir des conseils plus élaborés et

**E**NGLISH tive assessments indicate that the extension system has not responded with the kinds of information the farmers want, and the relevance of the advice it offers to a broad range of farmers is questionable. The focus of the extension services has remained on disseminating simple agronomic and maize-related messages. Extension activities under NEP I and NEP II had little influence on the evolution of patterns of awareness and the farmers' adoption of recommendations. The failure to deliver more advanced and context-specific advice reduced the cost-effectiveness of the main feature of the projects' design—that is, face-to-face extension. This was particularly true for NEP II. When this project began, most farmers were known to have already adopted the simpler messages about maize.

A significant finding is that a very large proportion of those who are aware of the messages on even the more complex practices have adopted them. Thus, although factors not related to extension, including a frequently cited lack of financial resources or access to credit, may be important in preventing farmers from adopting certain complex practices (for example, using fertilizers and pesticides), it is evident that the lack of information continues to be an important constraint.

Access to existing services is limited, especially for the poor and the less educated, despite the overall increase in coverage under NEP I and II. Most farmers also report that the availability of information and the quality of services have declined since the early 1980s.

Progress toward gender equity

**E**SPANOL disponibles indican que los arreglos institucionales corrientes para suministrar estos servicios son inefectivos. Esto es en parte un reflejo de las pocas posibilidades de apoderarse que existen en el ambiente en que los servicios de extensión han operado en años recientes. Sin embargo, este pobre funcionamiento no se debe totalmente a estos factores externos, porque la evidencia sugiere que la situación presente no es muy diferente de la de 1990.

Ambas las evaluaciones cualitativas y cuantitativas indican que el sistema de extensión no ha respondido con el tipo de información que quieren los campesinos, y la pertinencia de los avisos que se les ofrecen a un rango amplio de agricultores es dudosa. Los servicios de extensión continúan enfocarse en diseminar mensajes simples y agronómicos que muchas veces tratan del maíz. Las actividades de extensión bajo los NEP I y II tuvieron poca influencia en la evolución de los modelos de conocimiento y la adopción por los campesinos de sus recomendaciones. Su inhabilidad de ofrecer avisos más avanzados y específicos dentro del contexto redujo la rentabilidad de la característica principal del diseño del proyecto<sup>3</sup>es decir, la extensión cara a cara<sup>4</sup>sobre todo en el caso del NEP II. Cuando se inició este proyecto, se sabía que la mayoría de los campesinos ya había adoptado los mensajes más sencillos sobre el maíz.

Un hallazgo importante es que una proporción muy grande de los campesinos que se han dado cuenta de los mensajes, o aún de las prácticas más complejas, los ha adoptado. Así, aunque factores que no tienen nada que ver con la extensión, tales como la frecuentemente citada falta de recursos financieros o acceso al crédito, pueden ser importantes en impedir a los

**F**RANCAIS adaptés à leur environnement réduit la rentabilité des projets, notamment des rencontres individuelles avec les paysans. C'est particulièrement vrai pour le projet NEP II. Quand ce programme a été lancé, on savait que la plupart des paysans avaient déjà assimilé les messages les plus simples concernant le maïs.

Constatación significativa, la très grande majorité des paysans qui ont reçu des messages, même sur les méthodes plus complexes, les ont adoptées. Bien que des facteurs étrangers aux services d'extension, comme le manque de ressources financières ou l'incapacité d'obtenir des crédits, fréquemment mentionnés par les paysans, puissent les empêcher d'adopter certaines méthodes complexes (p. ex. l'emploi d'engrais et de pesticides), il va de soi que le manque d'information reste un obstacle important.

Malgré les progrès réalisés en ce qui concerne l'accès aux services, ce dernier demeure limité, surtout pour les paysans pauvres et peu éduqués. Les paysans affirment que l'information est plus rare et que les services sont de moindre qualité depuis le début des années 80.

Les progrès pour l'égalité des sexes sont mitigés. Les préjugés dont étaient victimes les paysannes autrefois ont disparu, mais certains préjugés demeurent quand vient le moment de choisir des contacts dans la population paysanne. La proportion de femmes parmi les agents d'extension sur le terrain est sensiblement la même depuis 1982.

La pénétration des projets reste bien inférieure aux niveaux prévus au moment de leur conception, car seulement 7 % des paysans qui y sont associés et 2 % de l'ensemble des paysans rencontrent régulièrement les

**ENGLISH** has been mixed. The earlier bias against women farmers has been rectified, but some bias persists in the selection of contact farmers. The proportion of women field-extension agents has remained largely unchanged since 1982.

Outreach is well below the levels anticipated in the project design—only about 7 percent of the contact farmers and 2 percent of all farmers meet regularly with extension agents in settings envisioned in the design.

#### *Efficiency*

Overall, a positive rate of return on expenditures for extension cannot be established. It is likely that NEP I yielded some early benefits, but they appear to have been short-lived, as the data do not indicate any significant impact, even by 1990.

Farmers' technical efficiency has improved somewhat since 1982, but overall efficiency continues to be low. According to the data, extension services have had a very small positive impact on the level of technical efficiency, but the level of confidence in the result is low. The data also indicate that extension services have had no discernible impact on the level of economic efficiency. Farmers' low economic efficiency suggests the potential for realizing significant savings by simply moving to a more economical mix of inputs under current market conditions.

The current data do not indicate a significant impact of the supply of extension services on productivity at the farm level. What the data do indicate is that extension resources have been allocated inefficiently and poorly targeted. Growth in agricultural production has been

**ESPAÑOL** campesinos de adoptar ciertas prácticas complejas (por ejemplo, el uso de los fertilizantes y las pesticidas), es evidente que la falta de información continúa a ser una limitación importante.

El acceso a los servicios existentes es limitado, sobre todo para los pobres y los ineducados, aunque su alcance ha crecido. Los agricultores informan que la disponibilidad de información y la calidad de los servicios son peores que a principios de los años ochenta.

El progreso hacia la igualdad de los géneros no ha sido totalmente positivo. El perjuicio anterior contra las campesinas se ha remendado, pero persiste este perjuicio en la selección de los agricultores que se contactan. La proporción de agentes de extensión en el campo que son mujeres ha cambiado poco desde 1982.

El alcance es bastante debajo de los niveles anticipados en el diseño del proyecto: sólo unos 7% de los campesinos contactados y unos 2% de todos los agricultores se reúnen regularmente con los agentes de extensión bajo las condiciones que se conceptualizaron en el diseño.

#### *Eficiencia*

En conjunto, no se puede establecer una tasa positiva de rendimiento en cuanto a los gastos para la extensión. Es probable que el NEP I rindió algunos beneficios tempranos, pero parece que no duraron mucho, visto que los datos no indican ningún efecto significativo aún en 1990.

La eficiencia técnica de los campesinos se ha mejorado algo desde 1982, pero su eficiencia en general continúa a ser baja. Según los datos, los servicios de extensión han tenido un efecto positivo muy pequeño en el nivel de eficiencia técnica, pero hay un bajo nivel de confianza en los resultados.

**FRANÇAIS** agents d'extension au cours des sessions prévues dans le cadre des projets.

#### *Rentabilité*

Dans l'ensemble, on ne peut établir un taux de rendement positif pour les dépenses courantes des projets d'extension. Il se peut que le projet NEP I ait récolté quelques profits au début, mais cela n'a pas duré. Les données ne révèlent aucun impact significatif, même depuis 1990.

L'efficacité technique des paysans s'est quelque peu améliorée depuis 1982, mais le rendement d'ensemble reste faible. Selon les données, les services d'extension ont eu un très léger effet positif sur l'efficacité technique, mais le degré de confiance est faible. D'après ces mêmes données, les services d'extension n'ont eu aucune influence visible sur l'efficacité économique. Le faible rendement économique des paysans laisse supposer qu'il suffirait d'adopter une meilleure combinaison d'intrants pour réaliser des économies considérables dans les conditions actuelles du marché.

Les données ne permettent pas de dire si l'offre des services d'extension a eu une influence significative sur la productivité des fermes. Il est cependant possible de souligner l'inefficacité de l'allocation des ressources de ces services et le mauvais choix de leurs objectifs. La production agricole affiche une croissance plus forte dans les zones jusque là moins productives, tandis que la mise en place d'agents d'extension favorise les zones plus productives. Les services d'extension ont peut-être aidé à transmettre des messages technologiques simples dans les zones auparavant mal desservies et moins productives, mais les données actuelles ne permettent pas de l'affirmer.

**E**NGLISH higher in the previously less-productive areas, while the placement of extension staff has favored the more productive areas. Extension might have helped spread simple technological messages to the formerly underserved and less-productive areas, but this cannot be conclusively determined with the current data.

A significant proportion of farmers is willing to pay for extension services, which indicates that they value the advice they receive. But the perceived value, as revealed by what the farmers are willing to pay, is well below what the government currently spends on extension services per farm.

#### **Principal Recommendations**

The lessons emerging from this study that can be applied to the design of future agricultural extension projects suggest the following recommendations.

##### *Targeting*

The first lesson is the need for more efficient targeting of extension services to areas and groups where the marginal impact is likely to be the greatest. This calls for a more flexible, "smart" system that can identify the gaps between best practices and average practices and allocate scarce resources more rationally. Further, the farmers who are selected for interaction should be more representative of the local socioeconomic environment, which will ensure the delivery of more relevant advice to the various categories of farmers.

##### *Information Systems*

Targeting calls for appropriate flows of timely and reliable information,

**E**SPANOL Estos datos también indican que los servicios de extensión no han tenido ningún efecto perceptible en el nivel de la eficiencia económica. La baja eficiencia económica de los campesinos sugiere la posibilidad de realizar ahorros significantes sólo por medio de introducir un conjunto de ingresos que sería más económico bajo las condiciones del mercado presente.

Los datos corrientes no indican ningún efecto importante de la oferta de la extensión en la productividad al nivel de la granja. Lo que sí indican es que los recursos de la extensión han sido asignados de manera ineficiente a objetivos malamente escogidos. El incremento en la producción agrícola ha sido más grande en las áreas que antes eran menos productivas, mientras que la colocación del personal de la extensión ha favorecido las áreas más productivas. Es posible que la extensión haya ayudado a diseminar simples mensajes técnicos a las áreas menos productivas que antes no se servían bien, pero esto no se puede determinar conclusivamente a base de los datos disponibles.

Una proporción significativa de los campesinos está dispuesta a pagar por los servicios de extensión, lo cual indica que valen los avisos que reciben. Pero el valor percibido, cuando se representa por la suma que los campesinos están dispuestos a pagar, es bastante menos que lo que el gobierno desembolsa por granja para los servicios de extensión.

#### **Recomendaciones principales**

Las lecciones que se han aprendido de este estudio y que se pueden aplicar al diseño de proyectos futuros de extensión agrícola sugieren las recomendaciones siguientes.

##### *Selección*

La primera lección es la necesidad de seleccionar más eficientemente las áreas

**F**RANCAIS Une grande proportion de paysans est prête à payer pour les services d'extension, montrant ainsi leur intérêt pour les conseils qui leur sont prodigués. Mais la valeur qu'ils y attachent, comme l'indique les montants qu'ils sont prêts à payer, reste cependant bien inférieure à que l'État investit par ferme dans les services d'extension.

#### **Recommandations principales**

Les leçons que l'on peut tirer de la présente étude, et dont on devrait tenir compte dans la conception des futurs projets d'extension agricole, débouchent sur les recommandations suivantes.

##### *Choix des objectifs*

La première leçon porte sur la nécessité de mieux cibler les zones et les groupes où l'impact des services d'extension devrait être plus fort. D'où le besoin d'un système plus souple et plus « ingénieux », capable de déterminer le fossé qui sépare les meilleures pratiques des pratiques courantes et d'allouer de façon rationnelle les ressources limitées. En outre, les services d'extension devraient sélectionner des paysans plus représentatifs du milieu socioéconomique local, de manière à pouvoir fournir des conseils mieux adaptés aux catégories de paysans.

##### *Systèmes d'information*

Afin de mieux cibler leur action, les services d'extension doivent fournir au bon moment une information fiable, ce qui souligne l'importance du monitoring et de l'évaluation. Une des grandes leçons à tirer de l'expérience kenyane est qu'il faut cerner les demandes des paysans et leur offrir des services adaptés au contexte technologique et économique de leur

**ENGLISH** which brings the focus to monitoring and evaluation (M&E). An important lesson of the Kenyan experience is that farmers' demands should be identified and that services should be tailored to suit local technological and economic conditions and circumstances. M&E is also critical for identifying the gaps and guiding the "smart" system, as needed, toward more efficient targeting.

#### *Intensity*

Based on their experience, farmers have clearly indicated that they do not want to see extension agents too often, and there are not enough new technological recommendations to sustain a highly intense visit schedule. It would be more cost-effective to establish a leaner and less-intensive presence with wider coverage. It is conceivable that improving service quality could increase demand. This would amplify the importance of a responsive and dynamic delivery system.

#### *Pluralism*

Delivering standard messages by means of a single or uniform methodology is likely to limit the effectiveness and efficiency of extension services. Younger, more educated farmers are taking over from their parents. Radio programs that disseminate new information are popular, and alternative providers are beginning to emerge in rural Kenya. Exploiting low-cost modern communications, demonstrations, print media, and partnerships with civil society and the private sector could be cost-effective. This would leverage resources to increase outreach, and would be likely to have a greater impact with the same or reduced demand on government resources.

**ESPAÑOL** y los grupos para los cuales el impacto marginal de los servicios de extensión va a ser el más importante. Para esto, se necesita un sistema más flexible e "inteligente" que pueda identificar las diferencias entre las mejores prácticas y las prácticas medias y asignar los recursos escasos de una manera más racional. Además, los campesinos que se escogen para la interacción deben ser más representativos del ambiente socioeconómico local, lo cual asegurará el suministro de avisos más relevantes a las varias categorías de agricultores.

#### *Sistemas de información*

Para la selección se necesita un flujo de datos oportunos y fiables, lo que se hace pensar en el monitoreo y la evaluación (M&E). Una lección importante de la experiencia de Kenia es que las demandas de los campesinos tienen que identificarse y que los servicios se deben hacer a la medida de las condiciones y circunstancias locales tecnológicas y económicas. El M&E es crítico también para identificar las faltas y guiar el sistema "inteligente," cuando sea necesario, hacia una selección más eficiente.

#### *Intensidad*

A base de su experiencia, los campesinos han claramente indicado que no quieren ver a los agentes de extensión con demasiada frecuencia, y no hay bastantes nuevas recomendaciones técnicas para sostener un programa muy intensivo de visitas. Sería más rentable establecer una presencia menos fuerte e intensa con un alcance más amplio. Es posible que un adelanto en la calidad de los servicios pueda incrementar la demanda. Esto agrandaría la importancia de un sistema de entrega más sensitivo y dinámico.

**FRANÇAIS** région. Le monitoring et l'évaluation sont aussi indispensables pour déterminer les lacunes et orienter le système « ingénieux » vers un meilleur choix de ses cibles, en fonction des besoins.

#### *Intensité*

En se basant sur leur expérience, les paysans ont clairement exprimé qu'ils ne veulent pas rencontrer trop souvent les agents des services d'extension, notamment parce qu'il n'y a pas assez de nouvelles technologies pour justifier des visites rapprochées. Il serait plus rentable d'instaurer un système qui allégerait la présence et qui couvrirait des zones plus vastes. On peut supposer que l'amélioration de la qualité des services augmenterait la demande. Cela permettrait d'accroître l'importance des services et de mettre en place un système dynamique et axé sur les besoins de la population.

#### *Pluralisme*

Des services d'extension qui transmettent des messages standards inspirés d'une méthodologie unique ou uniforme risquent d'être moins efficaces. Des paysans plus jeunes et plus instruits remplacent progressivement leurs parents. Les émissions radio qui diffusent de l'information nouvelle sont populaires, et d'autres fournisseurs de services font peu à peu leur apparition dans le Kenya rural. Il pourrait s'avérer rentable d'exploiter les communications modernes à bas prix, d'organiser des démonstrations, de recourir aux journaux et de créer des partenariats avec la société civile et le secteur privé. Ainsi, on multiplierait les ressources et étendrait la portée des activités, ce qui accroîtrait probablement l'impact des ressources

## ENGLISH

*Client Focus*

The central focus of the institutional design should be to empower farmers. An effective way to incorporate client focus is to integrate alternative means of giving farmers a voice—such as cost-sharing, fostering farmers' organizations, and decentralization—into the delivery mechanisms. Cost recovery (even if only partial), in particular, offers several advantages. It provides appropriate incentives, addressing the issues of accountability and quality control; it makes service more demand-driven and responsive; it provides some budgetary respite; and it encourages alternative providers. Such institutional arrangements remain unexplored in Kenya.

## ESPAÑOL

*Pluralismo*

La entrega de mensajes convencionales por medio de un método único o uniforme probablemente va a limitar la eficiencia y la eficacia de los servicios de extensión. Los campesinos más jóvenes y educados se están encargando de las tareas de sus padres. Programas de la radio que diseminan nueva información son populares, y los proveedores alternativos empiezan a aparecer en la Kenia rural. La explotación de comunicaciones modernas de bajo costo, demostraciones, la prensa, y asociaciones con la sociedad civil y el sector privado puede ser rentable. Así se aprovecharía de los recursos disponibles para el alcance para tener un máximo efecto con la misma o aún menos demanda para los recursos gubernamentales.

*Enfoque en el cliente*

El enfoque central del diseño institucional debe ser de apoderar a los campesinos. Una manera efectiva de incorporar un enfoque en el cliente es la integración dentro de los mecanismos de entrega de métodos alternativos para dar una voz a los agricultores, métodos tales como la repartición de costos, el apoyo a los organismos que representan a los campesinos, y la descentralización. En particular, la recuperación de los costos (aunque sea solamente en parte) ofrece varias ventajas. Provee incentivos apropiados, dirigiéndose a los temas de contabilidad y control de la calidad; resulta en un servicio más sensitivo y empujado por la demanda; ofrece una tregua presupuestaria; y estimula a los proveedores alternativos. Arreglos institucionales de este tipo se quedan a explorar en Kenia.

## FRANÇAIS

de l'État, qui pourraient peut-être même être réduites.

*Priorité aux clients*

Les services d'extension devraient viser l'autonomie des paysans. Une bonne façon d'y parvenir consiste à intégrer aux mécanismes d'offre des services des moyens permettant aux paysans de se faire entendre – partage des coûts, incitation à l'établissement d'organismes de paysans et décentralisation. Le recouvrement des coûts (même partiel) présente plusieurs avantages. Il sert d'incitatif et introduit la responsabilisation et le contrôle de la qualité. Il axe davantage les services sur la demande, procure un certain répit budgétaire et encourage d'autres fournisseurs de services. De tels arrangements institutionnels demeurent inexplorés au Kenya.



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## ABBREVIATIONS AND ACRONYMS

AIC	-	Agriculture Information Center
ASIP	-	Agricultural Sector Investment Program
ATD	-	Africa Technical Department
CVM	-	Contingent valuation method
DEA	-	Data envelopment analysis
FEW	-	Frontline extension worker
FTC	-	Farmer Training Center
GDP	-	Gross domestic product
IDA	-	International Development Association
IFAD	-	International Fund for Agricultural Development
KARI	-	Kenya Agricultural Research Institute
KP	-	Kenya pounds (currency)
Ksh	-	Kenya shillings (currency)
MALDM	-	Ministry of Agriculture, Livestock Development, and Marketing
M&E	-	Monitoring and evaluation
NASSEP	-	National Sample Survey and Evaluation Program
NEP	-	National Extension Project
NGO	-	Nongovernmental organization
OED	-	Operations Evaluation Department
PPA	-	Participatory poverty assessment
RHBS	-	Rural Household Budget Survey
SAR	-	Staff appraisal report
SMS	-	Subject matter specialist
T&V	-	Training and visit
WTP	-	Willingness to pay





# Introduction

The focus on agricultural extension in Kenya is rooted in agriculture's strategic importance in development. With 70 percent of the population living in rural areas, almost half in absolute poverty, the centrality of rural development to any strategy for poverty alleviation is clear. Critical to rural development is the performance of agriculture, both because of its direct contribution to the national economy (28 percent of gross domestic product; 60 percent of export earnings; and 80 percent of national employment) and because of its

indirect multiplier effects. Within agriculture, 81 percent of the farmers are smallholders (owning less than 2 hectares), which makes it imperative to improve smallholder productivity.

Accordingly, the government of Kenya has long had agricultural extension on its development agenda. With World Bank support, Kenya adopted a T&V system of management for its extension services in 1982 as part of its growth strategy. The Bank then financed the extension system with NEP I (1983–91) and NEP II (1991–98).

