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1975/77
Research - Agriculture
Vol. I



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For further correspondence, please see VOL. II.

RECORDS MANAGEMENT SECTION

Research Agriculture

INTERNATIONAL DEVELOPMENT
ASSOCIATION

INTERNATIONAL BANK FOR
RECONSTRUCTION AND DEVELOPMENT

INTERNATIONAL FINANCE
CORPORATION

OUTGOING WIRE

TO: LUCIO RECA
3 DE FEBRERO 1235
1426 BUENOS AIRES

DATE: AUGUST 26, 1976

CLASS OF SERVICE: *LT/IT*
(3691)

COUNTRY: ARGENTINA

TEXT:
Cable No.:

APPLICATION BEING MADE TO RESEARCH COMMITTEE FOR ADDITIONAL FUNDS TO USE BOTH PARTIAL AND GENERAL EQUILIBRIUM METHODS FOR AGRICULTURAL PRICES AND SUBSIDIES STUDY IN ZAMBIA PORTUGAL AND THAILAND STOP OUR MODEL FOR MEXICO FOUND UNSUITABLE STOP PROPOSE FOR YOUR CONSIDERATION SUBJECT APPROVAL OF RESEARCH COMMITTEE YOU ASSIST US WITH MICRO, PARTIAL EQUILIBRIUM WORK IN ZAMBIA AND PORTUGAL WORKING WITH GENERAL EQUILIBRIUM CONSULTANTS IN ZAMBIA AND EGBERT AND GULBENKIAN FOUNDATION IN PORTUGAL STOP PROPOSE FURTHER YOU PROCEED PORTUGAL WITH AGRICULTURAL SECTOR MISSION LED BY JACQUES KOZUB AROUND MIDDLE OCTOBER STOP PORTUGUESE DATA WOULD NEED SOME UPDATING FROM EGBERT MODEL STOP MUCH ZAMBIAN MICRO DATA ALREADY COLLECTED FOR GENERAL EQUILIBRIUM MODEL AND RECENT AGRICULTURE SECTOR SURVEY REPORT AVAILABLE STOP IF PROPOSAL ACCEPTABLE TO YOU IN PRINCIPLE TOR, VISIT TO ZAMBIA AND OTHER ARRANGEMENTS COULD BE WORKED OUT ON YOUR ARRIVAL HERE FOR DRAFTING ARGENTINE REPORT REGARDS

BRUCE

NOT TO BE TRANSMITTED

AUTHORIZED BY:

NAME Colin Bruce
DEPT. Agriculture & Rural Development

SIGNATURE *[Signature]*
(SIGNATURE OF INDIVIDUAL AUTHORIZED TO APPROVE)

REFERENCE: CB:ssp
ORIGINAL (File Copy)
(IMPORTANT: See Secretaries Guide for preparing form)

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Krishna, French-Mullen, Kozub
cc: Messrs. Dubey, Duloy, Hablutzel,
Hendry, Haynes

For Use By Communications Section

Checked for Dispatch: *[Signature]*

Research - Aigue

Research Committee Members

August 26, 1976

Orville F. Grimes, Jr., VPD

Research Proposal: "Agricultural
Innovation and Rural Development"

1. The Research Committee at its meeting of June 23, 1976, reviewing an earlier version of this proposal, suggested that the sponsors discuss with a "peer group" of Bank staff experienced in issues of farm technology and innovation the means by which the proposal's objectives and methodology could be made more specific. A revised proposal would then be discussed with Messrs. Thalwitz and Waelbroeck, constituting an ad hoc advisory group of the Research Committee, and, if found suitable, would be circulated to the full Committee.

2. You will find attached the outcome of this exercise: A revised proposal with a budget request of \$69,750 (of which all but about \$8,000 would be expended during FY77, the remainder during FY78), and the reactions of Messrs. Thalwitz and Waelbroeck. I would much appreciate your indicating, in writing or by telephone, whether or not you now recommend acceptance of this proposal. Thank you.

Attachments

Distribution

Messrs. Chenery, Avramovic, Balassa, B. de Vries, Dubey,
Jaycox, B. B. King, Lerdau, Thalwitz, van der Tak,
Vergin, Waelbroeck, Yudelman

OFGrimes:gm *of*

AGRICULTURAL INNOVATION AND RURAL DEVELOPMENT

1. Research funds are requested to support the preparation of a Policy Paper on Farm Technology. The project was originally conceived as a paper on farm mechanization, but this was soon seen to be too narrow a focus: mechanization is only one of many aspects of "innovation" within the development process in general and within farming systems in particular.^{1/} Indeed, the controversies which arise around the issues of mechanization in agriculture can be satisfactorily resolved only within the framework of a systematic analysis of the biological, mechanical, institutional, economic and social conditions relevant and appropriate to particular resource endowments, relative scarcities and stages of economic development. Many of the mistakes which have been made regarding the transfer of technologies from more to less developed countries are the result of failures to analyse and manage the adoption of technologies within a wider framework of socio-economic development.