The performance of Kenya's extension system is controversial, and this debate is part of a broader disagreement about the cost-effectiveness of the T&V approach. Debate has focused largely on the efficacy of the mechanisms for delivering extension advice (Picciotto and Anderson 1997). It is generally agreed that the T&V system is costly. The controversy centers on the returns to the high levels of investment by borrower countries in the T&V system, and hence on its impact on agricultural production (Purcell and Anderson 1997). (The general nature of the debate is discussed in Annex A.) Despite the debate's intensity, the importance of agricultural extension in the Bank's development strat-

egy for Africa, and the large investment made, there have been few attempts to rigorously measure the impact of T&V extension.

In the Kenyan context, the debate has been elevated by the estimate of very high returns to T&V extension by a Bank Africa Technical Department (ATD) study (Bindlish and Evenson 1993, 1997), on the one hand, and the lack of visible results on the ground, on the other.<sup>1</sup> Agriculture's poor performance in Kenya in recent years, the country's declining budgetary resources, and efforts to rationalize the structure of the Ministry of Agriculture, Livestock Development, and Marketing (MALDM) have increasingly called into question the effectiveness of extension services.<sup>2</sup>

Notwithstanding the ATD's estimates of high marginal returns to extension, an Operations Evaluation Department (OED) review of NEP I raised

**The performance of Kenya's extension system is controversial, mirroring the broader disagreement about the cost-effectiveness of the T&V approach.**

questions about the effectiveness of the T&V approach in Kenya. The review concluded that NEP I had some beneficial aspects but several operational deficiencies, and, most important, that it was not financially sustainable. With little evidence to suggest any significant impact on agricultural growth to justify T&V's high fiscal costs, OED questioned both the appropriateness of the extension format developed as a uniform approach throughout Kenya's cropping areas and the overall outcome of the project. The ensuing discussions with the Africa Region led to OED's final rating of the project outcome as marginally satisfactory. The Africa Region contested the rating, and the disagreement has persisted. This study was undertaken to inform the discussion.

The discontent with the current system of extension is not limited to the Bank. Criticism is sharpest among the donor and nongovernmental organization (NGO)

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communities, which seek reform toward a demand-driven system that better accommodates alternative ways of reaching farmers. The Kenyan government is also wary of continuing with the large allocation of resources to extension, given agriculture's poor performance since the start of the 1980s.

It is not clear, however, whether the poor record of agriculture necessarily reflects the performance of extension; it is possible that agriculture could have done worse were it not for extension. Establishing the impact of extension from the sector's aggregate performance is difficult because, much like casual observations from field visits, it lacks an appropriate counterfactual. The problem can be demonstrated with maize yields.<sup>3</sup> Between 1970 and 1989, the annual growth rate of maize yields in Kenya was 4.7 percent. This rate rises to 5.4 percent when rainfall is factored in.<sup>4</sup> Comparing the periods before and after 1982—that is, before and after T&V—growth slowed from 6.3 percent to 5 percent, a statistically significant difference. The difference, however, ceases to be significant when rainfall is factored in.

Given the strong and divergent opinions on the perceived performance of NEP I and NEP II and the lack of evidence to determine their impact, this study takes an

objective, empirical approach.<sup>5</sup> Most of the conclusions are based on the results of a 1997 OED household survey and a survey of the extension staff, supplemented by secondary data and information from several recent studies by MALDM. OED's household survey (see Annex I) covered the same population surveyed for the 1990 ATD study, which used a subsample of the 1982 Rural Household Budget Survey (RHBS) data. In 1997, interviewers revisited as many of the respondents as could be contacted in the clusters that had been sampled by the ATD study. This evaluation thus has the advantage of baseline data, even if they are somewhat limited. To dissociate the OED survey from the government extension service and the Bank, it was implemented by the Tegemeo Institute of Egerton University in Kenya.

### Study Objective

The goal of this study was to make an empirical assessment of the impact of the NEP I and NEP II projects in Kenya. Following a theory-based evaluation approach, it combined qualitative and quantitative methods to arrive at a credible body of evidence on the projects' likely impact. In so doing, it provides an independent review of earlier findings.

To allow for appropriate policy conclusions, the study distinguishes clearly between the impact of *extension* and the impact of a *particular system of extension*. This has implications for interpreting the results to illuminate the three key aspects of the study: the relevance, efficacy, and efficiency of the Kenyan extension system. In Kenya, impact evaluation is complicated by the introduction of the T&V system on a national scale, which precluded a with-and-without comparison. The system was also introduced rapidly, over the course of only 3 years, so that now, after some 15 years, the data allow only limited before-and-after comparisons.

### The National Extension Projects

Before NEP I and NEP II, the traditional system of extension in Kenya suffered from several weaknesses.<sup>6</sup> To overcome them, the T&V system of extension was introduced with the intent of providing "competent, well-informed village-level extension workers who will visit farmers frequently and regularly with relevant technical messages and bring farmers' problems to research" (Benor and Baxter 1984). (The design features of the T&V system implemented by NEP I and NEP II are described in Annex B.) T&V was introduced as a brief pilot project in two districts in 1982. Starting

in 1983 with NEP I, it was rapidly expanded to cover about 90 percent of Kenya's arable land.

The objective of NEP I was to achieve sustained increases in agricultural production in 30 of Kenya's 41 districts, covering all medium- and high-potential arable areas. The approach entailed reorganizing and strengthening extension services through the adoption of T&V over a period of three years and improving the link between research and extension. NEP I was considered an institution-building project, and the Bank expected to provide external assistance for 10 to 15 years to ensure that the necessary institutional reforms and improvements in staff skills were made.

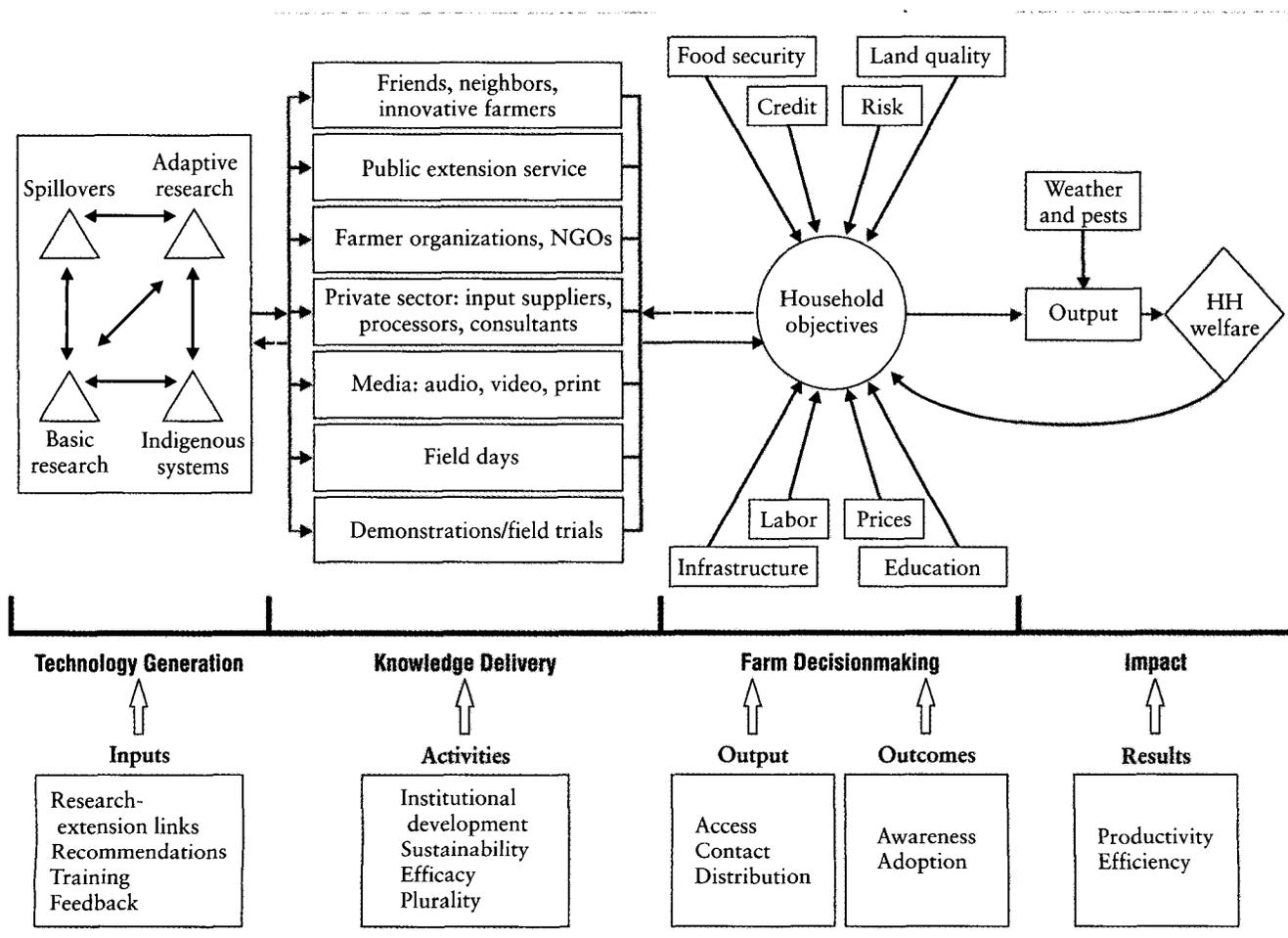
In 1991, NEP II succeeded NEP I. The objective of NEP II was to stimulate the development and adoption of technical packages that would enable smallholders

to increase their productivity and incomes. In addition to continuing to support the work of NEP I, NEP II introduced T&V to 6 new areas, and when 4 of the original districts were split, T&V extension was applied in 40 of Kenya's 45 districts. The project was designed to consolidate and fortify the gains made under NEP I, to increase direct contact with farmers, to improve the relevance of extension information and technologies, to upgrade the skills of staff and farmers, and to introduce pilot innovations into the extension system.

**Study Strategy and Outline**

The measurement of the impact of the two projects focused primarily on their key objectives—institutional development and sustained increases in agricultural productivity. While important economic, social, and

**FIGURE 1.1. STYLIZED IMPACT MODEL**



Note: Broken line: feedback from farmers to decisionmakers. Solid line: delivery of time-bound "messages" by extension workers from researchers to farmers. HH: household.

environmental impacts are implicit in the projects' rationale, they were not explicitly stated as major objectives. But the key social issues of gender and the distribution of benefits are naturally addressed because of the large proportion of Kenyan farmers who are women or smallholders.

The study's theory-based approach used the stylized causal flow model depicted in figure 1.1. The model reflects the reliance of NEP I and NEP II on extension agents successfully delivering time-bound "messages" (indicated by solid arrows) from researchers to farmers.<sup>7</sup> The task of delivering feedback from the farmers to the researchers (indicated by broken arrows) was also to be carried out by the extension workers. As implemented, the program was decidedly nonparticipatory—there was no pretense of involving farmers in the development of technology or the messages, nor was there an opportunity for the farmers to select topics of interest to them.

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of delivering feedback from the farmers to the researchers (indicated by broken arrows) was also to be carried out by the extension workers. As implemented, the program was decidedly nonparticipatory—there was no pretense of involving farmers in the development of technology or the messages, nor was there an opportunity for the farmers to select topics of interest to them (MALDM 1997b).

The impact of the projects can be assessed at several points along the continuum, from the knowledge complex to the final change in welfare. Following the results-based management framework, this evaluation sought to relate the results observed in the farmers' fields back to project inputs. In addition, intermediate output and outcome indicators were measured to assess the performance of the extension system along the results chain to confirm the potential for impact. Accordingly, the five boxes along the bottom of the model present the key indicative measures corresponding to inputs, activities, outputs, outcomes, and results. The evaluation strategy was to use a mix of qualitative and quantitative methods to measure and analyze these key indicators. No attempt was made to study the projects' impact on household welfare, because it was likely that it had been affected by a number of factors beyond the scope of extension's activities. The outline of this volume reflects the study approach.

### *Institutional Development*

The focus of institutional impact is on the left half of the model in figure 1.1, specifically on the institutional arrangements, or input, used by NEP I and II to deliver their output. The analysis is presented in Chapter 2, and combines secondary data with the findings of several recent reviews of extension in Kenya and results from the OED staff survey.

### *Beneficiary Assessment*

An important element of the strategy was to obtain participatory beneficiary assessments of extension service. Although the beneficiary assessments for this evaluation were not conducted, findings from two recent participatory assessments in Kenya are pertinent, and these, along with the farmers assessments from the OED household survey, are discussed in Chapter 3.

### *Efficacy: The Quantity and Quality of Contact*

The debate on the effectiveness of T&V in Kenya has centered primarily on the "real" side of the equation—that is, T&V's impact on agricultural productivity at the farm level. This impact is evaluated following the stylized flow expressed in the model in figure 1.1. The first part is an analysis of the outreach and the quality of interaction between extension agents and farmers, which is discussed in Chapter 4.

### *Outcomes*

Next on the continuum leading to ultimate results is the measurement of the proximate outcomes of extension efforts, which indicates potential for impact. This entailed measures of farmer awareness and adoption of extension outputs (that is, its technological recommendations, or "messages"). These measures, and how they relate to the supply of extension services, are discussed in Chapter 5.

### *Results*

Determining the physical impact, or results on the ground, required relating the supply of extension services to changes in productivity and efficiency at the farm level. To do this, the evaluation followed two lines of inquiry. One was a nonparametric measurement of farmers' efficiency in production and how farm productivity changed over time. (This is discussed in Chapter 6.) The other was an econometric measurement of the impact of extension on farm

production (see Chapter 7). These estimates reveal the returns to investment in extension and are needed to establish its efficiency.

*Willingness to Pay*

This analysis revisits the farmers with a new methodological tool—the contingent valuation method, which is used to directly elicit their willingness to pay for extension services (see Chapter 8). The findings from this exercise have implications for the relevance of the design of past projects and provide insights for future project design.





# Institutional Development

A key objective of both NEP I and NEP II was the development of organizational and institutional arrangements for the efficient and effective delivery of agricultural services to Kenyan smallholders. In 1982, it was expected that the extension system would need 15 years to mature. The period has now passed, and it is natural to ask how the extension system is performing in comparison with the system it replaced. The discussion in this chapter is based on reviews undertaken or commissioned by MALDM over the past two to three years in

an attempt to develop a national policy and a framework to rationalize the current extension service.<sup>1</sup> These reviews are supplemented with conclusions from discussions with extension and ministry staff, focus groups, individual district-level staff, and former extension staff familiar with the early days of NEP I and with findings from the 1997 staff survey conducted by OED for this study.

It is instructive to review the before-and-after pictures of Kenya's extension system.

## **Before**

Agricultural extension in Kenya dates back to the early 1900s. Several approaches were tried, including individual visits, group methods, unified extension, farm management, integrated development, and specialized commodity extension programs. Except for the last, none endured. Nevertheless, the traditional extension system was highly successful in the dissemination of hybrid maize technology. Starting in 1965 with a nationwide program of demonstrations and field days, hybrid maize was promoted so successfully that by 1977, 50 percent of even smallholders were growing hybrid maize (Johnson and others 1980).

By 1982, the year before NEP I was introduced, several disparate and uncoordinated donor-supported efforts were in the field. The various extension arrangements lacked a consistent national strategy and were essentially ad hoc project components. This proliferation of programs was viewed as expensive, inefficient, and largely ineffective.

The extension services did, however, have a well-defined line of command, from the director of agriculture down to the field-level, frontline extension worker (FEW). The staff numbers were seen as adequate, but the services were thought to be performing well below their potential (World Bank staff appraisal reports).<sup>2</sup>

There were several reasons for this: the junior staff were not well trained; there was a lack of field emphasis; and FEWs visited few farms, and most of their vis-

its were to progressive farmers, who represented about 10 percent of all smallholders. Other problems

**The traditional extension system was highly successful in the dissemination of hybrid maize technology.**

included insufficient operational funds, which limited mobility (except for projects and programs funded by donors), resulting in lax supervision and support of the field staff, and generally inadequate allowances for the FEWs, which left them to travel on foot and unable to cover a large area.

The extension system in place before the projects were implemented concentrated its efforts on male farmers, even though almost a third of the farmers or farm operators were women. However, women's groups had started to proliferate, and the government, recognizing their importance, was taking steps to integrate women into the extension service.

The link between research and extension was weak, but it was recognized that the research staff

**The extension system in place before the projects were implemented concentrated its efforts on male farmers, even though almost a third of the farmers or farm operators were women.**

members were more specialized and better equipped to analyze farmers' problems than the specialists working with extension. The main vehicles for disseminating technical knowledge to extension staff were field days; research station bulletins; Agriculture Information Center (AIC) publications on recommended practices; and

*barazas*, public meetings called by the chief, the location administrative officer, or local extension staff. The Banks' appraisal of NEP I, however, was realistic. It warned against expecting major increases in production as in the past, because new technological developments were not available to promote rapid growth. The focus was thus to rely on smallholder intensification and effective resource conservation.

**And After**

Annex C details some of the extension services' specific institutional features. Table 2.1 summarizes the analysis of the approach to agricultural extension of NEP I and NEP II from the perspective of Kenyan policymakers (MALDM 1997a). Annex D presents a briefing prepared by the staff of one of the districts that was visited for this study for a focus group discussion; it summarizes the generally held views about NEP I and

**TABLE 2.1. NEP I AND II: BORROWER PERSPECTIVES**

<i>Weak points</i>	<i>Strong points</i>
<ul style="list-style-type: none"> <li>• Very broad objectives</li> <li>• Strong top-down planning</li> <li>• Target not specific</li> <li>• Weak farmer participation</li> <li>• Low staff motivation</li> <li>• Weak monitoring and evaluation</li> <li>• Supply-driven messages</li> <li>• Donor-dependent</li> <li>• Little flexibility</li> <li>• Little accountability</li> </ul>	<ul style="list-style-type: none"> <li>• Wide coverage</li> <li>• Coverage of all types of farmers</li> <li>• Strong staff training.</li> <li>• Development of professionalism at district officer level</li> <li>• Strong presence of FEWs</li> <li>• Procurement of transport equipment and office accommodations</li> </ul>

Source: MALDM 1997a, p. 14.

NEP II in Kenya. The rest of the chapter describes the main conclusions on institutional impact that emerge from this study's analysis.

*Organizational Structure*

NEP I and NEP II succeeded in establishing an integrated national extension system. Although the existing organizational structure was consistent with the single line of command envisaged in the projects' design, the management of the system has been weak, an outcome of poor project implementation arrangements. Inadequate financial management compounds the problem of limited budgetary resources, disrupting the timely flow of operational funds. Kenya is also still developing a national policy on agricultural extension. While a qualitative analysis of the extension approach before NEP I similar to that shown in table 2.1 is not available, the institutional characteristics of the previous system, summarized in the preceding section, provide some points of comparison.

On the positive side, the infusion of large sums of development and operational funds in the early years of NEP I generated unprecedented energy in the system. Increased staff training, new vehicles and office equipment, and the new institutional paradigm represented by the extension system lifted the morale of the field staff. The link with research was weak, but sufficient to ensure an adequate flow of simple agronomic messages to the farmers. The increased activity is generally believed to have been beneficial, and training improved staff skills.

The focus was on maize and simple agronomic messages. While it is likely that this initially had some

positive impact in areas previously not covered by extension, the continued narrow focus over time reduced incremental benefits. With sufficient funds flowing, services expanded rapidly and staff numbers increased, which increased outreach to uncovered areas and unserved categories of farmers.<sup>3</sup> This helped reduce some of the biases of the previous system—those against women, younger farmers, and farmers living far from access roads. But new biases, in favor of the more educated and more productive areas, were introduced. The allocation of resources also favored areas with lower poverty levels, and there does not appear to have been any improvement in staff productivity as measured by the number of contacts per staff member.

With staffing rising to unsustainable levels and the cost of extension high, operational budgets proved inadequate. At the end of NEP II, a number of the problems afflicting the previous system continued, and their impact on the effectiveness of services has been significant. The staff survey showed that more than half of those who were in service in 1982 felt that the system was less effective at the time of the survey (1997) than it had been in 1982.<sup>4</sup> Less than a third considered it to be more effective (the rest thought it had remained the same). The system is also more expensive now, but no more efficient. Insufficient operational funds mean limited transport facilities and inadequate staff allowances, restricting mobility and reducing supervision. Slow progress in the generation of technology and limited adaptive research have diminished the number of new messages and have made training sessions and field visits repetitive and unproductive. As a result, staff motivation and morale have declined substantially since the initial boost in the early years of NEP I.

#### *Institutional Development*

The institutional aspects of extension have also been poorly developed. As implemented, both NEP I and NEP II adopted a top-down, supply-driven approach, and lacked a focus on the critical issue of farmer empowerment. While this may have been useful in the early, formative years of the program, change was small and slow, even during NEP II, despite the explicit intent of its design. More important, the primary client, the farmer, still has little or no voice. While most staff believe that both they and the farmers have a say in the development of messages, a majority have also noted that district officers determine the topics of the training sessions. The kind of information that farmers want—advice on com-

plex practices—and what extension effectively delivers—simple agronomic messages—are mismatched. The demonstrations that the farmers want and the home visits that the extension agents prefer are also methodologically mismatched. These disconnects manifest the lack of client focus and responsiveness of the extension service.

The poor functioning of the contact-farmer and contact-group approaches, together with inadequate messages and the lack of operational funds, has sent the extension agents back to the old system of disseminating messages through *barazas*. A large number of field staff are also working with alternative providers, NGOs, the private sector, and other projects. But the extension service has not yet attempted to institutionalize these links to make the system more effective and efficient.

A key feature, the incentive structure, has been given inadequate attention in the institutional design of NEP I and NEP II. FEWs have no accountability to the farmers. The control mechanism adopted in NEP I and NEP II, following the standard T&V approach, was designed to ensure that FEWs would follow a prescribed route to regularly meet with a fixed number of contact farmers. Supervision is reduced to ensuring compliance with the specified route. There is no focus on the quality of the relationship between FEWs and farmers, and FEWs are, for the most part, messengers.

#### *Financial Sustainability*

The most problematic feature of the Kenyan system is that it is not financially sustainable. Compared with the previous system, T&V is significantly more expensive. In 1982, Kenya was spending the equivalent of US\$3.92 per household in 1991 constant dollars (Bindlish and Evenson 1993, estimates for their study districts). Current estimates (using national data that do not appear to differ much from estimates for the same study districts) suggest an expenditure of US\$13.29 in 1991 dollars, or US\$15.11 in 1997 dollars. That is, in real terms extension service expenditures have gone up more than 300 percent, while increasing fiscal difficulties have led to declining operational budgets.

**As implemented, both NEP I and NEP II adopted a top-down, supply-driven approach, and lacked a focus on the critical issue of farmer empowerment.**

The rise in costs reflects the system's design, with its focus on a high frequency of field visits and training sessions, and blanket coverage of most of the country's arable area according to a standard FEW-to-farm ratio. While it may be argued that the high costs stem from increases in staff numbers, and that NEP I and NEP II did not cause these increases, it should be noted that current staffing levels are below the standards considered acceptable for the two projects. Even at current levels, the operational budget is highly inadequate.

### Conclusions

The limited impact of the two projects on the institutional development of Kenya's extension services is evident. At the end of NEP II, the service lacks a strategic vision, appears to have had no appreciable improvement in its effectiveness, and suffers from weak management. There is virtually no management information system. The benefits include wider coverage, improved research-extension links, and improved staff quality through training.

While the general principles underlying T&V are relevant for any institutional design, the highly structured extension approach that NEP I and NEP II adopted has been neither effective nor sustainable.<sup>5</sup> It

**Government has taken important steps recently to adopt a farming-systems approach to extension, improve research-extension links, rationalize the deployment of frontline extension staff, and experiment with alternative modes of delivery suited to local circumstances.**

has shown little flexibility, even though NEP II's design sought to introduce some plurality to improve system functioning. From an institutional perspective, responsiveness and accountability usually cannot be bureaucratically imposed. The projects' design failed to incorporate appropriate incentives for effective service delivery.

#### *Searching for Alternatives*

The prolonged ineffectiveness and lack of fiscal

sustainability of the extension service have turned the government toward alternative approaches. It has taken important steps recently to adopt a farming-systems approach to extension, improve research-extension links,



Women working in the field, Kenya.

rationalize the deployment of frontline extension staff, and experiment with alternative modes of delivery suited to local circumstances. In conjunction with other donors, the Bank has supported the bulk of this work, indicating that the Bank is also being responsive. Resulting changes on the ground, however, are yet to be seen.

When alternatives for the future are considered, appropriate exit mechanisms need to be incorporated into the institutional design. To do this, the nature of the benefits, the kinds of services, and the efficiency of their delivery mechanism need to be considered. Most agricultural information yields benefits in the form of private returns to farmers, whether embodied as a technological characteristic of goods, such as a fertilizer of high quality or a new type, or in less concrete form, such as information that improves farmers' management skills.<sup>6</sup> Several types of information also have benefits external to the farmers, raising their overall or social returns, as others learn by indirect information or observation. These externalities provide the rationale for public support for extension activities. Nevertheless, as long as farmers experience private

benefits, they should be willing to pay for the information, suggesting scope for cost recovery. (The findings reported in Chapter 8 support this.)

#### *Delivery Options*

The kinds of information most closely associated with extension services are simple agronomic messages, which have the characteristics of genuine public goods, since they are easily passed around. But these messages are also the kind of information that can be delivered well through the more cost-effective means of radio broadcasts, pamphlets, and public meetings. The print media, in particular, have significant potential as the younger, more educated farmers take over from their parents. Given the nature of the information that most extension agents have to offer, the decision of most agents to return to the *baraza* appears to be rational. For other kinds of extension information, more detailed and personal advice is required, such as addressing a farmer's specific pest problems or the optimal type and quantity of fertilizer for local soil conditions. Since the returns to such information are also largely private, there is significant scope for cost recovery or private provision. Further, since the greater use of such inputs also benefits the private input suppliers, they have an incentive to deliver such information. (That this trend may already be under way, although proceeding slowly, is evident from the findings reported in Chapter 5.)

#### *Incentives*

A number of institutional options—including decentralization, using farmers' organizations and those of civil society, outsourcing extension services, and cost-sharing—could sharpen system focus on clients. The central aim of the institutional design should be to empower farmers, which requires the inclusion of appropriate incentives.

Incentives can be addressed directly by building in some degree of commercialization. It is often argued that extension services are a public good and that most farmers, particularly poor subsistence farmers, may not

be willing to pay for them. This hypothesis is difficult to test, however, because public extension has historically been provided without charge, which tends to crowd out alternative providers. Still, in the Kenyan communities that extension does not reach or where the service is inadequate—mostly low-potential and poorer areas—NGOs are active, and some charge a fee, although indirectly, as a membership fee for a group or club.

Commercialization does not necessarily imply a direct cash payment for advice or doing away with public extension altogether. The latter may be neither feasible nor desirable, at least in the interest of equity and broader coverage, in the foreseeable future. Creating partnerships with local suppliers, providing training sessions for them (although they are likely to be able to afford fees for training), and improving the infrastructure for input delivery are also ways of commercializing information delivery.

Recovering costs through direct charges may not be as far-fetched as is often believed; farmers appear to be willing to pay for extension advice. Even if direct charges are only nominal or partial, they have several advantages in correcting for the shortcomings of the current system. They provide the right incentives for agents to deliver the advice that farmers want; make agents accountable to the farmers; build in a genuine quality control mechanism; alleviate budgetary constraints (at least somewhat); and encourage other, notably private, services. Commercialization does not necessarily mean totally privatizing services. Ways of introducing commercial elements into the provision of public service and various forms of partnership between civil society and public and private entities can be profitably exploited. Such partnerships are already emerging in Kenya.

**Recovering costs through direct charges may not be as far-fetched as is often believed; farmers appear to be willing to pay for extension advice.**





# Beneficiary Assessment

A participatory beneficiary assessment was included in the study to hear directly from the farmers about their access to extension services, the quality and relevance of the advice they receive, and their suggestions for the future.<sup>1</sup> In the spirit of collaboration, it was agreed that MALDM would conduct the beneficiary assessment with active involvement from OED and the Bank's Africa Region. After the initial preparations had been made, however, MALDM decided unilaterally, for unknown reasons, not to pursue the assessment.

This study draws instead on two independent assessments. One was a beneficiary assessment conducted for a separate OED study (Actionaid Kenya 1997, done for an OED NGO study, 1998). One of that assessment's components was designed to obtain the views of users, as well as potential users, of Kenyan extension services, and some of the findings are relevant to this study. The second assessment was a participatory poverty assessment (PPA) conducted in Kenya in 1994, and some of the results are also pertinent for this study (Narayan and Nyamwaya 1995).<sup>2</sup> The findings of both assessments are complemented by those from the OED survey.

## Welfare and Productivity

The ultimate goal of NEP I and NEP II was to improve farmers' welfare, primarily by increasing agricultural productivity. At the start of the OED survey, farmers were asked to assess their welfare (defined as a self-assessed standard of living) and farm productivity relative to their situation 10 to 15 years earlier. The majority, or 66 percent, thought that their welfare was lower than it had been before; only 25 percent thought that it was better. As for agricultural productivity, more

than 72 percent thought it was lower than before, while 25 percent thought it had improved. Similar sentiments were expressed in the 1994 PPA: most of the respondents thought that life had been better eight to ten years earlier. In a follow-up PPA conducted in 1996 by the Central Bureau of Statistics in Kenya, about 70 percent of the participants thought that poverty was worse than it had been five years earlier. The Actionaid Kenya assessment presented a similar picture.

## Access to Services

The OED survey asked farmers about the change in their access to, and the quality of, 19 social and infrastructure services, including extension, over the past 10–15 years. The results are presented in table 3.1. A large majority—75 percent—thought that their access to extension had not changed. Very few thought quality had improved (11.4 percent), but the largest number (39.4 percent) thought it had deteriorated. Compared with other services, extension appears to be generally worse-off in

**Most respondents thought that life had been better eight to ten years earlier.**

**TABLE 3.1. CHANGES IN FARMERS' ACCESS TO SERVICES AND SERVICE QUALITY**

Service	Access				Quality			
	Better	Worse	No change	Don't know	Better	Worse	No change	Don't know
Seed dealer	34.6	1.0	63.9	0.5	51.7	6.2	37.5	4.7
Fertilizer-chemicals store	31.5	1.0	66.4	1.0	48.7	3.7	40.2	7.4
Village shopping center	14.4	0.2	85.2	0.2	69.8	6.9	23.1	0.2
Output market	14.5	1.3	84.0	0.2	53.3	10.6	34.3	1.8
Banking services	18.7	1.3	77.5	2.5	27.9	3.2	43.2	25.8
Other credit sources	10.6	1.4	78.5	9.5	22.5	8.9	40.6	28.0
Private health centers	62.0	0.6	34.8	2.6	54.2	4.9	26.7	14.2
Public health dispensary	23.7	1.9	74.3	0.2	30.8	48.2	20.2	0.9
Primary school	14.5	0.3	85.2	0.0	50.6	14.1	33.7	1.6
Secondary school	20.5	1.2	78.3	0.0	51.2	8.7	34.7	5.5
Electricity	51.7	1.3	46.3	0.7	20.8	1.1	58.6	19.4
Telephone facility	48.6	2.2	48.0	0.3	30.4	8.9	46.4	14.4
Piped water	33.7	18.0	59.4	3.8	11.9	20.4	46.7	21.0
Tarmac road	14.7	1.9	83.1	0.3	26.1	30.2	40.7	2.8
Dry season road access	6.5	3.3	90.0	0.2	22.9	50.3	26.5	0.4
Public transport	7.6	1.2	91.2	0.0	41.3	17.9	40.8	0.0
Private veterinary services	51.7	0.7	32.5	15.1	42.1	5.1	30.3	22.6
Public veterinary services	17.2	2.4	77.3	3.1	16.0	27.3	42.8	13.9
Extension services	16.6	3.8	75.0	4.6	11.4	39.4	32.9	16.4

Source: OED survey.

perceived quality. It is noteworthy that for a number of services, private providers have compensated for the decline in public services. For example, veterinary services have been privatized as a matter of policy, and this is reflected in better access and quality in private extension services. Other public services that have deteriorated significantly are roads and public health.

#### Interactions Between Farmers and Agents

The PPA and the beneficiary assessment also reveal that access to information is lacking, particularly among the poor. Both assessments found extension

**Extension staff target wealthy farmers, hoping that the demonstrations will encourage the other, relatively poorer, farmers to adopt the same high-input, high-cost technology.**

services to be sporadic or irregular, and generally targeted toward the rich or large landowners, bypassing the poor. Interactions with extension agents were noted as being few, and service was generally reported to be inconsistent, inadequate, and infre-

quent.<sup>3</sup> Most farmers mentioned the chief's *baraza*, the radio, or friends and neighbors as their most

consistent source of information. The few demonstrations that are held are on the wealthier or more progressive farmers' fields, which are the ones that extension agents generally visit. The beneficiary assessment also found that residents of zones with lower potential have little access to extension and that NGOs are servicing them. Extension and NGOs, however, have no effective interaction.

#### The Relevance of Agents' Advice

The differing perceptions of the needs of the poor are an important issue in extension service effectiveness. The extension staff target the wealthy farmers, hoping for faster adoption of new technology, since it is more likely that the wealthy will be able to afford it. At the same time, however, the intent and the hope are that the demonstrations will encourage the other, relatively poorer, farmers to adopt the same high-input, high-cost technology. This contradiction limits the effectiveness of the current approach to extension. The current nonusers, or those who do not have access, would like to get information on crops that the larger farmers do not grow—crops other than maize and coffee. They also seek advice on less costly technologies, marketing, and diversification. This is not the sort of information they get on demonstration plots, which are usually maize demonstrations. At the same

time, the users—that is, the few who do have access—consider the technical advice they are given to be relevant and high in quality.

### **Farmers' Priorities**

Among the services that farmers would like to see improved, if they were to pay for the improvements, about 5 percent selected extension as their top priority. In overall ranking, however, extension was sixth among the 19 services.<sup>4</sup> The services ranked higher are also the ones that the farmers reported as having deteriorated in quality.<sup>5</sup> They generally gave lower rankings to services that had improved. This is consistent with the perceived deterioration of extension services.

### **Conclusions**

The beneficiary assessment and the survey are consistent in finding that welfare has declined over time. The assessment's findings also show that most farmers, especially the poor, have little access to extension advice. But this result should be put in perspective. Both the PPA and the beneficiary assessment noted that those who have access, or the current users of extension services, recognize the quality of the advice rendered. Extension is also not expected to reach all

farmers, and hence the need for selectivity and reliance on farmer-to-farmer information dissemination. The observation that extension is weak in low-potential zones is also consistent with the focus of extension, especially in NEP I, on zones with relatively high potential.

The key insights from the beneficiary assessment and the PPA point to the reasons for the limited effectiveness of the current extension system. The poor quality

of interaction with the vast majority of poor and smallholder farmers and the irrelevance of advice to their needs suggest poor targeting and poor responsiveness. If extension has to be selective, it should select a more representative set of farmers so that the advice delivered is relevant to a broader range of farmers. It is also clear that the needs of the farmers, particularly the small farmers, are diverse and go well beyond the production of traditional crops such as maize and coffee.

**The poor quality of interaction with the vast majority of poor and smallholder farmers and the irrelevance of advice to their needs suggest poor targeting and poor responsiveness.**





# Efficacy

## The Quantity and Quality of Contact

**E**fficacy refers to the extent to which the project design successfully delivered extension advice. For NEP I and NEP II, efficacy can be viewed as the overall effectiveness of both the extension system's approach and its outreach. In either case, efficacy is assessed through the output indicators for the projects: the extent and nature of contact between farmers and extension. The detailed findings presented in Working Paper 1 to this study (see Bibliography) are summarized here. The study

analysis uses data from the 1997 OED survey on the farmers' access to information on agricultural enterprises, including specific questions related to the nature and extent of contact with the public extension service.

### **Program Design**

It is generally believed that extension services before NEP I were ineffective and inefficient. The extension system favored progressive farmers, especially the larger, more educated, and male farmers. NEP I and NEP II sought to rectify these biases. Both followed standard T&V principles and used contact farmers and, later, contact groups as the point of interaction with the farming community. (The design of NEP I and NEP II is summarized in Annex B.)

The design called for providing advice biweekly to about 10 to 15 percent of the farmers, with information about up-to-date practices best suited to their specific conditions. Extension agents were to work mainly with the contact farmers (henceforth, both individual and group contact farmers are referred to as contact farmers), but would involve as many other farmers as possible in the demonstrations and discussions. Extension workers would visit farmers regularly and receive systematic training and technical support from research staff.

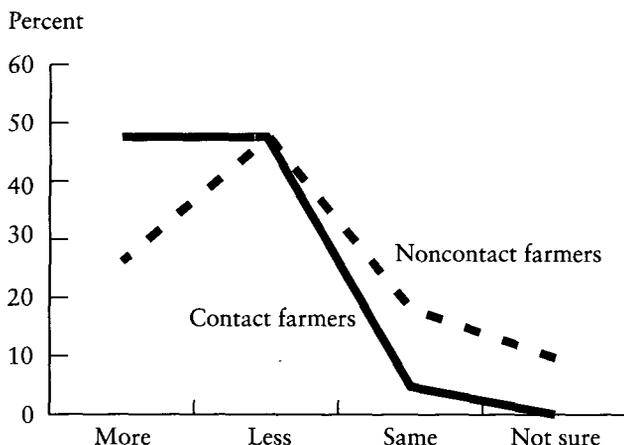
The initial focus of NEP I was to be on simple messages, concentrating on a few important crops and the most important crop production activities. The focus was also on low-cost improvements that the majority of farmers could afford. The implicit assumption was that once productivity and revenues had increased, a farmer could graduate to more costly technological components with the additional income generated.

### **Access to Information**

Public extension has historically been an important source of information in rural Kenya. Farmers' customary source of information on agricultural activities is the government extension service; there are few alternatives. But almost half the farmers, including contact farmers, think that information is less available now than it was 10 to 15 years ago (see figure 4.1), and less than 30 percent think it is more available now. While these

**Farmers' customary source of information on agricultural activities is the government extension service; there are few alternatives.**

**FIGURE 4.1. THE AVAILABILITY OF INFORMATION: NOW, RELATIVE TO 10-15 YEARS AGO**



Source: OED survey.

perceptions do not necessarily provide an accurate comparison with conditions before the projects were implemented, they do indicate that the availability of information declined over the life of the two projects.

**The Contact Farmer Approach**

Contact farmers made up about 9 percent of the sample. While this proportion is a bit lower than the preferred 10 to 15 percent, it is reasonable. However, the data also show that the more educated farmers had a significantly higher probability of being selected as

**Only about 7 percent of the contact farmers meet extension agents as planned—that is, regularly, in either their own or a neighbor's fields, and at least once a month.**

contact farmers. Being a woman farmer lowered the probability, although the result is only weakly significant (at the 10 percent level). This is consistent with the findings of the beneficiary assessment and PPA cited in Chapter 3, and it shows that at least some of the biases of the previous

system continued to affect service.

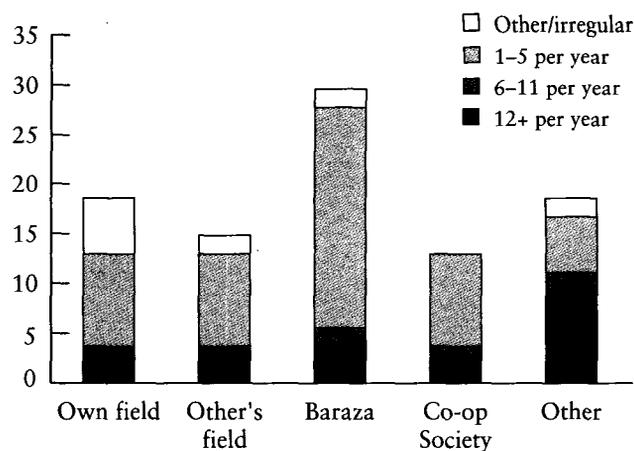
The poor quality of contact is reflected by the finding that only 22 percent of even the designated contact farmers meet as often as once a month, much less biweekly, as prescribed. Less than a third of the contact farmers normally meet extension agents in their own or their neighbors' fields (see figure 4.2). The most striking finding is that, even on a monthly basis, only about 7

percent of the contact farmers meet extension agents as planned—that is, regularly, in either their own or a neighbor's fields, and at least once a month. Following the projects' design, using monthly meetings as the norm, about 20 to 30 percent of the population should be in regular contact with extension services. In the entire sample, however, only about 2 percent of the farmers regularly meet with extension agents. Considering that extension concentrates on a few chosen farmers, this low level of contact is highly unsatisfactory.

The low frequency of farmer-extension agent contact is not a statistical artifact of this survey or of current times. The 1990 ATD survey obtained almost identical results (Bindlish and Evenson 1993). Even in 1990, before the start of NEP II, only about 2 percent of all farmers were meeting extension agents as planned (only 3 percent of all farmers were meeting extension agents monthly in any setting in 1990). These results indicate the poor efficacy of both NEP I and NEP II in delivering extension advice in Kenya.