2. Thus, technological innovation in agriculture tends to be handled, both outside and within the Bank Group on a specific project basis, with a primary focus on particular products, resources, or aspects of agricultural production (for example, mechanization, seed/fertilizer packages, livestock improvement, irrigation, processing facilities, and farmer credit schemes). Despite this rather narrow conception in implementation terms, however, technological change is essentially a disturbance to the whole farming system. Because it is, by definition, an effect on resource productivities even the most rudimentary conceptual analysis of the innovation process indicates that there will be adjustments in both output and resource use - indeed, this is the

^{1/} See explanatory note on the term "innovation" at the end of this proposal.

prime motivation for the introduction of new methods in the first place. It is clear, too, that the implied resource readjustments impinge not only on the product (or product class) on which the technology is focussed, and involve not only the particular resources upon which the technological change is dependent, but also exerts influences potentially on all other products and resources in the production system. Furthermore, the disturbance of a relatively static traditional farming system introduces new uncertainties and alters the pattern of risks that farmers have become adjusted to, and so requires the establishment of appropriate incentives if the change is to be accepted. Recognition of these aspects is vital regardless of whether the change can be viewed initially as being merely product specific (a new seed variety), resource specific (mechanization), factor neutral, output increasing, output stabilizing, or any other terms in which the technology might be characterized.

3. This gives rise to two major propositions:

- (i) that to understand the process of technical innovation it should be viewed in a wider setting perhaps more conceptually akin to that of the economist's general equilibrium framework; narrow ceteris paribus provisions may not hold, and the partial analysis of technological change, whether in planning or in evaluation, could be misleading. Having said this, however, the standard general equilibrium framework treats technological change as some vaguely defined shift in production functions - which is useful for general conceptual analysis but is not easily associated with particular types of technical innovation. In addition, many of the induced adjustments fall outside the conventional economic sphere and

into the arena of social, institutional and legislative patterns. In consequence, the relevant embracing frameworks can probably only be described adequately by employing "systems" concepts in their wider sense;

- (ii) that since the ultimate impact of a technological innovation may be recognized as much in terms of these consequential influences as in terms of the primary changes for which the innovation scheme was designed, it would seem desirable to conduct technological transformation within the confines of what might be termed 'a defined technology policy'. In essence, this would imply specifying the range of goals possible within a rural development context, a framework for the assessment of technology options and a series of intervention measures designed to initiate adoption and then guide and control the resulting changes along the most desired pathway - in short, a mechanism for the directed "management" of technological change.

4. It is to this end that the currently proposed project is committed. It is a presumption at this stage that a technology policy is both a necessary and a feasible element of rural development planning. Surprisingly, such a proposition has never been explored in the context of agricultural societies, although it has clearly become the focus of increasing attention in the industrialized nations. This concern has been summarized recently by H.W. Johnson, Chairman of the MIT Corporation, who stated "it is in the arena of the impact of technology on individuals, on the organizations and institutional systems under which men live that we now face a powerful challenge that to many of us seems wholly new. The problems require mixed solutions that are not only technical,

economic and managerial but political and social as well. The great failings of solutions in the past - and a deficiency that is becoming dangerous in the present - is that they are victims of partial definition, that there is too much emphasis first on one aspect of the problem and then on another so that momentum related to a balanced definition and solution cannot be sustained. It is clear that a continued and growing technology will have to be a new kind of managed technology, taking into larger account basic human, social and environmental concerns at a new level of awareness and with a longer time frame in mind. Such a definition will place a larger emphasis on the research base for technology, on understanding the scientific outcomes - biological, physical, social - of the applications of technology, and in monitoring the ongoing effects of technology. Understanding and managing the complex interactions of technology and society are the very heart of the matter." (Technology Review July/August 1976).

5. The study proposed herein will be directed towards structuring the necessary components of a technology policy for rural development by proceeding in the following manner:

- (i) An examination of the "operational" literature to extract (a) the prime effects and (b) the secondary effects of particular examples of technological changes in the agricultures of developing countries. This review will seek to cover not only the direct physical and economic impacts in terms of outputs, inputs, farmer incomes, etc., but also the side effects on markets, income distributions, farm size structures, work patterns and life styles etc.
- (ii) These observed outcomes will then be related in each case to (a) the technical potential, objectives and expectations of the project, and (b) the manner of its implementation and the operative policy measures and other conditions that prevailed at the time in the receiving environ-

ment. Experience suggests that, despite the aspirations of projects directed towards technological change, achievement has consistently diverged from or fallen short of expectations. It is intended to seek the reason for these differences and to seek explanations in terms of both the technology "package" that was offered and the other important economic, social and institutional factors that might be identified.

- (iii) With this information as a background, the more theoretical literature and formal models of the innovation process will be studied in an attempt to draw together the array of technical and non-technical factors thought to influence the nature, rate and extent of absorption of new technology within agriculture. The overall objective is to establish the determinants of successful innovation and the factors upon which it is conditional.
- (iv) Many of the influences on the innovation process are already commonly in the domain of public policy (selection of the technology package, market prices for products and factors, credit provision, establishment of farmer cooperatives/syndicates, fiscal measures) and many more could be incorporated through new and conscious acts of policy (perhaps land tenure legislation, creation of extension and advisory networks, animal health regulations). These kinds of policy measures will be studied with a view to assessing their potential effectiveness in molding innovation processes by reference to a number of common rural development environments (for example, subsistence family holdings, small commercial farms under landlord-tenant tenure, plantation agri-

culture, range livestock farming systems). It is hoped that this will allow the identification of guidelines for the "non-technical" aspects that ideally should be associated with any project having a technological change component.

- (v) From the standpoint of constructing a "technology policy", it would seem desirable to attempt a characterization of technological changes and technology systems that is meaningful for the assessment and selection of technology, and the ordered management of its implementation in relation to rural development goals. This would likely be a synthesis between the technologist's and economist's viewpoints about technology change which, in their simplest terms, can be seen to be somewhat different. For example, one view would assert that the potential impact of some innovation is a function of, and can be judged by reference to, the characteristics of the technology itself. For example one might predict that a mechanization program will result in output expansion because it increases the capacity for productive farming operations; or the effects of a new seed fertilizer package will be scale-neutral because the elements of the package are infinitely divisible. At the other extreme, the social scientist would tend to characterize technology changes more generally in terms of particular factor productivities and resource substitutions, seeing the economic, social and institutional setting (and not the specific technology itself) as the dominant influence on the direction of the innovation process. This is reflected in general terms by the writings of Marx, Weber, Schumpeter, Browne, etc., but in a rural development setting is exemplified by the view, for

example that any technology which confers the potential for output expansion (mechanization, seeds, fertilizer, water), will be more fully exploited under an ownership system of land tenure than under a tenancy system; or that the provision of appropriate credit institutions is a pre-requisite for almost any significant innovation by farmers. While there are elements of truth in both these approaches, neither one can be relied upon alone to provide an appropriate starting point for assessing technological innovation, whose actual effects are the result of a complex interaction between the technology package, the initial conditions, and the concurrent adjustments in the socio-economic system.

- (vi) As a side issue, the widely used concepts of "intermediate" and "appropriate" technology will be subjected to examination. They are, of course, terms which are open to a varied interpretation; however, they seem to be suggestive of what was termed the "technologists' viewpoint" in the previous paragraph - i.e., the view that the secret of successful technological change lies in the physical hardware that is offered. If the idea of constructing a defined technology policy is a realistic one, then this implies the possibility not only of fitting the "appropriate" technology to the rural system but also adjusting the system to receive a technology.
- (vii) Finally, it is intended to construct an outline "general systems framework", within which the process of technical transformation -- from the generation of new technology, through the selection, adaptation and implementation of a particular technology package appropriate to particular

situations, to the potential primary and secondary effects that might be wrought on the rural system -- can be viewed and managed. It is envisaged that the design of such a general systems framework will open up fruitful avenues of empirical research into particular situations, which in turn might lead to refinements or modifications to the initially specified systems framework. This final and culminating piece of work is not foreseen as a computable empirical model, but rather as a skeletal structure from which more detailed quantitative research projects might be constructed in order to further fruitful work in the technology field. It should also enable the identification of key considerations and general guidelines for the construction of a specific technology policy and the ordered management of technological change within agriculture.

6. This research proposal is not an empirical research project in the sense that new case studies are proposed. It is also not a research proposal in the sense that a mathematical model will be designed. It is, however, a research project in the sense of attempting a synthesis by culling the observations and distilling the conclusions arising from the theoretical treatises and empirical studies and the views of those working in this field. It will, we hope, result in a more appropriate analytic framework for (a) designing future research projects in this whole area; (b) designing farm technology packages which are relevant to development goals and appropriate in developing country situations; and (c) learning to manage the transfer of technologies. The methodology to be used is simply that of using the analytic abilities of trained economists with

experience in the field to analyze, integrate and synthesize the available knowledge and wisdom as contained in the literature and through discussions with those working in the field.

The Literature on Technology

7. Apart from the wider writings on economic development, in which technological change is treated more by implication than by analysis, the more relevant literature falls into five broad categories:

- (i) Adjustment Studies - include studies of economic adjustment using various kinds of quantitative and theoretical development models, (e.g. those of Thorbecke, Day & Singh, and Hayami and Ruttan). This literature is not large but is rather esoteric. In most cases, the models cover much more than the subject matter of technological innovation, and technology is generally conceived of in broad terms.
- (ii) Impact Studies - include many ex post and some ex ante evaluations of the effects, benefits, costs and implications of changing technology. This literature consists largely of empirical studies, though some cover theoretical and conceptual considerations as well, and is very extensive and variable in quality. There are several hundred items alone on the HYV technology as it has affected the Indian sub-continent in the past ten years, but many of these are repetitive and of poor quality in terms of accuracy, completeness and insight. Some of the better studies have drawn together and interpreted technology effects in various ways (e.g. Yudelman et al, Shand et al, Sen, and Griffin); mechanization studies, too, are quite common.