The efficacy of the contact farmer approach also depends on indirect dissemination through demonstration and spread effects. The T&V plots established in the contact farmers' fields were expected to have strong demonstration effects on other farmers. But these effects were likely rather limited, because less than a third—31 percent—of noncontact farmers even know of a contact farmer in their neighborhood.<sup>1</sup> The alternative, the spreading of information verbally from contact to noncontact farmers, is also likely to have been limited by

**FIGURE 4.2. NORMAL PLACE AND FREQUENCY OF EXTENSION AGENT-CONTACT FARMER MEETINGS**



Source: OED survey.

apparently poor communication between the two groups. Among the few noncontact farmers who know of a contact farmer, 58 percent report having received advice from the contact farmer on any occasion, and only 22 percent (that is, 8 percent of all noncontact farmers) receive advice regularly. However, a significantly higher proportion of the same farmers—86 percent of those who have ever received information and 93 percent of those who receive it regularly—also indicate that they discuss general agricultural information with other farmers. The flow of information from contact to noncontact farmers is clearly not working as well as might have been expected.<sup>2</sup>

Contrary to the projects' objectives, the methods that currently appear to be most widely used are the same methods that were popular before the projects began: most farmers, including contact farmers, rely on *barazas* and other forums to meet their extension agents. This outcome is significantly at odds with the intent of T&V, which seeks to bring about a qualitative change in the nature of extension contact with farmers by moving away from *barazas* and other public meetings, as they provide little opportunity for interaction. Public meetings rely largely on exhortation and are useful for broadcasting simple messages, but they are not conducive to effective learning or substantive exchanges on technical problems.

### System Performance

It is important to consider the change in the overall efficacy and efficiency of extension under NEP I and NEP II, irrespective of the method used. Outreach is

typically measured by such indicators as whether or not farmers have met an extension agent, which includes any type of contact, and the time of first contact. Although these measures are poor indicators of either the quality or the effectiveness of extension services, they are used here because they allow some comparison of systemic outreach before and after NEP I.

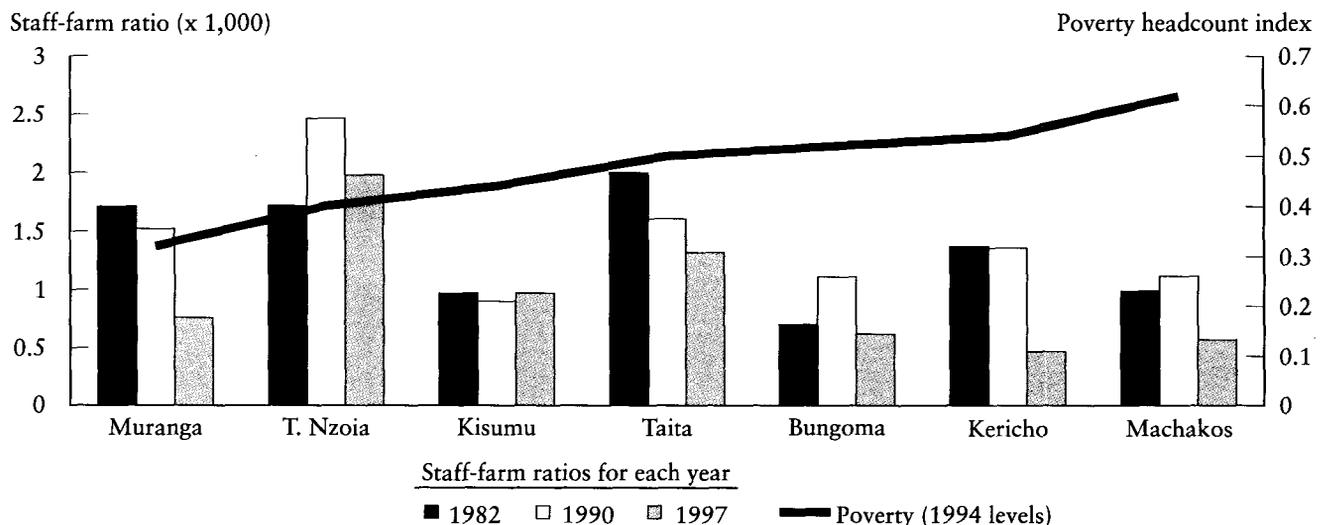
Since the start of NEP I, the proportion of farmers who have met extension workers has increased, and the increase is significantly higher for newer than for veteran farmers.<sup>3</sup> However, the increase in outreach is almost directly related to the increase in staff numbers, indicating little or no gain in staff productivity or systemic efficiency.

**Contrary to project objectives, the methods that currently appear to be most widely used are the same methods that were popular before the projects began.**

### Biases

The pre-NEP I extension system was known to be biased in favor of the more progressive farmers and areas of higher productivity. Statistical tests show that some of the earlier biases against women, small farmers, and farmers living far from access roads have been rectified, largely as a result of the expansion of services to previously neglected areas.<sup>4</sup> But new biases

**FIGURE 4.3. EXTENSION STAFF ALLOCATION AND POVERTY BY DISTRICT**



Source: OED survey and Mukui 1994.

have appeared, favoring more educated farmers, higher-potential zones, areas closer to markets, and areas closer to Nairobi. These findings are consistent with the headquarters-centric development of Kenya's extension system. The bias against relatively poorer areas, however, has been maintained (see figure 4.3).

### Farmer Assessment of Extension Advice

While less extension advice is delivered than the projects expected, the farmers' approval rating of meetings and messages they receive, measured in terms of "usefulness" and "applicability," is a very high 86 percent.<sup>5</sup> Even so, few farmers, about 40 percent, have actually applied the extension agents' recommendations. More important, the majority of even the contact farmers—51 percent—have not applied the recommendations. This disparity between the farmers' positive assessment of the recommendations and their reluctance to apply them is discouraging.<sup>6</sup> The

**The majority of the contact farmers did not notice any change in the delivery of extension services 1996, despite the disruption in the flow of funds for almost the entire year.**

findings indicate that while farmers think that the messages are probably good, they are just not meant for them, which calls into question the relevance of the advice. There is also a mismatch between the recommendations that the farmers find most applicable, interpreted as the effective supply of information—generally simple or unsophisticated agromonic practices—and their

demand for information about more sophisticated input-application or intensification issues.<sup>7</sup>

### The Suspension of NEP II's Disbursements

Finally, an incident with potential consequences for this evaluation was the suspension of NEP II's disbursements in 1996. Although the survey was conducted nine months after the suspension was lifted, providing sufficient time for the system to get back on course, the farmers' survey responses could reflect the adverse effects of the suspension on extension activities. The disruption of services also provides the rare opportunity for a counterfactual to evaluate the current effectiveness of the system.

Since contact farmers are the most likely to be affected by the disruption of services under the T&V

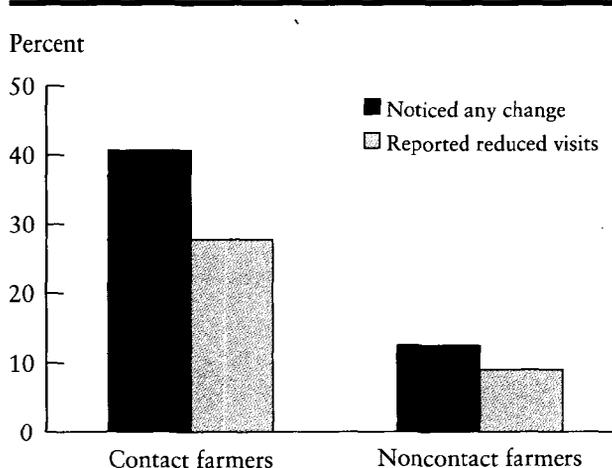
system, their responses are particularly significant. The majority of the contact farmers, or 60 percent, did not notice any change in the delivery of extension services in 1996, despite the disruption in the flow of funds for almost the entire year (see figure 4.4).<sup>8</sup> As may be expected, the proportion of noncontact farmers who reported no change was considerably higher, at 88 percent. Whatever methodology the extension system uses, the finding that the majority of the farmers did not notice any change raises two possibilities. One is that services were continued as usual by substituting nonproject funds, calling into question the additionality of NEP II funds. The other, more likely, possibility is that the frequency of interaction among the contact farmers, as for most farmers, was generally low, so that few noticed a disruption in service delivery. This more likely scenario indicates the lack of effectiveness of the current extension system.

### Conclusions

The key finding is that the contact farmer/group approach, central to the design of NEP I and NEP II, is not working as anticipated. There is no apparent improvement in either the qualitative or the quantitative aspect of the interaction between extension agents and farmers compared with the assumed pre-project situation. More specifically, there has been no improvement since 1990, when NEP II started, and even then the approach was performing very poorly.

Farmers think that information is less available now than it was 10 to 15 years ago. The nature of

**FIGURE 4.4. IMPACT OF THE SUSPENSION OF NEP II DISBURSEMENTS**



Source: OED survey.

meetings between extension agents and farmers is not of the quality that was expected and appears to be no better today than it was before the projects began. The extension agents have started using alternative methods, and many appear to have reverted to the old methods, particularly *barazas*, to reach the farmers. For relatively simple messages, this approach may be more cost-effective. For advice on more complex practices and for solving problems specific to individual farmers, however, this method is unlikely to be very effective. While systemic outreach has increased

and some of the biases of the previous system have been rectified, this has largely been the result of an increase in staff numbers, rather than improvements in staff productivity. The relevance of the advice that agents deliver is apparently limited, judging from the failure of the majority of farmers to apply the recommendations, and it is not responsive to their needs.

That a service disruption of almost a year went largely unnoticed by contact and noncontact farmers alike suggests the lack of effectiveness of the current system.





# Outcomes

## Farmer Awareness and Adoption

In the causal chain from investment in extension to the desired impact, farmers' awareness and adoption of technological components are important indicators of extension services' proximate impact, and they provide a backdrop for assessing their *potential* economic impact.<sup>1</sup> Impact will surely be limited if extension is unable to appreciably increase the level of farmer awareness. Further, despite awareness, the potential benefits in the form of increased productivity will be limited if the farmers do not adopt the recommendations.<sup>2</sup>

The degree of non-adoption reflects, in part, the quantity and relevance of extension advice, especially given the technical, marketing, and resource constraints that farmers face.<sup>3</sup>

Information is typically diffused through a number of channels, extension services being only one. Extension's role becomes important when the normal process of diffusion is too slow. It becomes particularly important in conveying more complex information, such as the type and quantity of fertilizer to use with a particular crop or a new crop variety, and in solving problems specific to individual farmers or local areas, such as pest control or soil micronutrient deficiency. In the T&V approach, selectively "infecting" contact farmers with new information is expected to speed up the usual rate of diffusion.<sup>4</sup>

Working Paper 2 in support of this study, which deals with awareness and adoption of extension messages, presents details of the data and analytical methods used, and the results. The main findings are summarized here. The analysis in this chapter deals with recommendations for cropping activities.<sup>5</sup>

### Awareness

All farmers have heard maize-related messages, most are aware of the messages on cash and minor food crops, and about two-thirds have heard of the crops currently being promoted by extension. The proportion of those who are aware is higher in the more productive districts and where the crops have a relatively long history. Thus, at a very basic level, messages appear to be reaching the farmers, with some room for improvement for new crops.

**Extension's role becomes important when the normal process of diffusion is too slow.**

Awareness of simple agronomic recommendations is high, but falls significantly as practices increase in complexity. Surprisingly, the levels and pattern of awareness among contact farmers are similar to those among other farmers. The lack of awareness of complex messages among contact farmers is disappointing, considering that intensive, face-to-face inter-

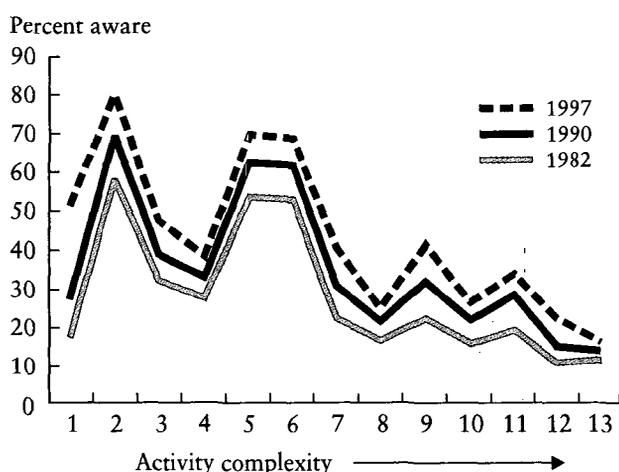
action has an advantage over other methods of extension in delivering such advice.<sup>6</sup>

During NEP I and NEP II, farmers' awareness appears to have increased only modestly (see figure 5.1). More important, the pattern by activity has remained virtually identical. The simpler messages, for which the current level of awareness is high, were already distinguished by high awareness before NEP I.<sup>7</sup> For the relatively complex practices, low levels of awareness have persisted. For most activities, change was relatively greater during NEP I than during NEP II.

Awareness is relatively high for maize-related messages, but it is significantly lower for other crops, especially cash and nontraditional crops.<sup>8</sup> Even for maize, however, the difference between simpler and more complex messages persists. Given the high levels of awareness of simpler messages, the marginal returns to additional efforts at extending them are likely to be low. Data from the current survey, as well as findings

**For the relatively complex practices, low levels of awareness have persisted.**

**FIGURE 5.1. FARMERS' AWARENESS OF SIMPLE-TO-COMPLEX MESSAGES, 1982-97**



Note: The simplest of the 13 types of messages is at the far left of the horizontal axis, the most complex at the far right. The activities are crop variety (1), planting time (2), spacing (3), seed rate (4), weeding time (5), weeding number (6), basal fertilizer type (7), basal fertilizer quantity (8), top-dress fertilizer type (9), top-dress fertilizer quantity (10), top-dress fertilizer time (11), chemical plant protection (12), and cultural plant protection (13).

Source: OED survey.

from the 1990 survey, suggest that efforts to extend awareness of simple messages during NEP II are also likely to have had limited payoffs.

For farmers who are aware, government extension is a sizable, but not the largest, direct source of information. This is to be expected, since extension can reach only a small proportion of its client population. But even among contact farmers, who meet extension agents the most regularly, fewer than half cite extension as their source information. This is consistent with the earlier findings that even most contact farmers do not meet extension agents regularly.

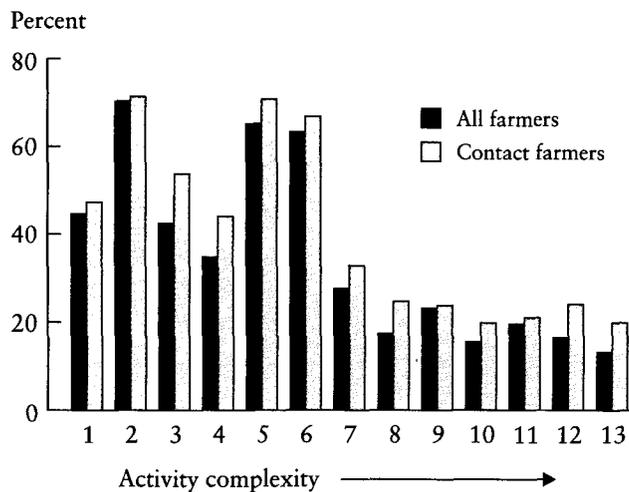
An intertemporal analysis of information sources reveals that even before NEP I, public extension was the main source of information for spacing and the more complex practices. As a source of other, simpler messages, extension's role was relatively small, while friends and family were a more important source. During NEP I and NEP II, extension's share as the main source of simple messages increased significantly, but its share for complex messages fell (particularly during NEP II). Equally significant is the increase not only in the private sector's delivery of messages on complex practices, but also that of other sources such as specialized services, cooperative societies, and youth clubs for simpler practices. These trends reflect the continued focus on simpler messages during NEP I and II. They also reflect the dynamism of an information system that is undergoing a transition, with nonpublic sources becoming increasingly important providers of information.<sup>9</sup>

### Adoption

The patterns of adoption follow those of awareness. In general, the levels at which farmers adopt agents' recommendations, except for some simpler practices involving planting time and weeding, are very low. Less than a quarter of the sample has ever tried any of the recommendations for the complex practices. A breakdown by current and past adopters shows that the proportion of farmers currently applying recommendations is almost negligible for more complex practices (see figure 5.2). Not surprisingly, current adoption rates are relatively higher for maize than for other crops. However, a comparison with ATD's survey results, which is feasible only for maize practices, indicates that the levels of adoption have remained almost the same since 1990.

As expected, among the reasons that recommendations are not adopted, or are discontinued, farmers cite

**FIGURE 5.2. FARMERS' ADOPTION OF EXTENSION RECOMMENDATIONS, 1982-97**



Note: See activity list in figure 5.1.  
Source: OED survey.

lack of funds most often. A sizable proportion of the sample, 40 percent, report their reasons for not adopting recommendations as resource constraints, including land and labor. However, an almost equally substantial proportion of the sample, 34 percent, cites reasons that could be addressed through proper extension advice.

The most significant finding is that a very large proportion of those who are aware have adopted the practices—more than 80 percent for even the more complex recommendations. Thus, while credit and resource constraints may be important factors, the primary constraint on the adoption of recommended practices is lack of information.<sup>10</sup>

#### Statistical Tests of Extension's Impact

The statistical analysis was designed to establish the factors that influence the probability of awareness or adoption of each recommended practice.<sup>11</sup> (Approaches and results are detailed in Working Paper 2.)

The main finding is that the current supply of extension cannot be associated with a greater probability of either awareness or adoption of individual extension messages. However, the supply of extension in 1982 continues to have a strong positive impact on current awareness and adoption. These results suggest that information diffusion has proceeded at its own pace; the impact of NEP I and NEP II is not apparent from the current data.

The test of the efficacy of the contact farmer

approach also yields disappointing results. Being a contact farmer increases the probability of awareness only for spacing and cultural plant protection practices (with the contact variables treated as exogenously given). Allowing for the endogeneity of the measured contact variable (that is, with instrumental variables), contact farmers have a higher probability of awareness for only 5 of the 13 messages tested.<sup>12</sup>

Among other factors, social capital increases the probability of awareness of simpler messages, while farm size has the same effect for complex messages. Education has positive short- and long-term impacts—primary education for simple practices, and higher education for complex practices. Better infrastructure (in the form of roads) increases the probability of awareness for most practices, while the distance to Nairobi and off-farm work generally have a negative effect.

The adoption analysis tried a new specification to directly estimate delayed impacts, but it fails to show a positive influence of extension activities since 1982.<sup>13</sup> The initial stock of knowledge—that is, at the start of NEP I—has a strong positive influence for every practice, but the subsequent supply of extension does not show any significant or systematic impact. The only significant impact discernible is the negative effect on the adoption of complex practices for the early years of NEP I.

#### Conclusions

Both the descriptive and statistical analyses show that the focus of the Kenyan crop extension service has remained on providing advice on simple agronomic practices. The pre-1982 bias in favor of the simpler messages and maize has continued. The data do not reveal any

significant correction of this bias. The evolution in the levels of awareness and adoption also suggests that the underlying dynamics of the diffusion process have been little influenced by extension activities. Thus, the less sophisticated messages, which are amenable to quick diffusion through informal communication channels or casual contact, and messages that have been known for a long time have continued to spread. The less well known and the more sophisticated have lagged behind,

**A very large proportion of those who are aware have adopted the practices—more than 80 percent for even the complex recommendations.**

with low levels of awareness and adoption.

While the focus on simpler messages and the primary subsistence crop, maize, may have been justified in the early years, the benefits of such efforts are clearly bounded. For continued increases in productivity, a graduation to more sophisticated practices would be the natural path of evolution in an effort to intensify agricultural production. Such a transition, however, is

**Because face-to-face extension is best suited to delivering more sophisticated and context-specific advice, the preoccupation with simple messages clearly indicates that the design features of the projects were not fully exploited.**

not evident from the current data, either in awareness or in adoption of the more complex practices. This could be a result of either a poor focus of extension efforts or a lack of expertise in delivering the more complex messages, or perhaps both.

The continued emphasis on simple practices and maize, despite seemingly high levels of awareness of these practices before the project period, and the lack of association of post-1982 extension with adoption rates suggest that the potential impact of NEP I and NEP II

on agricultural productivity may be limited. This is apparent, at least for NEP II, from a comparison with the results of the ATD's survey of the same population, which shows that adoption rates have remained virtually unchanged since 1990.

This raises concerns about the cost-effectiveness of the T&V approach as applied in Kenya, particularly given its considerable cost. Because the major share of the system's cost stems from its focus on face-to-face extension, which is best suited to delivering more sophisticated and context-specific advice, the preoccupation under both NEP I and NEP II with simple messages clearly indicates that the design features of the projects were not fully exploited in Kenya. This is particularly noteworthy for NEP II. At its start, it was clear (from the ATD study) that most farmers were aware of, and a large proportion had adopted, the simpler messages for maize.

The economic justification for the investment in extension under NEP I and NEP II—whether the returns to extension justify the costs incurred—requires an estimation of the *actual* impact of extension on agricultural productivity. That exercise is the subject of the next chapter. The findings in this chapter indicate that it is unlikely that the *potential* impact of the T&V system as implemented in Kenya since 1982 was significantly greater than that of the extension system it replaced.