However, much of the broad sweep of technology change has been inadequately evaluated, and many aspects not studied at all.

- (iii) Possibility Studies - are those that look for gaps in the current technology frontier, or in relation to a projected development pathway. A few are general in orientation (e.g. Marsden on Progressive Technology) but most are situation-specific - such as the reports of the Intermediate Technology Development Group. While this literature is not extensive and often not readily accessible, it will be reviewed for the insight it might provide on the need for, and the use of, various policy instruments (including R & D).
- (iv) Policy Studies - seek to indicate the possible directions that technological innovation might take and the means by which it might be guided. (In most cases, the emphasis is on the policy measures rather than the possible or preferred directions). Studies of possible directions include those of the US National Science Foundation; studies of directions and means include Owens and Shaw, "Development Re-considered", and publications of the Science Policy Research Unit of Sussex University; studies of means include those of Moseman, Graham Jones and Evenson. This is the genre into which this proposed study will fit, with equal emphasis on policy directions and appropriate instruments for technology guidance.
- (v) In addition, there exists a varied collection of studies and reviews of industrial innovation, both in general terms (Nadiri, Rosenberg, Salter, Cooper) and in connection with particular industrial processes (NIESR). While this literature may have no obvious relevance to

agricultural technology, such studies of industrial processes could provide useful insights into the mechanisms of, and influences on, adoption processes and suggest other issues worthy of consideration.

Organization and Timing

8. It is proposed that work would begin as soon as possible and be completed by the end of August 1977. The project will be undertaken jointly by Graham Donaldson and Dr. J.P. McInerney (consultant) of the University of Manchester, England, who will take a year's leave-of-absence to come to Washington for the purpose. Some work has been done already on exploring the literature and defining concepts during September 1975. The study team will have as input the material on the green revolution and agricultural R & D drafted by Professor F.G. Jarrett of the University of Adelaide, Australia during his stay at the EDI in 1975. It is proposed that use would be made of other short term consultants (at this stage unspecified) where necessary to advise on particular issues and to comment on drafts.

9. To draw on the first-hand experiences of LDC experts and the staff of the International Research Centers, two field trips are proposed - one to Asia, including visits to IRRI in the Philippines and ICRISAT in India; the other to Latin America, including visits to CIMMYT in Mexico and CIAT in Colombia.



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Withdrawn by Sherrine M. Thompson	Date December 28, 2017			

Note: The word "innovation" is susceptible to differing interpretations by different people depending, among other things, on which of the science or social science disciplines one associates oneself with. To many it implies merely new discovery through research and development; to others it means the first practical use or exploitation of a discovery; others still class something as an innovation as long as it has not become widespread and in common use; finally, others continue to call a development an innovation, even if commonplace, because it differs from older established and outmoded practices. "Innovation" is used herein to convey a very particular, but broad, idea of "the introduction of something new" (Merriam-Webster 7th Edition) covering the whole range of activities from the introduction of new knowledge to society ("discovery"), the making available of new resources/methods/products to the farming sector ("innovative development"), the practical implementation of the new technology by target groups of farmers ("adoption"), and the spread and establishment of the practice throughout agriculture ("diffusion").

Innovation is, therefore, not a particular thing, nor an event, but is a process. Furthermore, it is a process which encompasses a wide array of adjustments to the rural system and is an ongoing and dynamic phenomenon rather than a single discrete change in the production process.

Research Rural Development

Mr. August Schumacher

August 25, 1976

Ben Thoolen, Acting Division Chief

Rural Development Conference, Michigan State University
September 26-27, 1976 - Terms of Reference

On September 26th, you will plan to proceed to East Lansing, Michigan, to be the principal speaker at the NFE Rural Development Conference at Michigan State. As requested by Professor Niehoff, you will distribute copies of the short note on the Mexican PIDER project, show the rural development film on Mexico prepared by IPA and deliver a 20 minute talk following the film on Mexico and more general issues on rural development facing the Bank. Upon your return, you will prepare a Back-to-office Report on issues discussed at the conference of relevance to Bank rural development operations.

cc. & cleared with Mr. A. Morris - IPA
Messrs. Yudelman
Christoffersen
Turnham
ASchumacher/cp

OFFICE MEMORANDUM

TO: Mr. O. Grimes, Office-V.P., Dev. Policy

FROM: Jean Waelbroeck, Adviser, EPD *JL*

SUBJECT: Revised Proposal of Agricultural Innovation
and Rural Development

DATE: August 24, 1976.

I have found the revised research proposal sent to me by Mr. Donaldson much better focused than the previous one. Its goals are still ambitious but they appear achievable given the resources requested from the Research Committee. The problem posed: how innovations impinge on the agricultural production system and what the social consequences are - is an important one; it is also an area in which the Bank has special expertise so that it is capable of making a useful contribution to the abundant literature on this topic.

The immediate aim of the proposed research is to contribute to the preparation of an issues paper. It also seems to me that the paper may constitute a useful survey of the state of the arts in the area covered, which may inspire further research dealing with specific aspects of the problems posed.

JWaelbroeck:lb

Research - Agriculture

THE SOUTHERN RURAL DEVELOPMENT CORPORATION

1108 NORTH CONCORD ROAD
CHATTANOOGA, TENNESSEE 37421

August 20, 1976

Robert S. McNamara
The World Bank
1818 H. Street
Washington, D. C. 20433

Dear Mr. McNamara,

You have spoken eloquently for the need to curtail spiraling consumerism in the middle-class countries, if we are to bridge the gulf in living conditions between the rich nations and the poor.

Sharing your concern in this vital but thus far discouraging matter, I am very pleased to report what is I believe the first scientific evidence to come to light that the American people might be willing to adopt a new life-style in line with the needs and aspirations of the developing world -- if not of the whole of it, perhaps, at least of our immediate neighbors to the south, in Latin America and Africa.

The proposed new life-style revolves around the concept of part-time rural employment, supplied by factories in the countryside run on part-time jobs. It assumes that, for a variety of reasons, many Americans have become disillusioned with the prospects

Original to: *Mr. McNamara*
Date: *AUG 23 1976*
Communications
Section

of life in the suburbs, and would choose a simpler, more relaxed way of living in the countryside, which might be less affluent, but with a greater amount of personal freedom.

To test this idea we asked the Gallop Organization in June to survey the American public with the following query:

"As a new way to live in America, the idea has been suggested of building factories in rural areas -- away from cities -- and running them on part-time jobs. Under this arrangement the man and the woman would each work 3 days a week 6 hours a day. People would have enough spare time to build their own houses, to cultivate a garden and for hobbies and other outside interests.

How interested would you be in this way of life: definitely interested, probably interested, probably not interested, definitely not interested?"

The results of the survey indicate that about 58,000,000 Americans, or 40% of the adult population, expressed either definite or probable interest in the idea. The exact division of replies was as follows:

	<u>Per Cent</u>
Definitely interested	16
Probably interested	24
Probably not interested	19
Definitely not interested	35
Don't Know	<u>6</u>
	100
Number of Interviews	1,524

Analyses of the data by age, race, sex, income, education, size of community and region of the country are contained in the enclosed report, "The Public's Attitudes Toward a New Way to Live in America".

Of course, these figures alone are not conclusive, as I will be the first to admit. What people say they would like to do and what they actually will do when given a chance are not necessarily the same. In practice the trick will be to put together a "package" of amenities and services in the countryside which people will choose over a more expensive arrangement in the city. In this equation the cheaper land, increased leisure and personal freedom, and an abundance of light, space, and trees in rural areas will work against the overcrowding, crime, and congestion of the urban environment. But to my mind the critical factor remains the elimination of the private automobile in its present form -- to be replaced by feet, bicycles, busses, and country stores. A vastly improved system of home delivery services, or possibly a lightweight motorized bicycle cart for going to market (top speed 15 mph, will not go on freeways) are other ideas which might be considered.

There are excellent theoretical reasons for believing that in the short period a factory run on part-time jobs will make more money than the same factory run on full-time jobs -- involving reduced absenteeism and, with proper incentives, a faster tempo of work on the factory floor. In the long run, however, nationally

oriented concerns are likely to view the prospect of the new life-style with its lower per capita consumption levels as threatening future growth and sales. It was while pondering this dilemma, and responding to criticisms about company towns, that the following intriguing possibility occurred to me, which ought to be carefully considered and should be of special interest to you and the work of the Bank:

If within the boundaries of a local territory, in the legal form of a municipal corporation, such factories are built, and if the inhabitants of the territory are given exclusive rights to work in the factories in their area (which is not without precedent), and if, in addition, the community has attached to it in a permanent way -- that is, within its boundaries -- an independent agricultural land base (organized as a corporate farm, in the legal form of a perpetual land trust) which is sufficient in an emergency to provide the inhabitants with a subsistence food supply or its equivalent in agricultural commodities, then an interesting circumstance obtains: a strong interdependence is established between the factories and the inhabitants of the territory, or, in other words, between capital and the local community. This defines the condition of a mutually responsible relationship. For while the community would be in a strong bargaining position vis-a-vis the factories (with good strike powers, and the land to fall back on for an independent food supply) unreasonable demands

could be met by a withdrawal of working capital and non-fixed resources from the factories (including special management personnel, depreciation funds, and access to markets and suppliers) which would close the plants and leave the community without its source of external income, or, in other words, virtually ruined.