# Results I

## Farmer Efficiency and Productivity Change

The impact of extension is most directly measured by relating it to farm productivity. Changes in productivity can result from improved efficiency or technical change. Productive efficiency is a measure of the farmers' level of skill and knowledge, often termed managerial skills, in producing the most with a given set of production inputs, or in producing a given level of output with minimal inputs. Technical change is a result of technological advance—for example, improvements in the quality of inputs. Extension has

an important role in both production efficiency and technological change: in the first by imparting knowledge and advice on best practices suitable to the local circumstances to improve farmers' skills, and in the second by disseminating information on the latest technological advances.

This chapter presents an investigation of farmers' levels of efficiency in crop production at two points in time using the data envelopment analysis (DEA). DEA is a nonparametric method that allows a ranking of households by their level of efficiency. Also measured is the change in farm-level productivity between 1982 and 1997, using the Malmquist index. (A detailed description of the technical aspects of the analysis, data considerations, the assumptions maintained, and the results produced is presented in Working Paper 4 in support of this study.) The analysis uses the 1982 RHBS data to describe farm circumstances before the projects began, and 1997 OED survey data to elucidate the current situation. The two surveys have 285 households in common;

these are used to calculate the Malmquist indexes of productivity, efficiency, and technical change.

The data for 1982 are limited, but did yield some input-based technical efficiency measures. The data for 1997 are more complete and allow the estimation of overall cost-efficiency and its components—the technical, scale, and allocative measures—to help identify the source of inefficiency.<sup>1</sup> What is measured is relative efficiency—that is, each observation is measured against the best practice, or *production frontier*, generated from within the sample.

**Extension has an important role to play, both in improving production efficiency and in promoting technological change. It can impart knowledge regarding best practices for a given circumstance and disseminate information on new technology.**



Field consultations.

All observations are ranked against the most efficient farmer in the sample.

### Relative Efficiency

The average farm was operating at a very low level of technical efficiency in 1982 (31 percent), and although there was some improvement, relative efficiency was still quite low in 1997 (45 percent). The scale of farmers' operations has improved, but a majority still operate at a suboptimal scale; statistical tests fail to reject the hypothesis of nondecreasing returns to scale.

**The low level of cost-efficiency implies that the allocative efficiency of households is quite low, which indicates that the farmers are not using economically optimal levels of inputs.**

ciency. Thus, even with the current level of technology, it appears that a simple change in the input mix, to one that is more economical given the current market conditions, would offer farmers the potential for significant savings.

A comparison of cost or allocative efficiencies between 1982 and 1997 is precluded by a lack of price data for 1982. For 1997, the results show that the average level of economic (cost) efficiency was very low (15 percent), much lower than technical effi-

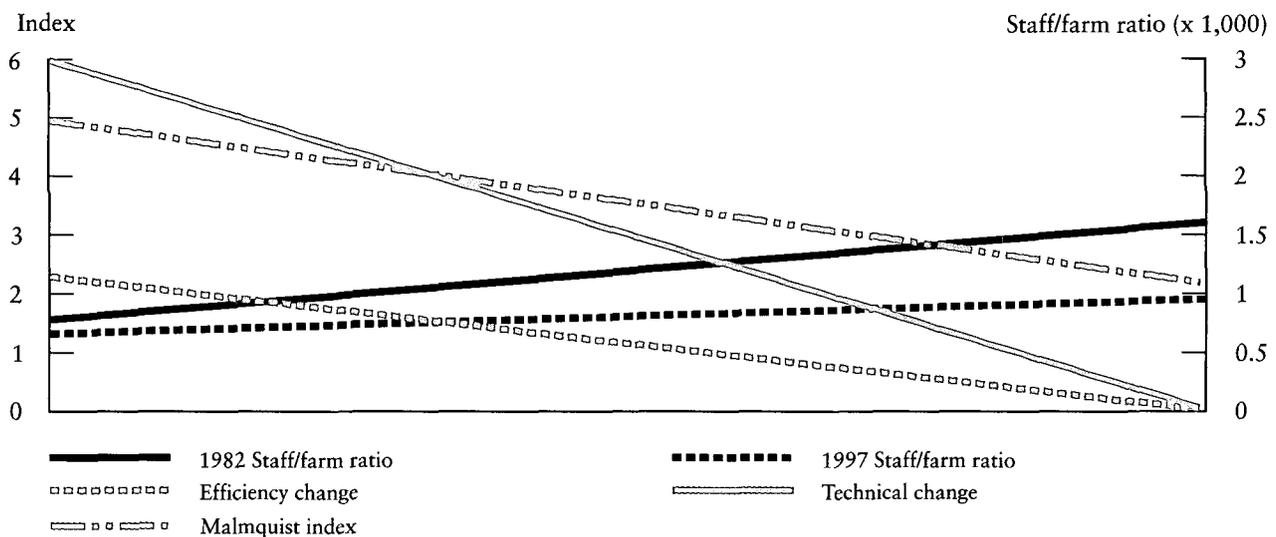
The measures above, calculated over all regions, are useful in putting the overall picture in perspective. Since regions vary in their productive potential and agroecological endowments, district-specific measures were also calculated for 1997. As expected, the average level of technical efficiency increased (with an average efficiency level of 69 percent), but the economic efficiency was still very low (30 percent). The low level of cost-efficiency implies that the allocative efficiency of households is quite low, which further indicates that the farmers are not using economically optimal levels of inputs.

A statistical analysis using the 1997 district-specific efficiency measures fails to reveal a statistically significant relationship between any of the efficiency measures (cost, technical, or allocative) and the supply of extension services. In these tests, the cluster average technical efficiency for 1982 is used to control for the regional effects for each location, and extension supply is measured as a weighted average of lagged extension staff-farm ratios. Qualitatively, extension has a small positive coefficient in the cost and technical efficiency relationships, but a negative coefficient for allocative efficiency. The 1982 efficiency level is positive and significant for cost and technical measures, and positive but weakly significant for allocative efficiency.

Although there is no clear-cut rationale for including district-specific effects, since efficiency measures are calculated by district, the consequence is that the effect of the supply of extension on technical efficiency is still low and positive (0.056), but is now significant at the 10 percent level. Overall, the results do not change much, but they do reinforce hints of mild extension effects on technical efficiency. Cost and allocative efficiency results do not change.

To test for the effectiveness of alternative extension methodologies, indicators for the normal place and frequency of meetings were tested in a separate set of regressions. The frequency of meetings has no influence on efficiency. Those who interact with extension agents at cooperative society meetings have a large but weakly significant effect on both cost and technical efficiencies.<sup>2</sup> It might also be expected that contact farmers would be more efficient, but the current data do not show this for any measure of efficiency.

Among other variables, farm size has a strong negative effect on cost and technical efficiency; that is, smaller farmers are more efficient. Distance to markets has a significant negative effect on allocative effi-

**FIGURE 6.1. PRODUCTIVITY CHANGE, 1982–97: TRENDS IN CLUSTER AVERAGES**

Note: Clusters sorted by average 1982 efficiency scores.  
Source: Results of DEA analysis using OED survey data.

ciency, no effect on overall cost efficiency, and a positive effect on technical efficiency. This suggests that farmers farther from markets may be specializing in specific crops, and hence may be more efficient; those close to markets may be diversifying, and while they gain in allocative efficiency, they compromise technical efficiency. As may also be expected, agroecological variables variously affect all measures of efficiency. Larger families and land fragmentation have a negative influence on cost and technical efficiency, and farmer age has a weak negative effect on technical and cost efficiency. Social capital has a weakly positive effect on allocative efficiency, while distance to dirt roads has weak negative significance for both cost and allocative efficiency. Households whose heads have attained higher levels of education also have a lower cost efficiency, but the result is only weakly significant.

### Productivity Change

Relative measures for individual years do not indicate how efficiency or productivity has changed. These changes are measured with the Malmquist index for productivity change, which is also decomposed into indexes that measure technical and efficiency changes. The indexes are calculated by district to control for regional effects in production and the economic environment.<sup>3</sup> The results show that, on average, produc-

tivity increased by 28 percent over the period 1982–97. This increase stemmed largely from positive technical change, which raised productivity by about 56 percent. The technical improvement, however, was moderated by a decline in efficiency of 31 percent, on average, relative to 1982 levels. By district, the more productive districts (Kericho, Muranga, and Trans Nzoia) experienced net productivity declines, while the others experienced substantial gains (with the largest gains in Kisumu and Machakos, followed by Bungoma and Taita Taveta). Most districts show technical progress, but declines in efficiency. The exceptions are Kericho, with no technical change but a decline in efficiency, and Trans Nzoia, with significant technical regression but a modest gain in efficiency.<sup>4</sup>

The measures reveal some unexpected trends. Figure 6.1 plots the linear trends in the cluster-level averages of the three Malmquist indexes.<sup>5</sup> The data are sorted in ascending order by the 1982 cluster-level average relative efficiency. The trends show that clusters that had high

**The less productive districts have experienced substantially greater productivity gains. Most districts also show technical progress, but declines in efficiency.**

average efficiency levels in 1982, generally in the more productive areas, gained less in total productivity, and some may have regressed.<sup>6</sup> The trend in efficiency is similar, but shows relatively smaller changes. The technical change trend is much flatter, but, again, negatively correlated with the 1982 level of efficiency. Without any major technological advances, these results show a convergence across regions toward homogeneity in the level of productivity.

How does this relate to extension? Figure 6.1 also shows the trends of the staff-farm ratios in 1982 and 1997. Other ratios are not shown since these trends are similar—that is, positively correlated with the 1982 level of efficiency. The 1990 trend is steeper than that of 1982, indicating that the allocation of front-line staff during NEP I generally favored the more productive regions. During NEP II, recruitment was frozen. The decline in the slope of the 1997 trend may thus reflect natural attrition in the frontline work force. Productivity change is clearly inversely correlated with the allocation of extension staff.

### Conclusions

The results of this analysis, especially as summarized in figure 6.1, are striking. The analysis shows that there has been little change in the areas that were relatively more productive in 1982, while the other regions have been catching up. This suggests that the more productive areas may have reached an upper

bound, and with little new technology forthcoming to substantially raise production, their productivity has stagnated. However, the efforts of the extension services have been consistently focused on these areas. At the same time, a general lack of improvement in efficiency has meant that even in districts that have seen technological progress, the overall potential for productivity gains has been compromised.

Combined with the still very low overall efficiency (as measured by cost-efficiency) and the high degree of variation in efficiency among farmers, these results suggest that, despite room for improvement, the extension resources have not been used as efficiently as they might have. While extension may have contributed to growth in the less-productive areas, its overall effectiveness appears to have been limited. The minor differences in the cost, technical, and allocative efficiencies, even though the estimates are statistically insignificant, suggest that extension has generally concentrated on disseminating technical messages rather than helping farmers optimize their resource use or tailoring its messages to the prevailing economic environment.

The lesson that emerges is that extension services could have been allocated more efficiently. If the potential for technical gains had been properly assessed (especially in the main areas of maize production that had already benefited substantially from past research and extension efforts), a greater deployment of extension staff in less-productive areas might have been more cost-effective. Considering the significant resources that are needed to sustain the current system and MALDM's extremely tight budget constraints, it is apparent that fewer resources could have been used to achieve the same results. And the returns to the investment in extension could have been much higher.



## Results II

# Production Effects of Extension

**D**etermining returns to an investment in extension requires an estimate of its impact on agricultural production. Chapter 6 showed that the allocation of extension has been biased in favor of the relatively more efficient—and likely more productive—areas. This bias makes measuring the impact of extension difficult in a cross-sectional framework—that is, with the use of data from one point in time—and necessitates the use of more reliable methods using panel data. This problem was demonstrated in the context of ATD’s evaluation of the

impact of extension in Kenya (Bindlish and Evenson 1993). Working Paper 3 in support of this study reconsiders the results of the ATD study, and discusses the technical details of the difficulty of interpreting its results.<sup>1</sup> The main finding is that the high estimated returns in the ATD study are very sensitive to regional effects. At the same time, correcting for inadvertent data errors makes the results less robust. The sensitivity of the results precludes any judgment that the returns are positive.

To overcome the methodological limitations of a cross-sectional framework, the current study used a more robust method. It combined the 1982 RHBS data and the 1990 ATD data with a fresh survey of the same households to develop a panel data set. (The technical details of the analysis and results are presented in Working Paper 5.) The objective of the analysis was to identify the impact of extension on crop production by appropriately controlling for as many unobserved factors as possible. Of these, the primary concern was with the unobserved natural productivity effects and other inherent regional socioeconomic or agroecological effects.

### **A Fixed-Effects Approach**

The 1997 data confirm the problem with using data from a single cross-section. Statistical tests show that while the marginal effects of variable production inputs on farm production are stable with respect to alternative regional and agroecological indicators, the coefficient on the extension variable is sensitive. To overcome this problem, the panel nature of the data is exploited.<sup>2</sup>

A difference model can control for the unobservable regional and agroecological factors. Using this specification, a separate model is estimated for each of the three two-year panels (1982 and 1990, 1982

and 1997, and 1990 and 1997). In addition to the variable production inputs, household characteristics are included in differenced form, since these also changed over time. Varying weather conditions are controlled for by including farmer-reported crop performance indicators (normal or poor, relative to good);

**Allocation of extension has been biased in favor of more productive areas.**

these indicators, however, are available for 1990 and 1997, but not 1982.

The remaining complication is the extension supply variable. The data on staff-farm ratios, used to measure the supply of extension services in each location, go back only to 1982. Thus, for 1997 and

**The less productive farmers and areas have been catching up as new technology reaches them.**

1990, it is possible to model lagged impact of extension, using weighted lags going back seven years each.<sup>3</sup> For 1982, only the single-year measure can be used. While it would be desirable to have data on the previous years' supply of extension, such data are not available. One way around the problem is to assume that past extension efforts are embodied in the 1982 level of production. The post-1982 changes in the supply of extension thus help identify the impact of the new system. In addition, the 1982 staff-farm ratio provides additional control for the base level of extension supply. What the difference model measures, then, is the change in productivity that can be attributed to changes in extension after 1982.<sup>4</sup> Extension supply can thus be modeled either as the difference between the cumulative extension supply for one of the later years (1990 or 1997) and the 1982 supply, or by allowing the coefficient to vary over time by including both variables independently.

### Findings

The results detailed in Chapter 6 point to the importance of distinguishing between the program effect—or, more precisely, efficiency in the allocation of extension resources—and the direct extension effect. Given that the allocation of extension staff has been, and continues to be, biased in favor of the more productive areas, and that growth in agricultural productivity has been uneven from area to area, it is necessary to control for the initial conditions in order to properly identify extension's impact.

To control for the effect of initial conditions, a more flexible approach is used than a simple difference model. The analytical model is extended to yield an empirical model that allows a distinction between program efficiency, or the "program effect," and the impact of extension, or the "extension effect" (see

Working Paper 5). Average cluster-level yields for the base year are used as a proxy for the initial conditions.<sup>5</sup> Applying the model to the three panels confirms that the resources have been allocated inefficiently. The base year yields have a significantly negative coefficient. The extension effect, however, is not significant in either the production function or the reduced-form supply function specifications for any of the panels.<sup>6</sup>

To confirm the hypothesis of the confounding effect of initial conditions on the impact of the supply of extension services, the simple difference model for all specifications yields a result similar to that described in Chapter 6. That is, in the pure difference specification, productivity change is negatively and significantly correlated with the extension variable. A naïve interpretation of this result would be misleading, since it suggests that extension has a negative impact on production.

### Conclusions

The main finding of both this analysis and the material presented in Chapter 6 is that extension resources in Kenya have been inefficiently allocated and poorly targeted. At the same time, once the initial conditions are controlled for, a statistically significant impact cannot be established for extension.

It appears that the less productive farmers and areas have been catching up as new technology reaches them. And while it is likely that extension has played a role in extending these technologies, this cannot be firmly established with the data in hand.

It is likely that more rational allocation of resources would have achieved the same results more cost-effectively. The lesson that emerges is that Kenya needs to build a flexible and responsive system. With little new technology forthcoming, as in the case of maize, it is not economical for extension to maintain a high-level presence. Instead, reaching new areas or farmers previously not covered by extension services would have a greater marginal impact on both production and poverty. What is needed, perhaps, is a "smart," flexible system that responds to imbalances in the delivery of information, targeting existing or emerging gaps between average and best practices. At other times, it would be more efficient to keep a leaner presence to maintain a local equilibrium, rather than blanketing all regions with intensive coverage at all times.



# Client Focus

## Farmer Valuation of Extension Benefits

The benefit of public service to the ultimate beneficiaries is a critical issue for policy. If the beneficiaries were paying clients, the value of the services provided to them would simply be their market price. For most public services, however, there is no market. Traditionally, extension advice has been free because of its nature as a public good (low *excludability* and *rivalry*), with substantial positive externalities. But with limited resources, the issue of the efficiency of allocation across a number of possible public goods remains, and hence

the need to measure the benefits of the services provided. A measure of benefits would also allow consideration of cost recovery measures. Even if it is only partial, cost recovery has several benefits: it provides appropriate incentives, and therefore accountability and client responsiveness; it brings budgetary respite; and it promotes pluralism by allowing alternative providers, particularly private suppliers, to enter the market.

With respect to the relationship between extension and poor farmers, some pertinent issues are their demand for advice, their willingness to pay for it, and their ability to afford the payments. Theoretically, the upper limit of what an individual would be willing to pay for a service would be the maximum private net benefit derived from it. This benefit can be estimated either directly or indirectly. One indirect method is to estimate benefit from the impact of the service on a farmer's productivity, as discussed in Chapter 6. This method, however, assumes that the service is delivered, and delivered in a manner that is efficient and effective. More important, it does not reveal whether the farmer is willing to pay for it. A direct method is the contingent valuation method (CVM), which elicits from farmers their willingness to pay for the service, giving some idea of what they perceive to be its benefits.

The approach this evaluation uses is briefly discussed in Annex F. Working Paper 6, on farmers' willingness to pay, presents a more detailed discussion of the survey design, an important part of CVM; the tests and controls to check the consistency and reliability of the farmers' responses; and the detailed descriptive and analytical results.<sup>1</sup> The key findings are summarized here.

### Desired Frequency of Visits

Some farmers (4 percent) indicated that they do not want any extension advice, and some (another 4 percent) do not want the current service to continue. For the remainder, the median number of desired visits is three each year, with a modal value of two.<sup>2</sup> More than two-thirds of

**Cost recovery, even if only partial, provides appropriate incentives, and hence accountability and client responsiveness; it brings budgetary respite; and it promotes pluralism by allowing alternative providers, particularly private suppliers, to enter the market.**

the farmers want fewer than one visit every three months. Even among contact farmers, almost half want to meet the extension agent no more than once every three months. These responses suggest that the norm of biweekly or even monthly visits under NEP I and NEP II exceeds what farmers want.

### Willingness to Pay

Overall, a small proportion (9 percent) of the farmers who would like to receive advice (including 12 percent of the contact farmers) are not willing to pay for it. More than half of the farmers are willing to pay individually,

**A vast majority of farmers are willing to pay for extension services. Of these, over half are willing to pay individually, the rest to pay in a group.**

while the rest prefer to pay in a group.<sup>3</sup>

The mean willingness to pay (WTP) for individual contributors is Ksh 67 for each visit, and for group contributors, it is Ksh 51 for each visit; the mean WTP is Ksh 60. At

the time of the survey, the daily wage rate for agricultural labor was Ksh 60. The farmers who are unwilling to pay (at all, or as individuals) most frequently cited lack of funds as the reason.

The average total annual WTP is Ksh 346, with a median of Ksh 160. The range is quite wide, from 0 to 8,640, but the mean WTP is significantly different from 0 (standard error of 32). The interquartile range, however, is tighter, between 60 and 360.

### Factors That Influence Willingness to Pay

Systematic variation in WTP by socioeconomic or agroecological characteristics, or with the alternative extension methodologies currently in use, is important for policymakers to more effectively and efficiently target future services. It is also important in determining the perceived benefit from the services that are available to different farmers.

The influence of existing extension services on WTP is viewed from three perspectives. One is the effect of its current supply of extension services. This has a small positive effect, but does not attain statistical significance in any specification tried in the analysis. Next, to test the influence of alternative methodologies, variables indicating the households' normal meeting place with extension agents were

tested. Households that meet extension agents either in their own fields or in a *baraza* do not have a significantly higher WTP than those who do not normally meet extension agents or who meet them very infrequently. Farmers who normally meet at a cooperative society have a negative and significant effect. Finally, a variable indicating whether a farmer is a contact farmer was tested, but it failed to attain significance.

Listening to radio programs has a strong positive and highly significant influence on WTP. This could be because hearing information on the radio encourages farmers to seek additional or more detailed information—enough to convince them that it would be worthwhile to pay for it. It may also reflect their current lack of access to such additional information, and their consequent inability to follow up on what they hear on the radio.