The question now becomes: suppose the plan were adopted in this form in the United States -- factories in the countryside, run on part-time jobs, and interdependent with the local community -- could it not be made to serve as a precedent for a similar type of arrangement in the developing world, with initial emphasis upon the developing countries of Latin America? As a strategy for development it offers certain definite advantages. In the first place, it would tend to preserve intact the traditional agrarian (peasant) social structures of these areas, and would not produce the kinds of dislocations and political instabilities inherent in current attempts to create urban proletariats in the midst of rural poverty; nor would it hold out the false promise of urban affluence, for which the resources probably do not exist. Furthermore, by establishing a genuine interdependence between capital and the local areas it would undercut the main argument for expropriation and nationalization of foreign owned enterprises: namely, that because these enterprises are owned by foreigners, they are not responsive to native interests. Indeed, the vested interest that would be established in local areas to specific groups of factories, or to the future prospect of such factories, would work

on the side against expropriation. In this regard agrarian reforms might be instituted at the local level, under local initiative, as a condition for such investments, with the local landowners exchanging their rights in the land for a certain percentage interest in the factories. If developed along these lines, this plan could serve as the basis for a stable penetration of American capital into underdeveloped areas. The multinational corporations would be interested in it as a potential strategy for long-term growth.

The next step, I suppose, is to actually launch the thing into practice, which in the end will be its only test. The Bank of America has indicated they will extend credit for a pilot, if we can find a corporation willing to undertake the venture. But where to find our corporation -- that is the question. Any suggestions or assistance which you might be able to offer in this matter would be deeply appreciated. And I will be more than glad to try to answer any further questions which you might have.

With best wishes,

Sincerely,



Luke Lea
President

LL:jds

Enclosures

Research - Agric

OFFICE MEMORANDUM

TO: Mr. Orville Grimes, Research Committee

FROM: Wilfried P. Thalwitz, WAP

SUBJECT: Research Committee Proposal on Agricultural Innovation and Rural Development - Revised Proposal

DATE: August 19, 1976

I have reviewed the revised proposal dated August 13, "Agricultural Innovation and Rural Development". It is a substantially improved version capable of being implemented as a preparation exercise for a policy paper. I have some doubts whether it can be executed with a budget of about \$70,000, but I would now re-submit the paper again to the Research Committee where I would support it.

Farm Technology Study Group

August 17, 1976

Graham F. Donaldson *GFD*

Research Committee Proposal on Agricultural Innovation
and Rural Development - Revised Proposal

1. Since receiving your comments on our first proposal as modified, we have realized the need to recast the submission in order to adequately express our ideas as they have been refined through discussion and re-thinking.
2. A revised Research Committee proposal is attached for your review and comment. Because of the time lapse that has occurred I am sending copies concurrently to Messrs. Thalwitz and Waelbroeck of the Research Committee (who were designated to examine revisions) and Mr. Grimes of the Research Committee secretariat.
3. As you will note, we have (i) restated our intentions regarding the study more succinctly and in a more operational way, (ii) made the proposal shorter than it was, and (iii) amended our proposal to focus on the preparation of a Policy Paper. We hope and expect that the Research Committee will agree this is an admittedly large but surmountable task.

cc: Messrs. W. Thalwitz,
J. Waelbroeck
O. Grimes

C. Bruce
S. Burki
J. Coulter
M. Leiserson
D. Turnham
C. Weiss

C. Downing
P. Hazell
R. Hofmeister
H. Kaneda
D. Pickering
L. Sonley

GFDonaldson:mt

AGRICULTURAL INNOVATION AND RURAL DEVELOPMENT

1. Research funds are requested to support the preparation of a Policy Paper on Farm Technology. The project was originally conceived as a paper on farm mechanization, but this was soon seen to be too narrow a focus: mechanization is only one of many aspects of "innovation" within the development process in general and within farming systems in particular.^{1/} Indeed, the controversies which arise around the issues of mechanization in agriculture can be satisfactorily resolved only within the framework of a systematic analysis of the biological, mechanical, institutional, economic and social conditions relevant and appropriate to particular resource endowments, relative scarcities and stages of economic development. Many of the mistakes which have been made regarding the transfer of technologies from more to less developed countries are the result of failures to analyse and manage the adoption of technologies within a wider framework of socio-economic development.

2. Thus, technological innovation in agriculture tends to be handled, both outside and within the Bank Group on a specific project basis, with a primary focus on particular products, resources, or aspects of agricultural production (for example, mechanization, seed/fertilizer packages, livestock improvement, irrigation, processing facilities, and farmer credit schemes). Despite this rather narrow conception in implementation terms, however, technological change is essentially a disturbance to the whole farming system. Because it is, by definition, an effect on resource productivities even the most rudimentary conceptual analysis of the innovation process indicates that there will be adjustments in both output and resource use - indeed, this is the

^{1/} See explanatory note on the term "innovation" at the end of this proposal.

prime motivation for the introduction of new methods in the first place. It is clear, too, that the implied resource readjustments impinge not only on the product (or product class) on which the technology is focussed, and involve not only the particular resources upon which the technological change is dependent, but also exerts influences potentially on all other products and resources in the production system. Furthermore, the disturbance of a relatively static traditional farming system introduces new uncertainties and alters the pattern of risks that farmers have become adjusted to, and so requires the establishment of appropriate incentives if the change is to be accepted. Recognition of these aspects is vital regardless of whether the change can be viewed initially as being merely product specific (a new seed variety), resource specific (mechanization), factor neutral, output increasing, output stabilizing, or any other terms in which the technology might be characterized.

3. This gives rise to two major propositions:

- (i) that to understand the process of technical innovation it should be viewed in a wider setting perhaps more conceptually akin to that of the economist's general equilibrium framework; narrow ceteris paribus provisions may not hold, and the partial analysis of technological change, whether in planning or in evaluation, could be misleading. Having said this, however, the standard general equilibrium framework treats technological change as some vaguely defined shift in production functions - which is useful for general conceptual analysis but is not easily associated with particular types of technical innovation. In addition, many of the induced adjustments fall outside the conventional economic sphere and

into the arena of social, institutional and legislative patterns. In consequence, the relevant embracing frameworks can probably only be described adequately by employing "systems" concepts in their wider sense;

- (ii) that since the ultimate impact of a technological innovation may be recognized as much in terms of these consequential influences as in terms of the primary changes for which the innovation scheme was designed, it would seem desirable to conduct technological transformation within the confines of what might be termed 'a defined technology policy'. In essence, this would imply specifying the range of goals possible within a rural development context, a framework for the assessment of technology options and a series of intervention measures designed to initiate adoption and then guide and control the resulting changes along the most desired pathway - in short, a mechanism for the directed "management" of technological change.

4. It is to this end that the currently proposed project is committed. It is a presumption at this stage that a technology policy is both a necessary and a feasible element of rural development planning. Surprisingly, such a proposition has never been explored in the context of agricultural societies, although it has clearly become the focus of increasing attention in the industrialized nations. This concern has been summarized recently by H.W. Johnson, Chairman of the MIT Corporation, who stated "it is in the arena of the impact of technology on individuals, on the organizations and institutional systems under which men live that we now face a powerful challenge that to many of us seems wholly new. The problems require mixed solutions that are not only technical,

economic and managerial but political and social as well. The great failings of solutions in the past - and a deficiency that is becoming dangerous in the present - is that they are victims of partial definition, that there is too much emphasis first on one aspect of the problem and then on another so that momentum related to a balanced definition and solution cannot be sustained. It is clear that a continued and growing technology will have to be a new kind of managed technology, taking into larger account basic human, social and environmental concerns at a new level of awareness and with a longer time frame in mind. Such a definition will place a larger emphasis on the research base for technology, on understanding the scientific outcomes - biological, physical, social - of the applications of technology, and in monitoring the ongoing effects of technology. Understanding and managing the complex interactions of technology and society are the very heart of the matter." (Technology Review July/August 1976).

5. The study proposed herein will be directed towards structuring the necessary components of a technology policy for rural development by proceeding in the following manner:

- (i) An examination of the "operational" literature to extract (a) the prime effects and (b) the secondary effects of particular examples of technological changes in the agricultures of developing countries. This review will seek to cover not only the direct physical and economic impacts in terms of outputs, inputs, farmer incomes, etc., but also the side effects on markets, income distributions, farm size structures, work patterns and life styles etc.
- (ii) These observed outcomes will then be related in each case to (a) the technical potential, objectives and expectations of the project, and (b) the manner of its implementation and the operative policy measures and other conditions that prevailed at the time in the receiving environ-

ment. Experience suggests that, despite the aspirations of projects directed towards technological change, achievement has consistently diverged from or fallen short of expectations. It is intended to seek the reason for these differences and to seek explanations in terms of both the technology "package" that was offered and the other important economic, social and institutional factors that might be identified.

- (iii) With this information as a background, the more theoretical literature and formal models of the innovation process will be studied in an attempt to draw together the array of technical and non-technical factors thought to influence the nature, rate and extent of absorption of new technology within agriculture. The overall objective is to establish the determinants of successful innovation and the factors upon which it is conditional.
- (iv) Many of the influences on the innovation process are already commonly in the domain of public policy (selection of the technology package, market prices for products and factors, credit provision, establishment of farmer cooperatives/syndicates, fiscal measures) and many more could be incorporated through new and conscious acts of policy (perhaps land tenure legislation, creation of extension and advisory networks, animal health regulations). These kinds of policy measures will be studied with a view to assessing their potential effectiveness in molding innovation processes by reference to a number of common rural development environments (for example, subsistence family holdings, small commercial farms under landlord-tenant tenure, plantation agri-

culture, range livestock farming systems). It is hoped that this will allow the identification of guidelines for the "non-technical" aspects that ideally should be associated with any project having a technological change component.