The results also show that WTP is significantly higher among those who are willing to pay in a group. Both gender and education make a difference: households headed by women and households whose heads have a primary or, especially, higher-level education have a significantly higher WTP. Other variables do not appear to influence WTP. Social capital variables show weak but mixed effects. The membership of households in groups (either of farmers or their spouses) increases WTP, but a higher incidence of groups within a location has a generally negative effect. Perhaps the latter reflects the benefit of having greater access to information, while the former reflects the benefit of collective action. Among infrastructural variables, only access to dirt roads affects WTP (households that live farther from a dirt road are willing to pay more), although the effect is weak. Households living in lower-potential zones have a lower WTP, as do those living on hills and undulating terrain.

### Conclusions

A significant proportion of farmers would like to receive extension services and are willing to pay for them. The perceived benefit, however, as reflected in the total amount that farmers are willing to pay, is well below what the government currently spends per farm on extension services. Also, the frequency of visits the farmers desire is much lower than was presumed in NEP I and NEP II designs. An econometric analysis suggests that WTP is not related systematically to the

level or methods of extension currently in use. One interpretation of these findings is that the farmers' WTP reflects an unmet demand for services, which is also indicated by the close, statistically indistinguishable willingness to pay of contact farmers and those who have never before received advice. Another indicator is the desired frequency of visits, which is approximately the same across all categories of farmers. Finally, the strong influence on WTP of farmers' listening to the radio probably reflects their inability to follow up on the information they get through that medium.

The study results have important implications for the design of future extension services. The most important is the implication for cost recovery and the possibility of incorporating an endogenous quality control mechanism in the delivery system. Considering that even those who do not regularly receive extension services, or who meet agents only infrequently and in public gatherings, are willing to pay clearly indicates

that farmers value agricultural advice and are willing to share its cost. It also reflects the current lack of an alternative source of information.

At the same time, the uniformity of the level of demand (that is, the frequency of visits) and WTP suggests that it would be more efficient to cover a

larger number of farmers, but with lower intensity and a higher quality of contact. The large positive influence of radio programs on WTP suggests that complementary extension approaches should be exploited for potentially significant synergy. It is also possible that radio programs could be used to whet the farmers' search for information, which could then help promote the provision of more specialized private extension, or extension for a fee.

**Farmers value  
agricultural advice  
and are willing to share  
its cost.**





# Conclusions and Lessons

**T**he rationale for providing extension services in Kenya is still relevant, but the evidence suggests that the extension approach used by NEP I and II was not efficacious.

The overall record of the T&V extension system implemented in Kenya has been disappointing. The extension approach adopted by NEP I and NEP II has not proven to be effective, and the current system is not sustainable. Although the system's geographical coverage, research-extension linkages, and staff skills have been improved by the projects, the outreach of the system

is low, and the interaction between the extension agents and the farmers is qualitatively well below what was anticipated.

The evaluation reveals that there is an unmet demand for extension services, and the farmers value access to advice enough to be willing to pay for it. Despite the substantial scope for improvement, however, the data do not provide evidence of any significant impact of the current extension system on farmer efficiency or crop productivity. On the contrary, all approaches indicate that the current institutional arrangements have been ineffective in delivering the much-needed services to the vast majority of Kenyan farmers. It is likely that NEP I had some beneficial impact early in its implementation period. The benefits, however, appear to have been short-lived. The available evidence does not indicate any significant impact, even by 1990. The results do show that extension resources have been allocated inefficiently.

The various estimates obtained in the evaluation's analysis show that a positive rate of return to the expenditures on extension cannot be established. Further, the worth of the perceived benefits from the current services, as indicated by the amount that

farmers are willing to pay for them, is well below what the government is currently spending per farm to deliver the services. The findings suggest that a more rational allocation of extension resources would have been more cost-effective.

## Lessons and Recommendations

The main lessons and recommendations to emerge from this evaluation include the following.

*Targeting.* The first lesson is the need for more efficient targeting of extension services to focus on areas and groups where the marginal impact is likely to be the greatest. This calls for a more flexible, "smart" system that can identify the gaps between existing best practice and average practice and allocate scarce resources more rationally. Further, the farmers selected for interaction should be more representative of the local socioeconomic environment so

**There is an unmet demand for extension services, and the farmers value access to advice enough to be willing to pay for it.**

that more relevant advice can be delivered to different categories of farmers.

*Information systems.* Targeting calls for appropriate flows of timely and reliable information, and hence for monitoring and evaluation (M&E). An important lesson emerging from the Kenyan experience is the need to identify farmer demands and tailor the service to suit local technological and economic conditions and circumstances. M&E is also critical in identifying the gaps and guiding the “smart” system for more efficient targeting of services.

*Intensity.* Reflecting their current experience, farmers do not want to see the extension agent too often; and there are not enough new technological recommendations to sustain a high intensity of visits. It would be more cost-effective to establish a leaner and less-intensive presence, but with wider coverage. It may be that with improved quality of service, the demand will increase. To be ready for such a change, it is imperative that a responsive and dynamic delivery system be in place (as in *targeting*, above).

*Pluralism.* A blanket approach, using a single or uniform methodology to deliver standard messages, is likely to limit the effectiveness and efficiency of extension services. Younger, more educated farmers are

taking over from their parents; radio programs are popular among farmers; and alternative providers are beginning to emerge in rural Kenya. It would be advisable to adopt a more cost-effective strategy that exploits the synergistic effects of low-cost modern communications, demonstrations, printed media, and partnerships with civil society and the private sector. This would leverage the resources to increase outreach, and is likely to have a greater impact with the same or lessened demand on government resources.

*Client focus.* The central focus of the institutional design should be on empowering the farmer. An effective way to incorporate client focus is to consider alternative options that give a voice to the farmer, such as cost-sharing, farmer organizations, decentralization, and the like, as an integral part of the delivery mechanism. Cost recovery (even if only partial), in particular, would be advantageous: it provides appropriate incentives, addressing the issues of accountability and quality control; it renders the service more demand-driven and responsive; it provides some budgetary respite; and it encourages alternative providers. Such institutional arrangements remain unexplored in Kenya.

# ANNEXES

## ANNEX A. BACKGROUND

Among the several goals often cited for agricultural extension services, the most common is agricultural development (Feder, Willett, and Zijp 1999). The objective of extension services is to sustainably increase agricultural productivity by, among other things, expanding the knowledge farmers have about new crops, crop varieties, inputs, and better husbandry and management practices. The importance of science-based technological advances in raising farm productivity makes agricultural extension key to development, and has brought about consistent Bank support for such activities in many of its borrowing countries. Over the past two decades, the Bank has invested about US\$4 billion worldwide in extension projects. A large number of these projects have used the T&V system of management (along the principles laid out by Benor, Harrison, and Baxter 1984).

In Africa, agricultural extension has been central to the Bank's development strategy (Cleaver 1993). The strategy for the new millennium, designed to "focus on a few selected national and thereby systemic programs of high impact," also lists extension as a key area for Bank support in Africa (World Bank 1997). In the past, this strategy largely relied on the T&V system, with national programs in more than 22 countries designed to follow its guidelines (Venkatesan and Kampen 1998).

The effectiveness of the T&V system of extension, particularly its cost-effectiveness, has been subject to much debate. The central issue has been the institutional design and efficacy of T&V relative to alternative mechanisms for delivering extension advice (Picciotto and Anderson 1997). Within the Bank, the debate has been passionate, and often emotional. The focus has largely been on conceptual issues, but little

### BOX A.1. THE DIFFICULTY OF DRAWING INFERENCES FROM FIELD VISITS

Most of the field visits for this evaluation were arranged through the extension service. Each visit typically entailed an entourage of mission members; resident mission staff; ministry representatives; provincial or district staff, or both, often including the officer in charge; several subject matter specialists; divisional staff; and the local frontline staff. The group usually arrived in a motorcade of three to five vehicles to visit with farmers or groups that normally worked with extension agents. Almost always the

more successful farmers, or those who had benefited from extension, were visited. The farmers visited apparently received many missions, since most of them kept an impressive diary that the visiting "dignitaries" were obliged to sign. Such experiences are unlikely to be insightful, however.

The moral hazard confronting the field extension staff was revealed during a visit organized by a bilateral donor to view an alternative extension approach. Most previous visits had been to districts funded only by NEP, and most discussions of the issues and problems with the

extension services were positive, pointing to the benefits of the system. The visit organized by the bilateral agency, however, was to a district that received both NEP and bilateral aid funds. At the start of the visit to the district extension office, the extension staff seemed uncomfortable. Their problem was that the "mission" included representatives of both funding sources, the local program head of the bilateral agency, and a Bank staff member. The district officials confided in the accompanying local staff (some of whom had previously worked for the government service but were

now with the bilateral agency) about their dilemma. The difficulty was in deciding which program to discuss and, more important, which program to praise, since their approaches were very different. The project staff resolved the issue by noting that the Bank staff were actually from OED, and that the extension staff should feel free express their feelings about NEP. Of course, the rest of the discussion revealed that the program funded by the bilateral agency was the program of choice.

supporting evidence has been offered. The limited evidence that is put forth usually comes from assessments made during field visits. As expected, supporters of T&V generally make positive assessments; its critics generally draw negative conclusions. While there is probably some truth in all the assessments, the reality is largely obscured—most field visits are unlikely to be representative or unbiased, either in the manner in which the data are obtained or in their interpretation. The facts are also often colored by moral hazard on the part of the local extension staff when dealing with so-called random donor visits (see box A.1).

Despite the intensity of the debate, very few attempts have been made to rigorously measure the impact of T&V, or the lack of impact. Three notable exceptions attempted to estimate the returns to T&V investments.<sup>1</sup> All were conducted by the Bank, and included work in India (Feder, Slade, and Lau 1985), Burkina Faso (Bindlish, Evenson, and Gbetibouo 1993), and Kenya (Bindlish and Evenson 1993). Positive but varying degrees of impact were found. All three studies used survey data, but were subject to limitations imposed by the available data. Other studies have considered the effectiveness of the T&V approach in other settings—for example, Hussain, Byerlee, and Heisey (1994) in Pakistan—and the findings have been generally mixed. A number of studies of T&V's operational aspects, most of them critical of the approach, have failed to assess the full impact of the extension system.

The Kenya study (Bindlish and Evenson 1993), of particular interest here, was part of an effort by the Africa Region to assess the impact of the large amount of development resources going to extension in Africa. The Africa Technical Department (ATD) undertook the study to evaluate the impact of the agricultural extension projects it had supported in Kenya and Burkina Faso in 1990.<sup>2</sup> As noted, the studies estimated very high returns to extension, especially in Kenya. The findings have been controversial, however, because of their various limitations, some of which the authors themselves noted (Bindlish and Evenson 1993, p. 29).

At a time when many borrower countries were becoming concerned with the high costs of the T&V approach, and concern was increasing within the Bank about the development effectiveness of its extension portfolio, the high estimated returns were greeted with mixed feelings, and even skepticism, in some quarters (World Bank 1994; Purcell and Anderson 1997). Nevertheless, since the evidence was based on household survey data and formal statistical methods were used, the estimates of high returns lent credibility to the claims of T&V supporters.<sup>3</sup> The findings vindicated the Bank's stated policy of using extension as a major plank in the overall rural development strategy for Africa (Cleverly 1993) and justified speeding up the already rapid introduction of the T&V system in Africa. At the end of 1997, 22 countries had a national extension program with a T&V system of management, with active Bank projects supporting a total investment of more than US\$700 million.

## ANNEX B. THE DESIGN OF NEP I AND NEP II

The Bank introduced the T&V system of management as a pilot in two districts in 1982.<sup>1</sup> Following the brief pilot, the system was expanded to 30 of Kenya's 41 districts over a 3-year period, covering all high- and medium-potential areas. NEP I was designed as the first phase of a longer-term institutional development plan: the T&V system was to be introduced, and then improved over time. It was primarily an institution-building project, and it was anticipated that external assistance would be required for 10 to 15 years.

The project design followed standard T&V principles. Project activities would provide farmers regular, systematic, up-to-date advice on the farming practices best suited to their specific conditions. The program was initially restricted to the crop extension service. Frontline extension workers (FEWs) would visit farmers regularly and receive systematic training and technical support from research staff. Each FEW was to divide the farm families in their jurisdiction (then anticipated to be between 400 and 800 farmers) into 8 groups. Each group was to be visited every fortnight (four one week, and four the next). Since it was impossible to visit every group member on any one day, five to ten contact farmers were to be selected from each group. About 10 percent of the farmers would thus be designated contact farmers, and the extension workers were to work mainly with them, demonstrating practices that would be followed in the next two weeks, and were to involve as many other farmers as possible in the demonstrations and discussions. The selection process was to entail an inventory of all farmers, identifying the particularly poor farmers, whose progress was to be monitored and evaluated.

The initial focus was to be on simple messages, concentrating on a few important crops and the most

important aspects of crop production activities, as well as low-cost improvements that the majority of farmers could afford. The implicit assumption was that once productivity and revenues had increased, the farmers could graduate to more costly technological components with the additional income generated.

Technical officers and subject matter specialists were to supervise and back up each FEW. Every two weeks, the FEWs were to receive a full day of intensive technical training on the messages they were to deliver during the following fortnight. The subject matter specialists were to upgrade their knowledge and skills through monthly training workshops attended by research scientists. By design, at the district level alone, the ratio of non-FEW to FEW staff was 1:3.<sup>2</sup> The project also provided funding for transport to increase staff mobility; allowances for field staff; audiovisual equipment; civil works to build office space where none existed; incremental operating costs; and the production, publication, and updating of extension manuals for all staff by the Agricultural Information Centers (AICs).

NEP II sought to further strengthen extension services and support their expansion to uncovered areas, including the dryer zones; provide funds to improve staff transportation; foster the use of mass media and communications; rehabilitate and refurnish FTCs; and promote links between research and extension by funding transportation and equipment, allowing greater participation of research staff in extension training sessions, demonstrations, and farm trials. The project's goal was to effectively deliver technical messages tailored to the needs of smallholder farmers, especially women, and increase yields of both staple and export crops.



## ANNEX C. INSTITUTIONAL FEATURES

### Management

An immediately notable feature of Kenya's extension system is that not only is monitoring and evaluation (M&E) nonfunctional, but even basic management information is missing. Data are not readily available on the number of extension staff, their operational capacities, or even on extension's annual expenditures. While some of the underlying factors go beyond the extension department, and indeed beyond MALDM, it is apparent that NEP I and NEP II had no impact on this important aspect of management. Overall management of the projects was also weak. Poor financial arrangements compounded the problem of inadequate resources, and poor implementation arrangements have impeded the functioning of extension services. This proved particularly significant during NEP II, during which the management of extension services rested with a working group with insufficient authority; it was unable to coordinate the activities of the agriculture, livestock development, and veterinary departments. As a result, the management during most of NEP II was ineffective. This is particularly significant since the staff appraisal report for NEP I prominently stated that T&V was first and foremost a management system.

Another shortcoming of the projects' work in institutional strengthening is the continuing lack of a strategic vision or national policy for agricultural extension. Several observers have noted that this reflects a preoccupation of extension's management with the modalities of the delivery mechanisms, without regard to policy, planning, or management of the extension services.<sup>1</sup> The new institutional paradigm introduced by NEP I helped increase the level of energy throughout the program in the early years because of the large influx of operational and development funds, the availability of new vehicles, payment of allowances, and significant training. These changes raised morale and motivated field staff, and the detailed implementation program, with its clear chain of command and well-defined bureaucratic staff assignments, dispensed with the need for policy or planning.

But with a deteriorating financial situation and ineffectiveness of the services, efforts were begun recently toward developing a national policy and a framework for the future development of extension in Kenya. Progress so far, however, has been driven by

multifaceted pressures, including involvement of the Bank and other donors in the context of the preparation of the Kenya Agricultural Sector Investment Program, as well as support from other Bank projects. The resulting studies, as MALDM documents, reflect renewed thinking about extension and deeper and candid assessments of the current state of Kenya's extension efforts. Progress toward developing a national policy has nevertheless been slow, and a final policy paper has not yet been produced.

### Incentives

Another consequence of the mechanistic implementation of the projects' design has been inappropriate incentives, both institutional and individual. The "rules of the game" are key elements of institutional development, especially for service delivery, as they determine the incentive structure. While the bureaucratization of the extension services cannot be attributed to the projects, the hierarchical structure of the T&V design has not improved the situation over that before NEP. The result is that the extension service is both top-heavy and headquarters-centric (supervisory staff is excessive, with a large concentration in Nairobi).

Extension's relative success and free flow of funds in the beginning led to an intolerance of dissent and neglect of emerging problems. The perceived management benefits of the projects, in the monitorability of project outputs and accountability of staff (for example, in terms of number of visits, number of training sessions, and whether or not FEWs were strictly following their assigned routes) and the focus on delivery of specific and well-defined messages, put in place adverse incentives. As in any bureaucratic organization, staff accounted to their supervisors, not to the clients, and what was monitored was the number of visits, not the quality of the meetings.

This lack of accountability to the farmers is observable in both the household and the staff surveys. The household survey shows that the proportion of farmers who need advice—that is, the demand for information—on more complex messages is twice that of the farmers who need information on simple agronomic practices. In contrast, the proportion that finds simple agronomic messages most applicable, which reflects the effective supply of information, is twice that finding the more complex messages applicable. Simi-

larly, the mismatch between what the farmers want and what extension services supply is reflected in extension's methodology. According to the FEWs themselves, field/home visits constitute the least popular method among the farmers (only 5 percent prefer them), and demonstrations and field days are the most popular. Yet the majority of the FEWs prefer to use field visits.

### **Sustainability**

The available estimates of total expenditure on extension do not present a complete picture.<sup>2</sup> How expenditures have evolved over time is not known.<sup>3</sup> The most reliable are the "printed" estimates, which suggest that for the year 1996–97, expenditures were approximately KP 156–177 million (or US\$54–61 million)<sup>4</sup> out of a total ministry budget of KP 340 billion.<sup>5</sup> That is, about 46 percent of the ministry's budget goes to extension activities. A review of public expenditures for agriculture also estimated that about 60 percent of the agricultural budget is devoted to extension activities, of which 70 percent is donor-funded.

With Kenya's total of about 3.44 million farm families, according to the Welfare Monitoring Survey and the Staffing Norms Study, these estimates suggest that Kenya spent an average of about US\$15.11 per farm family in 1996–97 for extension services, or Ksh 876.38.<sup>6</sup> Comparable estimates for 1982 are not available, but estimates for the districts in the 1990 ATD study were US\$3.92 for 1982 and US\$4.67 for 1990 (in constant 1991 dollars). These figures compare with the current estimate of US\$13.29 (in 1991 constant shillings at the 1991 average exchange rate of Ksh 27.5 per US\$1) or US\$15.11 (in 1997 dollars, Ksh 58 per US\$1).

While the optimal extension expenditure level is debatable, the problem facing MALDM is that the current system is too expensive and not financially sustainable. Even toward the end of NEP II, project funds were financing 90 percent of the system's nonsalary operating costs. The government budget is insufficient to keep the staff mobile and effective. A vast majority of both FEWs and SMSs confirm that funds for transportation and allowances are a "serious or very serious" constraint on the effective delivery of extension services. Similarly, training sessions and monthly workshops have been reduced significantly because of a shortage of funds.

A major reason for the inadequacy of funds is the large number of extension staff. Estimates indicate that

at the end of 1996, more than 48 percent of all ministry staff were engaged in extension. At the field level, the agricultural FEWs numbered approximately 6,841, more than double the 3,328 of 1982. Veterinary and livestock production FEWs numbered 357 and 547, respectively, in 1996 (comparable estimates for 1982 are not available). This yields an average of about 500 farms per agricultural FEW. The number of technical (non-FEW) agricultural staff is estimated at about 1,577—that is, there are about 4 FEWs for each supporting technical staff member.

The unsustainable growth in staff through the 1980s, which currently takes up about 80 percent of operating costs, led to a recruitment freeze in 1990. While the increase in staff numbers was the result of government policy and presumably unrelated to NEP I (during which most of the increase occurred), it is noteworthy that the ratios of farm families to FEWs and FEWs to technical staff are very close to the original NEP I prescription of 500:1 and 3:1, respectively. It appears that the number of farm families was underestimated at the start of NEP I, when the farm-to-FEW ratio was much higher than the reported 500:1.

These estimates of staff strength, however, are inconsistent with the data provided by the districts. The ratio of farms to FEWs is, on average, about 1,100:1. The discrepancy is significant and not easy to explain. It may stem from the poor identification and classification of staff by their current assigned duties (which do not necessarily correspond to the assigned job codes), and probably also reflects a concentration of staff at headquarters, provincial, and district offices, where staff are involved in essentially nonfield activities. This is reflected in the staff survey: a majority of the SMSs indicated that they had responsibilities in subject areas other than those of their expertise. But regardless of the particulars, it is apparent that the current system is overstaffed and expensive.

### **Pluralism**

Pluralism was clearly not a characteristic of T&V as implemented in Kenya. NEP I introduced the contact farmer, and later the contact group, approach, with all the extension staff time devoted to delivering advice to the contact farmers. This was achieved by eliminating all other extension activities; which may not have been effective in all cases, but were nevertheless efficient alternatives for delivering certain types of general

information. The NEP I and NEP II approaches, however, were not very successful in reaching noncontact farmers (the briefing in Annex D, prepared by extension staff in one of the districts for a focus group meeting, gives some insight into the reasons, and the effectiveness of the NEP I and NEP II approaches), but institutional energy has remained focused on the T&V approach.

A vast number of FEWs and supervisors acknowledge working on projects of other donors and working with NGOs and the private sector, mostly for the additional incentives such as allowances, mobility, and training. Most such activities are also differently organized, and staff generally consider them to be more effective. Whether or not they truly are, or if this belief is a reflection of better working conditions, is unknown. However, there has been no effort to institutionalize the significant level of ad hoc activity to make the system more effective or rational.

A negative impact of NEP I on an alternative institutional arrangement was the discontinuation of the soil conservation program (Tiffen and others 1996). The program had been well established and functioning reasonably well since 1974, but the collective action required for soil conservation extension was not amenable to the contact farmer or even a small group, approach. It cannot be demonstrated on small plots, nor can it be reduced to simple messages. The program was therefore discontinued. It was reintroduced in 1988 as a separate branch office, supervised and supported by the Swedish International Development Authority. The new program introduced the catchment area approach.

A more recent unintended impact has been on livestock extension. NEP I had concentrated on agriculture. Even though the Ministry of Livestock was merged with the Ministry of Agriculture briefly in the early 1980s, the livestock extension department operated separately until 1991, using its own approach, largely funded by other donors. Early attempts at including livestock extension in NEP did not succeed, because the livestock department resisted the T&V approach. The reamalgamation of the ministries and the more recent unified approach to extension promoted by NEP II are creating significant tensions. In general, livestock extension is not amenable to delivering messages at predetermined times, and it does not require frequent visits. Livestock advice is based on solving specific problems and is not seasonal. It

requires a significant amount of training to convert specialists into generalists and vice versa, which the already trained and experienced livestock staff resent.

### **Training**

The benefit of NEP I and NEP II that is most widely agreed on is the upgrading of staff skills through training.<sup>7</sup> NEP I provided substantial training to older staff and newer, untrained staff. The regular training schedules were effective and had a positive impact on staff quality. After the initial years, however, funding constraints, strained research-extension links, and the lack of new technology reduced the effectiveness of training sessions. The quality of extension staff is also attested to by farmers' positive assessments of their competence (as noted in Chapters 3 and 4) and by assessments from NGOs and other donor projects that often use extension staff (although with additional training).

Despite these significant efforts, however, a majority of the SMSs feel that FEWs are not qualified to carry out their responsibilities. A majority also feel that there are too many subjects to handle effectively; a large number of FEWs also voiced this sentiment. Finally, limited funds have restricted training sessions, although the primary reason the vast majority of SMSs give for reduced frequency was that there was "nothing new to say." This reduced frequency of training, however, is reflected in the FEWs' demand for more training sessions, since they see their effectiveness declining.

### **Research-Extension Links**

A critical element in the high-intensity T&V approach is a regular flow of messages from research. In the early years, the link between research and extension was weak, but sufficient to ensure a supply of simple messages. Over time, as funding became tight, problems started to emerge. Eventually, when KARI was separated from MALDM, the link was totally severed. In 1993, renewed efforts under NEP II led to a memorandum of understanding between KARI and MALDM to reestablish the link. The staff survey, however, reveals that the link is still very weak. The majority of both FEWs and SMSs have noted that meetings with researchers are inadequate and infrequent and that participation in field trials is limited. One constraint is the lack of adequate adaptive research to generate new messages. Limited feedback

from farmers through extension has led several regional research centers to conduct their own participatory rural appraisals to identify the farmers' problems and to target adaptive research. More recently, under the Farming Systems Approach to Research, Extension, and Training Initiative, with KARI's leadership, the link appears to be improving, and some new technologies are emerging.

## **ANNEX D. FOCUS GROUP BRIEFING ON NEP'S IMPACT**

A field extension staff member prepared the following briefing points for a focus group meeting that discussed the impact of NEP I and NEP II in one of the districts.

### **NEP I**

- Farmer selection was not handled well. In most cases, the farmers were handpicked by extension staff.
- The farmers were unwilling to go to the same home every time, so that a program of fortnightly visits was not well received.
- In most cases, poor follow-up led to the failure of follower farmers to take up agents' messages and replicate them in their homes.
- Repetitive messages and the lack of clear technology packages led to monotony in the information being passed to the farmers.
- Feedback mechanisms—from the farmers, through extension, to research, and vice versa—were not effective.
- Research programs rarely addressed the farmers' needs in the field, which led to poor linkages.
- Individual farmers who were left out felt that the extension service was aimed only at a few well-to-do farmers. This is the reason for the administration's permanent attack on extension—that its agents were never seen.
- Division and district staff supervision was difficult because transportation was lacking and route maps were unrealistic.
- Integration with other programs such as soil conservation and home economics was minimal.
- While funding was adequate for program activities, more than 90 percent of support went to staff activities, and less than 10 percent went directly to the farmers. This was the reason for low adoption rates. Extension packages were judged impractical for simple farmers.

### **NEP II**

- Coverage was fairer than the contact farmer approach, but most areas did not have worthwhile groups. Groups made up mostly of women had a "merry-go-round" agenda with very little agricultural activity.

- Frontline extension workers meet with four groups a day, primarily women's groups. They meet once a month, and therefore the FEW would either meet the owner of the home (a chairlady) alone or very few members of the group.
- The lack of serious technical packages resulted, again, in repetitive and boring messages.
- Most of the demonstration sites were based at the chairladies' homes, with little benefit to the members.
- No clear packages came from research except for the normal agronomic messages that the farmers had already practiced for a long time.
- The farmers' problems have still not been solved by the existing extension approach. For example, (a) correct seed varieties for beans, maize, sunflowers, and the like; (b) crop pests and diseases are still being researched, and there is little assurance that success will come soon; and (c) the lack of credit supply has led to poor or low adoption rates.
- Mobility has continued to be the greatest problem at the frontline, leading to very poor coverage at the field level. The districts have good vehicles but insufficient funds to maintain them. Field staff are poorly remunerated.
- The administration of funds, particularly problems with district treasuries' liquidity, always led to the failure of demonstration plots compared with those of the farmers.
- Funding for research programs depends on the interest of the donor agencies, which generally do not address farmers' needs. For example, only one cluster was selected for an entire district of 14 divisions that had very varied farmer needs.
- The top-down approach resulted in farmers' expecting free things, and the projects' approach as it was implemented seemed to be imposed on the farmers. Farmers' views on how extension should be conducted should have been taken into account.



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**ANNEX E. AWARENESS AND ADOPTION OF EXTENSION MESSAGES**

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This annex briefly summarizes the data used for the awareness and adoption analysis; results are discussed in Chapter 5. Complete details on OED's survey, the methodology of the analysis, and the results are given in Working Paper 2.

**Stock of Messages**

The first step of this strategy was to establish an inventory of extension messages and technologies that are available from the research system. This effort yielded limited results. Few new technologies were recommended during NEP I and NEP II, and those few generally took the form of updated varieties, without major changes in practices. The recommendations for most practices have remained essentially the same for the past 15 years. Obtaining specific extension messages proved to be difficult, because district farm management guidelines have not been updated. That the technology stock and associated messages have remained fairly constant is noteworthy. The evaluation, however, was able to establish that recommendations for the 13 main activities for the crops grown most commonly in the study districts do exist.

**Survey Design**

OED's survey covered four crop categories: the main crop, which was maize, cash crops, minor food crops, and new or promotional crops.<sup>1</sup> The questionnaire, which covered messages on 13 cropping activities, was designed to gain an appreciation of the sophistication of the farmers' knowledge.<sup>2</sup> The coverage of the different crop categories was motivated by the status of the main crop, which was maize for all study districts. Maize has been the target of extension activities since the mid-1960s, and therefore may not be very useful in determining the impact of extension services at the time of the survey. Cash and minor (or non-maize) food crops were covered to assemble a more complete picture, and the new and promotional crop category was included as a test of the effectiveness of the information dissemination system.

Some limited comparative results for 1990 are available from the ATD survey. It should be noted, however, that the ATD data have information on only one crop (mainly maize) for the vast majority of the sample of 420.<sup>3</sup> Results from the ATD and OED surveys must thus be compared with caution.



## **ANNEX F. THE CONTINGENT VALUATION METHOD AND ITS APPLICATION**

The contingent valuation method (CVM) is a tool for eliciting individuals' use and nonuse values for a variety of public and private goods and services. The method relies on describing a hypothetical situation to a sample of individuals and asking them to state their willingness to pay to avoid a particular change in that situation, or their willingness to accept compensation for a proposed change. The name of the technique derives from the fact that what the individuals report is *contingent* on the scenario that is described to them.

In its simplest form, CVM asks individuals directly about their willingness to pay to maintain the status quo; that is, to avoid a change in the provision or quality of goods or services. The method has been used widely in industrial countries to estimate nonuse values, typically for environmental and public goods. Its applications in developing countries are growing. It has been used to value, among other things, improved sanitation services, household water services, surface water quality improvements, tsetse control, forest protection, and wildlife viewing. This is the first known application of CVM to elicit the willingness to pay for agricultural extension services. This is also the first known application for an impact evaluation of a project.

In the OED survey, the farmers were first asked whether they wanted to continue receiving extension advice, or would like to start receiving advice. Those who answered in the affirmative were then asked how many extension visits they would like to receive each year. The following statement was then read to the farmers:

*The cost of providing extension advice (including transport costs, salaries, etc.) has been mostly financed by the government. The lack of funds is a major obstacle in providing extension services. This could lead to irregular visits by the extension workers, and a deterioration in the quality of the service. There is also the possibility that the extension program could be eliminated altogether.*

This was followed by a question on whether the farmers wanted the extension program to continue. The farmers who did want it to continue were reminded of the number of annual visits they wished to have and asked whether they would be willing to pay individually for extension services. Those who said no were then asked whether they would be willing pay as a group member, if such a group were to be organized. The farmers were then asked how much they would be willing to pay per visit.

The format of the CV questions was altered between the first and second rounds of the survey in order to test for various biases. In the first round, about half of the farmers were asked double-bounded referendum, or closed-ended, questions, and the other half were asked open-ended questions. In the second round, farmers asked closed-ended questions in the first round were asked the open-ended questions, while the rest were asked a costless choice question—that is, whether they would prefer to receive extension services or a market good (such as sugar or kerosene) worth approximately 100 Ksh. The results reported in this evaluation are from the pooled responses to the open-ended questions. The detailed description of the survey design and results are given in Working Paper 6.



**ANNEX G. COMMENTS FROM THE GOVERNMENT OF KENYA**

**REPUBLIC OF KENYA**



**MINISTRY OF AGRICULTURE**

Telephone 718870, Fax 720568  
When replying please quote  
Ref. No. OFTA/9  
and date

THE PERMANENT SECRETARY  
KILMO HOUSE  
CATHEDRAL ROAD  
P.O. BOX 30028  
NAIROBI

28 June, 1999

Gregory K. Ingram  
Manager  
Sector and Thematic  
Evaluations Group  
Operations Evaluation Department  
The World Bank  
Washington, DC 20433  
USA

Fax 202-522 3123

Dear *Gregory,*

**RE: COMMENTS ON IMPACT EVALUATION OF AGRICULTURAL EXTENSION PROJECTS**

Refer to your letter dated 10<sup>th</sup> June 1999 on the above subject.

Please enclosed herewith final our comments on the document for your consideration and incorporation to the final document.

Yours *Sincerely,*

A handwritten signature in black ink, appearing to be 'Joshua K. Terer'.

**AMB. JOSHUA K. TERER**  
**PERMANENT SECRETARY**

Encl.

## Ministry of Agriculture's comments on the Impact Evaluation of Agricultural Extension Projects in Kenya

[Numbers refer to original paragraph numbers in draft submitted.]

### 1.0 Introduction

1.1 Generally the document has captured most of the areas in evaluating the Agricultural Extension Projects in Kenya. However, we have the following comments to make.

### 2.0 Specific Comments

2.1 In 1994, the animal health extension was incorporated in NEP II activities after the Mid-Term Review of August, 1994, however, the contribution of T&V towards livestock activities has not been captured in the document.

2.2 After four joint IDA and GOK monitoring and evaluation Missions. It was concluded that management of NEP II was the main constraint towards unification and co-ordination of extension services. Firstly, Management of NEP II was through a Project-Working Group and this may have had a far reaching effect on the project implementation. This was a very important conclusion that the evaluators of efficacy of T&V should have considered. Secondly, the implementation process followed the procedures laid down by the Ministry of Agriculture. Procurement was an important management tool in NEP I and NEP II. Motor vehicles, motor cycles, bicycles and office equipment and furniture were procured. The extent to, which it was realized should be evaluated.

2.3 Extension Services provision in NEP II were mainly confined to monthly workshops, monthly training sessions, staff seminars and courses, staff/farmer educational tours, on-farm demonstrations farmers field days, agricultural shows, farmers courses and seminars, group visits and meetings. These were extension methods used by extension agents to create awareness and encourage adoption of technologies by farmers. However, one page 6 of the document in table 1, it has been observed that T&V had its strengths and weaknesses that the evaluators should have considered to be able to arrive at a balanced evaluation report about the efficacy of T&V Management of Extension Services.

2.4 In the document enumerators have used a structured questionnaire. Unfortunately no sample of

questionnaire is appended hence it is difficult to establish the quality of data. There is also no indication of use of informal survey methods to verify the results from the formal survey.

2.5 Comparison has been made using data and information of 10-15 years ago. There is no indication of any survey done before the start of project implementation, hence the rationale mentioned here does not hold. It is also stated in the document that there was no baseline study done to ascertain pre-project situation.

2.6 The document has concentrated basically on information access/dissemination within the household and no other stakeholders are involved. In addition, the indication that only 47% of respondent say that information is less available now than it was before relates to asking direct questions or through a questionnaire which may not be conclusive. Other forms of verification should have been explored.

2.7 The document also indicates that key findings of the survey are that there has not been apparent improvement in the quality of delivering of extension services. There are no conclusive indication of the same. The kind of data the evaluators have obtained from the questionnaire can not be conclusive. Other verifiable indicators are required.

2.8 Extension Services covers a wide range of agro-ecological zones. In all places it is not possible to apply contact farmer and follow-up farmers principles of T&V. So the extension agent has to apply other methods to deliver information to the farmers. In ASAL areas they can use extension barazas but it should be noted that these are not administrative barazas. Also in administrative barazas, extension agents are invited to address the public but this should not be construed to mean it is an extension barazas.

2.9 One year of suspension is too short to notice any significant change in delivery of extension services as reflected in the document. There were other parallel extension related projects, which may have supported extension services in 1996, when NEP II funds were suspended. The Government may have redirected the recurrent funds from other sources towards extension services during that period of suspension.

- 2.10 Regarding the outreach, first contact with farmers has been used to analyze the effectiveness of an Extension Services. This measure does not say much about the efficacy of T&V. It leaves a lot of room for criticism because the baseline data on pre- T&V situation were not available. This is may therefore be treated as a proxy output indicator.
- 2.11 The document has largely covered crops at the expense of livestock which is often a major enterprise in some farms, therefore it may not represent a holistic picture of the Extension Services.
- 2.12 In T&V extension approach, it is assumed that farmers learn about innovation/technology by becoming aware of it, become interested in it and adopt it. Learning occurs by adopting ideas that come from outside. The evaluation has not considered the possibility that farmers are active problem solvers on their own and that they are not passive consumers of technology, but part of its development born out of long experiences in farming. The term “message” here could acquire a more pluralistic meaning if the term “information” was used instead of message.
- 2.13 The use of statistical analysis to be able to explain process such as awareness and adoption is not plausible. It is because there are other confounding variable like attitudes and past experiences of farmers that will very much influence farmers probability of becoming aware of technology or information and adopting it. This section is an academic exercise and does not explain actual reality.
- 2.14 The Ministry of Agriculture through the Division Extension Service also recognized the constraints of non-adoption due to irrelevant technology. A linkage was established between extension and KARI with the mandate to address the problem of inappropriate technology. Indeed some NEP I funds were allocated to KARI Regional Research Centers (RRC) for linkage activities. The results may not have been captured during the survey.
- 4.15 The evaluators conducted T&V systems as stated in theoretical books and did not consider the modification that this approach had undergone, the complex farming system and socioeconomic circumstances of smallholders. Therefore the evaluation is academic.
- 4.16 Despite the increased farmer/extension contact and significant increase in level of technology awareness as observed in the documents, the evaluators have not considered that adoption rate for these new technologies was also limited to a greater extent by low returns from farm produce.



## ANNEX H. OED'S RESPONSE TO BORROWER COMMENTS

This report summarizes the main findings of the OED evaluation, detailed descriptions of the analysis are included in the six supporting working papers. The evaluation is based on evidence obtained through a broad-ranging household survey and on the information and data available from two earlier surveys, in 1990 and 1992. The evaluation also surveyed frontline extension staff, subject matter specialists, and supervisors in the study districts. As noted in the report, these data were combined with secondary sources of information obtained from various reports and documents, including several reports of the Ministry of Agriculture (MOA). The historical evidence was collated from studies reaching back to the early 1970s (see references in the report and the Working Papers). In addition, the evaluation used the government of Kenya's participatory poverty assessments (as noted in Chapter 3) and an independent beneficiary assessment conducted by an NGO in full cooperation with the MOA. Responses to specific comments from the government of Kenya follow. (All paragraph references refer to the original draft.)

*Para. 2.1.* The household and staff surveys and the beneficiary assessments covered all extension activities, including livestock production, animal health, soil conservation, and the like. Thus, the analysis in Chapters 2–4 is not restricted to crop production. In other chapters, dealing more specifically with physical or technical impact, the analysis is restricted to crop activities. Accordingly, the text in Chapters 5–7 has been modified and a footnote added to clarify this. The primary reason for focusing on crop-related activities was that livestock production was included in NEP II only after 1994. For most of the period under study, livestock extension activities were financed and managed under a different system. Also, a preliminary analysis of the awareness and adoption of livestock production practices showed that almost all farmers had heard of and adopted those practices by 1994. A deeper analysis of livestock production activities will be undertaken and communicated separately, although the association with NEP II is likely to be tenuous. Further, as discussed in Annex C, the limited experience of the livestock extension staff with T&V has not been positive.

*Para. 2.2.* OED considers procurement to be a function of project management, not a management tool. The text in Chapter 2 and Annex C has been suitably modified.

*Para. 2.3.* OED assesses efficacy by comparing a project's outcomes with its goals. The findings in Chapters 3 and 4 show that project design was not efficacious, for reasons outlined in table 2.1 and noted in the conclusions section of Chapter 2.

*Para. 2.4.* The questionnaire was deliberately omitted from the final report for brevity, but is available on request. A copy was sent to the Ministry of Agriculture at the time the survey was conducted.

*Para. 2.5.* The comparison with the situation 10 to 15 years earlier was a subjective assessment by the users of the extension services, the farmers, of the change in their access to extension services and their quality. OED took these beneficiaries' perceptions at face value, but their views were not the only basis for the analysis. In the absence of appropriate baseline data on various aspects of the extension services, OED used recall data where feasible. Formal statistical tests in Working Paper 1 compare recall estimates with estimates from three independent surveys for different time periods between 1982 and 1993 on contacts made with the extension system. The tests demonstrate that recall bias is unlikely to be significant. Further comparisons in Working Paper 2 on the awareness and adoption of maize practices also suggest the same. More important, comparable findings from a number of studies noted in Working Paper 1, some from as early as 1972, provide a significant degree of confidence in the broad results emerging from the OED survey. As for the technical impact on farmers' efficiency and productivity, the 1982 RHBS provided an appropriate baseline for NEP I, the 1990 ATD survey for NEP II.

*Para. 2.6.* As noted above, the evaluation included a survey of extension staff. Most staff reported a decline in the system's effectiveness after 1982 and 1990, as noted in Chapter 2. Table 3.1 summarizes an alternative assessment by the beneficiaries that queried 19 services in a contextually independent manner. There is no compelling reason to believe that the responses for extension services are biased. In this context, it should be noted that the evaluation strategy included beneficiary assessments. It is unfortunate that the beneficiary assessments were not carried out. It was agreed that beneficiary assessments would be conducted by the MOA with the full support and cooperation of OED (including financial contribution) and the Bank's Kenya Country Department. However, after

initial preparations, the ministry unilaterally decided not to implement the beneficiary assessment.

*Para. 2.7.* The qualitative aspect of the delivery of services refers to the projects' design, and the text has been modified to clarify this point. The projects' design anticipated high-intensity and qualitatively different meetings between extension agents and the contact groups. As discussed in Chapters 3 and 4, the outcome for this aspect is unsatisfactory.

*Para. 2.8.* OED agrees with the assessment, and the report is consistent in noting that a uniform method should not be used in all locations, as advocated in the T&V design. The report has been modified to reflect the correct interpretation of *baraza*.

*Para. 2.9.* The impact of the suspension of funds is discussed in further detail in Working Paper 1. Considering the prescribed schedule of meetings between extension agents and contact farmers and contact groups envisaged by T&V, the suspension would be noticeable if the system were working as anticipated. While it is possible that other funds could have been used, this did not happen. None of the officials met during the evaluation indicated that alternative funds were made available. In any event, if other funds had been used, it would have indicated that the Bank's funds were not needed, raising the issue of the additionality of NEP II funds.

*Para. 2.10.* OED agrees with the comment, Working Paper 1 makes the same point, and the report has been modified to further clarify this point. The analysis, however, does go beyond first contact and covers more meaningful aspects of meetings between extension agents and farmers.

*Para. 2.11.* The response is the same as that for paragraph 2.1.

*Para. 2.12.* OED fully agrees with the premise of the comment, which is the basis for judging the incremental impact attributable to NEP I and NEP II. It should be reiterated that this is an evaluation of the impact of NEP I and NEP II; both relied on the time-bound delivery of messages.

*Para. 2.13.* The analysis of awareness and adoption in Working Paper 2 includes a number of social and agroecological factors in addition to extension. The statistical results are consistent with the descriptive findings and the focus of NEP I and NEP II activities, as noted by several senior extension staff and other observers.

*Para. 2.14.* The report takes note in Chapter 2 that staff training and improved links between research and extension are benefits of the projects. As inputs into the extension system, the results of these activities would naturally affect the flow and content of the extension activities in the field. These would thus be fully reflected in the impact at the farm level in greater awareness and adoption of practices and improved productivity.

*Para. 2.15.* Farmer characteristics are included in all aspects of the evaluation. The analysis is, for the most part, general and encompasses alternative methods, as long as they were carried out by government extension agents. However, as an evaluation of NEP I and NEP II, the focus had to be on the projects' objectives and design as contained in their Staff Appraisal Reports and as presented in the various MOA documents noted earlier. Therefore, the evaluation paid particular attention to the specific aspects of the extension methodology, but the farmers' quantitative and qualitative assessments were generally independent of any particular method.

*Para. 2.16.* The results show increases in awareness and adoption for only a few simple agronomic messages. As noted in the relevant sections of Chapter 5, these are also known to have been relatively high even at the start of NEP I, and especially during NEP II. The levels for the more complex messages are still very low. It is true that low returns, along with other constraints such as the availability of credit or inputs, are important factors. However, a negligible proportion of farmers indicated low returns as the reason for not adopting agents' recommendations (see Working Paper 2). A number of farmers did note financial constraints, and some noted input market problems. Also, almost 80 percent of those who were aware of the recommendations (including the more complex ones) adopted them. This clearly shows that while other concerns may be valid, lack of information is a serious constraint. Finally, according to the 1998 Economic Survey published by the Government of Kenya, the agricultural output price index for 1997 was 598.9 (1982=100), the total input price index was 520, and the fertilizer price index was 314.3. Thus, it is unclear whether adverse market conditions were behind the failure of farmers to adopt the recommended practices.

## ANNEX I. HOUSEHOLD SURVEY DATA

OED conducted a comprehensive household survey in 1997 to collect data on a wide range of topics.<sup>1</sup> The survey was designed to generate panel data by revisiting as many households as could be relocated from a 1990 household survey conducted by the Africa Technical Department (ATD), which drew from a subsample of the 1982 Rural Household Budget Survey (RHBS).<sup>2</sup> As may be expected, the number of households common to all three surveys is considerably smaller than the total observations in each year. The intervening periods are relatively long and it is not surprising that a number of households could not be traced (because of deaths, migration, and the like).

The 1982 survey was a stratified random sample representative of about 95 percent of the national population, and drawn from the existing national sampling frame (NASSEP I).<sup>3</sup> The sample represented 2.8 percent of the rural population, drawn from 640 clusters from all but the North-Eastern province (covering about 54 percent of the land area). The 1990 survey randomly picked clusters in seven of the districts, representing a broad cross-section of Kenyan agriculture, but excluded districts in which NEP I had not been implemented. From the list of households surveyed in 1982 in these districts, about 700 households were randomly picked for the ATD survey (all households with household identifiers ending in 7). The 1997 survey targeted the same subsample as the 1990 survey, using the original list of respondents from the 1982 survey.

For this analysis, only the clusters included in the subsequent surveys are retained from the RHBS data. This yields about 611 observations for which agricultural input and output information is available. The 1990 survey targeted about 700 households, but complete data for production analysis are available for about 450 households. The 1997 survey targeted households belonging to the same clusters retained for the 1990 ATD survey, but clusters with fewer than four target households were dropped. Another 11 clusters could not be traced, following the many changes in administrative boundaries that have occurred since the original sample selection. Of these, two were discarded altogether; for the other nine, replacement households were randomly selected in the same location as the original clusters. Overall, 293 of the original respondent households could be contacted.

Another 62 of the households belonged to descendants of the original respondents, and these were retained in the sample. In addition, 241 new households were randomly picked from the same clusters as the missing households, bringing the total sample size for 1997 to 596 households.<sup>4</sup> The purpose of selecting replacement households was to develop a sample of reasonable size, but at the same time to maintain the locational and socioeconomic characteristics of the sample. In all, the OED survey collected data from 73 clusters spread over 12 (current) districts.

The OED survey was structured to begin with contextually general questions—that is, questions that were not specific to any particular agency or organization. The enumerators were specifically instructed to record unprompted responses whenever feasible.<sup>5</sup> Farmers were prompted only when it was necessary to test for specific issues or to pursue certain preconceived notions based on past experiences within and outside Kenya. Special care was taken to phrase and sequence the questions to ensure that there were no leading questions. Accordingly, it was important to maintain the identity of the surveyors as far removed from the government or the extension service.

To dissociate the survey from the extension service, the government, or the World Bank, the OED survey was conducted by the Tegemeo Institute of Egerton University. The enumerators were college graduates, selected for their familiarity with agricultural issues and fluency in the local dialects of the survey sites. The enumerators were trained in the survey methodology, particularly for questions relating to the extension and contingent valuation modules. The survey instrument was pre-tested to fine-tune the nuances of the questions and language. The survey was implemented in two rounds, one at the start of the 1997 long rains season (August/September 1997) and the second after harvest (November/December 1997). In the second round, 34 of the respondents could not be contacted again.

The type of data available from the three surveys varies. But although the surveys are not fully comparable, they are sufficiently so to allow some meaningful analysis. The 1997 data is the most detailed, by design. In the planning stages, the objective of the OED survey was to be able to allow a comparison with the 1990 data. However, the questionnaire was expanded to

collect additional information on various aspects of the production process. The details of the differences among the surveys are discussed in the Working Papers as needed for analysis or comparisons. The OED survey questionnaire is available from the author on request.

# ENDNOTES

## Chapter 1

1. The ATD Kenyan study is one of the three notable attempts to rigorously estimate the returns to T&V investments, as described in Annex A. But as discussed in Chapter 7, the estimates of high returns are not robust.

2. A public expenditure review for agriculture revealed that in 1996–97, extension claimed 61 percent of the development resources allocated for MALDM's core services. Extension also accounts for about 45 percent of MALDM's total expenditure and more than half of its staff.

3. Aggregate crop statistics are notoriously poor in Kenya. Maize data are likely to be the most accurate because of the importance of maize in Kenyan agriculture and the attention it receives from all quarters. Nevertheless, the accuracy of even these data cannot be affirmed.

4. Average growth between 1970 and 1996 is estimated at 2.7 percent, reflecting a deterioration of yields in the 1990s. The rainfall-controlled growth rate cannot be calculated from 1990 onward because rainfall data are lacking. The rainfall data used here are average annual millimeters of rain from 14 stations from the south, southeast, central, and western parts of Kenya.

5. Most opinions are based on anecdotal evidence from field visits. See box A.1 in Annex A on the difficulty of using such evidence to draw inferences.

6. These weaknesses, of course, were not specific to Kenya (Feder, Slade, and Lau 1985).

7. As the perception of the roles and functions of extension has evolved, so have the models used to capture the interactions of research, alternative extension providers and methodologies, and farmers. The simplistic model here is meant to reflect the interactions assumed for NEP I and NEP II.

## Chapter 2

1. The key reference reports are MALDM 1997b, c, and Kandie 1997.

2. It was found later that a miscalculation of the number of farm families had led to a farm-to-staff ratio much higher than the 500:1 that the staff appraisal report judged to be adequate.

3. *Outreach* is defined here as any type of contact between farmers and the extension system. As discussed in Chapter 4, however, this can be a poor measure of effectiveness. It is also inconsistent with the role of "contact farmer" or "contact group" that T&V advocates. Nevertheless, for reasons discussed below, field staff are using alternative methods, particularly *barazas*, to increase their outreach.

4. About 26 percent of those who were in service in 1990 thought that the system was more effective at the time of the survey; 49 percent thought that it was less effective, and 25 percent thought that it had remained the same.

5. The general principles are professionalism, a single line of command, concentration of effort, time-bound work, client orientation, and regular training.

6. Most institutional analyses focus on the characteristics of

goods or services from the suppliers' perspective. Thus, the subtractability and rivalry of benefits from goods and services provide guidelines for the optimal delivery mechanism. But even for a public good, viewing benefits from the demand side helps conceptualize efficiency gains from cost recovery, even if cost recovery is only partial.

## Chapter 3

1. In addition to complementing the quantitative, survey-based findings of this study, the beneficiary assessment was intended to allow a comparison of the quantitative results with those from a more qualitative and participatory approach.

2. Even though these were "poverty" assessments, a substantial number of people belonged to land classes that are comparable to the OED survey households.

3. On average, once a year in low-potential zones, twice a year in medium-potential zones, and often in higher-potential zones.

4. The ranking used a simple tabulation of the reported first choices. Considering that basic preferences are likely to be given higher priority, alternative rankings were tried that used the top three and five choices and the assigned ranks as weights for aggregating across observations. These results were consistent with extension retaining the fifth or sixth ranking.

5. The only exception was electricity. In declining order, the rankings were piped water, public health dispensaries, dry season road access, electricity, and tarmac roads.

## Chapter 4

1. It is possible that some noncontact farmers do not know that a neighbor is a designated contact farmer, and consequently report their source of information as "friends and neighbors." However, it is unlikely that in a small community, especially where group activities are reportedly common, that farmers would not observe the regular and frequent visits of an extension agent or other farmers to one particular farm. In either case, the lack of publicity about extension activities in given locations is likely to have reduced their potential for impact.

2. These results are consistent with recent findings from beneficiary assessments in several African countries, which show that contact farmers are likely to be less well connected with the rest of the community than hoped (Salmen 1999).

3. This analysis is based on farmers' recall of their first meeting with extension agents. Comparisons with three independent data sets for three different time periods since 1992 show that the recall bias is unlikely to be significant.

4. As noted earlier, however, the bias against women in the selection of contact farmers appears to have persisted.

5. That is, among the farmers who reported receiving advice at least once a year, or about 41 percent of the sample.

6. In part, the problem is that "useful," a term used often to determine the effectiveness of extension services, is ill-defined and vague. Farmers are also reluctant to volunteer criticism.

7. *Supply* is defined as the effective supply of information as revealed by the farmers' responses about the recommendations that they find most applicable. It is assumed that these recommendations are either those they receive advice on or those that are relevant to their circumstances.

8. Of the contact farmers who reported noticing a change, about 23 percent actually reported an increase in extension visits, 37 percent reported fewer visits, and 32 percent reported no visits at all. The remainder gave unspecified or other responses. Surprisingly, the pattern of the contact farmers' responses is almost the same as that of the noncontact farmers.

## Chapter 5

1. Assessing the *actual* impact of extension requires measuring the associated increase in farmers' agricultural productivity. This is dealt with in Chapter 6.

2. Increased productivity can take the form of diversification into higher-valued crops, an increase in the efficiency of input use, a change in the use of productive inputs, or a combination of the three.

3. A farmer's decision to adopt a particular technology is influenced by a number of economic and technological factors, including extension advice (Feder, Just, and Zilberman 1985).

4. This process is akin to the spread of an epidemic or an infectious disease (Feder and Umali 1993).

5. Livestock extension services were included in NEP II only after 1994. A separate, preliminary analysis shows that the vast majority of the households that were aware of livestock-related recommendations were already aware of them by 1994. Attributing the awareness or adoption of these recommendations to NEP II is thus likely to be tenuous. The analysis of the awareness and adoption of livestock recommendations will be conducted separately.

6. Less than a third of the sample was aware of the recommendations on fertilizer and other chemical inputs.

7. Several early surveys showed that activities in many of the simpler and maize-related recommendations were already being performed widely at the start of NEP I (see Gerhart 1975 and Ongaro 1990).

8. Since maize has been the focus of government extension since the mid-1960s, the cumulative impact of its efforts on relative levels of awareness for maize practices is to be expected.

9. The results could also be interpreted as reflecting the efficient working of the spread effect of the contact farmer approach. But if this were the case, there should be a corresponding increase in the share of friends, neighbors, and family as a source of information. The results show a contrary trend: the share of friends, neighbors, and family has steadily declined for all activities.

10. It is reasonable to assume that, with more than 80 percent of those who are aware adopting recommendations, if the remaining two-thirds who are currently unaware of the recommended practices were provided with appropriate advice, almost 50 percent of the sample could be potential adopters.

11. These include the supply of extension, measured as the ratio of extension worker to farm families in each location. The

cumulative effect of extension advice over years is captured by using a weighted, lagged structure of extension supply over a number of years.

12. For spacing, seed rates, and chemical plant protection measures, the predicted contact farmer variable is significant at the 5 percent level; for crop variety and cultural pest control, it is significant at 10 percent.

13. This new specification, a multiplicative parametric specification of the supply of extension over discrete time intervals between 1982 and 1997, was also tried for the awareness estimation. The results for awareness with respect to extension were similar to the adoption results.

## Chapter 6

1. Technical efficiency measures physical productivity—that is, it relates physical inputs to output. Scale efficiency measures the deviation of each farm from the optimal size of operation. Allocative efficiency measures the deviation from the optimal of the input mix given the current market conditions as reflected by the current prices. For 1982, input price data are not available, and hence only the technical and scale measures are calculated.

2. Weak significance refers to significance at the 10 percent level.

3. Since only 285 observations were used, some tests were done to check for potential selection bias for the retained observations (a result of inability to contact all the households in the 1997 survey locations). A simple *t*-test of the 1982 level of relative efficiency shows that the average efficiency of retained observations is slightly lower than that of the rest of the 1982 sample, and significant at the 5 percent level. But when agroecological factors are controlled for, in a Probit regression, the 1982 difference in efficiency level is no longer significant at the 5 percent level.

4. A drawback of DEA is its sensitivity to measurement errors. To minimize these, the analysis used only observations with positive outputs, and for all variables, observations in the top and bottom 1 percent of distribution of intensities (output or input per unit of area) were eliminated; the exception to this was observations with zero nonlabor cash inputs.

5. Malmquist indexes are calculated so that scores below 1 represent a positive change or gain, while scores above 1 represent regress. To make the presentation more transparent, the graphs depict the inverse—that is, scores greater than 1 represent gains in productivity or efficiency.

6. These trends are consistent with farmer complaints in the high-potential districts, such as Trans Nzoia, that they are obtaining lower yields with the same or more inputs.

## Chapter 7

1. The working paper has been recently published as World Bank Policy Research Working Paper 2098.

2. Because of attrition and incomplete data for some variables, the number of observations common to the 1982 and 1990 data are 306; to the 1990 and 1997 data, 216; to the 1982 and 1990 data, 258.

3. Alternative lag structures and lengths were tried, but the qualitative results did not change significantly.

4. To the extent that there are any carryover effects from the previous system, the impact of NEP I's early years is likely to be overestimated, but this is not considered to be a major limitation.

5. For each observation, the average was taken over all other observations in the cluster to avoid spurious statistical association, since household production level enters the dependent variable calculation.

6. Note that district dummy variables are included, in conjunction with distances to market and roads, as proxy for local prices, which are not available for the 1982 and 1990 data.

## Chapter 8

1. The survey followed the professionally accepted guidelines for CVM questioning; interviews were conducted in person; the more conservative willingness to pay (rather than willingness to accept) was elicited; sample and item nonresponse were quite low; open-ended as well as double-bounded referendum questions were asked; the program was well understood by the farmers; and the farmers were given opportunities to explain their responses (see Arrow and others 1993).

2. Eleven respondents (less than 2 percent of the sample) mentioned "on-demand" in response to the desired frequency of visits. These observations have been dropped for the rest of the analysis.

3. Farmers were also asked the mode of payment they preferred, and the majority chose cash.

## Annex A

1. A larger number of studies have attempted to measure the effectiveness of extension in general, including several studies of T&V systems. However, most of the studies suffer from conceptual or methodological limitations, as Birkhaeuser, Feder, and Evenson (1991) and Feder and Umali (1993) have noted.

2. Kenya was the first country in Africa to reform its national extension service along T&V lines.

3. The Central Bureau of Statistics, an independent agency, collected the data, not MALDM.

## Annex B

1. The pilot focused only on maize and was conducted with weekly visits rather than the fortnightly visits prescribed by T&V standards.

2. Non-FEW staff included the DAO, SMS/AO, DEO, TO, senior account clerk, clerks and enumerators, and drivers.

## Annex C

1. Such observations were made during individual and group meetings of current and past extension and nonextension staff of the ministry, academics, researchers, and donors.

2. Expenditure estimates for wholly extension projects can be identified, but expenditures on extension as a component of

other projects (a number of which are donor-funded) are not yet accounted for.

3. The data MALDM provided to OED for NEP I are inaccurate. A cross-check with the appropriation accounts for 1994–95 revealed that those data were for expenditures (development and recurrent) for the whole ministry, and not just for extension.

4. The conversion rate is US\$1 to KP 2.9 (Ksh 58) for 1997.

5. The exact total depends on how much of the KP 21.7 million that was spent on information management was attributable to extension activities.

6. An alternative estimate can be derived from the Staffing Norms Study. Assuming that the short-term staffing norms proposed for 1998–99 reflected the current staffing levels, personnel costs for the study districts for district-level staff alone were about Ksh 374 per farm family. Adjusting for 15 percent inflation, assuming that these costs represented 80 percent of the recurrent budget, and doubling it to account for the development budget, yields an estimate of Ksh 794 per farm family for 1998–99. This is close to the estimate from the 1996–97 budget, considering that it is an underestimate because it omits staff expenses for all staff above the district level.

7. Part of the improvement in staff quality can also be attributed to the rapid increase in staff numbers through the 1980s, which brought in better trained graduates from the agricultural colleges.

## Annex E

1. The questions on awareness and adoption of practices were administered in the second round of the OED survey, when 34 households from the original sample of 596 could not be contacted again. The following analysis is based on responses from the remaining 562 households.

2. Targeted recommendations ranged from simple messages (on crop varieties, planting time, spacing, seed rate, weeding time, number of weeding, and the like), to practices of intermediate complexity (such as applying types of basal and top-dress fertilizers), to more complex messages (such as knowing the quantity of basal and top-dress fertilizers, time of top-dressing, and chemical and cultural pest and disease control measures).

3. The results reported in Bindlish and Evenson (1993) are mostly for maize, with beans as the only second crop for about 25 percent of the 1990 sample. Coverage of crops other than maize intercrops was negligible.

## Annex I

1. The survey included modules on the nature and extent of interaction with agricultural extension services and other extension activities; detailed input and output data for crop production; animal health and livestock production data; household demographics; farm equipment and agroecological characteristics; awareness and adoption of extension messages; a contingent valuation module

to elicit willingness to pay for extension services; infrastructure and other services; credit; and group activities.

2. These three surveys generate a panel data set for approximately 300 households. The surveys cover household demographics, farm characteristics, and input-output data on agricultural production. The 1990 and 1997 surveys also collect information on contact with extension services, including awareness and adoption of extension messages.

3. NASSEP stands for the National Sample Survey and Evaluation Program.

4. The selection criteria for the replacement households was to select the fourth household to the left (facing out at front gate) of the missing household's farm.

5. With subsequent post-coding of the responses.

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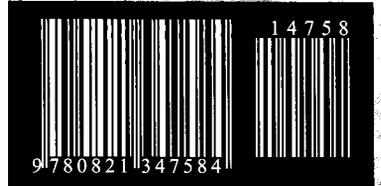
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