- (v) From the standpoint of constructing a "technology policy", it would seem desirable to attempt a characterization of technological changes and technology systems that is meaningful for the assessment and selection of technology, and the ordered management of its implementation in relation to rural development goals. This would likely be a synthesis between the technologist's and economist's viewpoints about technology change which, in their simplest terms, can be seen to be somewhat different. For example, one view would assert that the potential impact of some innovation is a function of, and can be judged by reference to, the characteristics of the technology itself. For example one might predict that a mechanization program will result in output expansion because it increases the capacity for productive farming operations; or the effects of a new seed fertilizer package will be scale-neutral because the elements of the package are infinitely divisible. At the other extreme, the social scientist would tend to characterize technology changes more generally in terms of particular factor productivities and resource substitutions, seeing the economic, social and institutional setting (and not the specific technology itself) as the dominant influence on the direction of the innovation process. This is reflected in general terms by the writings of Marx, Weber, Schumpeter, Browne, etc., but in a rural development setting is exemplified by the view, for

example that any technology which confers the potential for output expansion (mechanization, seeds, fertilizer, water), will be more fully exploited under an ownership system of land tenure than under a tenancy system; or that the provision of appropriate credit institutions is a pre-requisite for almost any significant innovation by farmers. While there are elements of truth in both these approaches, neither one can be relied upon alone to provide an appropriate starting point for assessing technological innovation, whose actual effects are the result of a complex interaction between the technology package, the initial conditions, and the concurrent adjustments in the socio-economic system.

- (vi) As a side issue, the widely used concepts of "intermediate" and "appropriate" technology will be subjected to examination. They are, of course, terms which are open to a varied interpretation; however, they seem to be suggestive of what was termed the "technologists' viewpoint" in the previous paragraph - i.e., the view that the secret of successful technological change lies in the physical hardware that is offered. If the idea of constructing a defined technology policy is a realistic one, then this implies the possibility not only of fitting the "appropriate" technology to the rural system but also adjusting the system to receive a technology.
- (vii) Finally, it is intended to construct an outline "general systems framework", within which the process of technical transformation -- from the generation of new technology, through the selection, adaptation and implementation of a particular technology package appropriate to particular

situations, to the potential primary and secondary effects that might be wrought on the rural system -- can be viewed and managed. It is envisaged that the design of such a general systems framework will open up fruitful avenues of empirical research into particular situations, which in turn might lead to refinements or modifications to the initially specified systems framework. This final and culminating piece of work is not foreseen as a computable empirical model, but rather as a skeletal structure from which more detailed quantitative research projects might be constructed in order to further fruitful work in the technology field. It should also enable the identification of key considerations and general guidelines for the construction of a specific technology policy and the ordered management of technological change within agriculture.

6. This research proposal is not an empirical research project in the sense that new case studies are proposed. It is also not a research proposal in the sense that a mathematical model will be designed. It is, however, a research project in the sense of attempting a synthesis by culling the observations and distilling the conclusions arising from the theoretical treatises and empirical studies and the views of those working in this field. It will, we hope, result in a more appropriate analytic framework for (a) designing future research projects in this whole area; (b) designing farm technology packages which are relevant to development goals and appropriate in developing country situations; and (c) learning to manage the transfer of technologies. The methodology to be used is simply that of using the analytic abilities of trained economists with

experience in the field to analyze, integrate and synthesize the available knowledge and wisdom as contained in the literature and through discussions with those working in the field.

The Literature on Technology

7. Apart from the wider writings on economic development, in which technological change is treated more by implication than by analysis, the more relevant literature falls into five broad categories:

- (i) Adjustment Studies - include studies of economic adjustment using various kinds of quantitative and theoretical development models, (e.g. those of Thorbecke, Day & Singh, and Hayami and Ruttan). This literature is not large but is rather esoteric. In most cases, the models cover much more than the subject matter of technological innovation, and technology is generally conceived of in broad terms.
- (ii) Impact Studies - include many ex post and some ex ante evaluations of the effects, benefits, costs and implications of changing technology. This literature consists largely of empirical studies, though some cover theoretical and conceptual considerations as well, and is very extensive and variable in quality. There are several hundred items alone on the HYV technology as it has affected the Indian sub-continent in the past ten years, but many of these are repetitive and of poor quality in terms of accuracy, completeness and insight. Some of the better studies have drawn together and interpreted technology effects in various ways (e.g. Yudelman et al, Shand et al, Sen, and Griffin); mechanization studies, too, are quite common.

However, much of the broad sweep of technology change has been inadequately evaluated, and many aspects not studied at all.

- (iii) Possibility Studies - are those that look for gaps in the current technology frontier, or in relation to a projected development pathway. A few are general in orientation (e.g. Marsden on Progressive Technology) but most are situation-specific - such as the reports of the Intermediate Technology Development Group. While this literature is not extensive and often not readily accessible, it will be reviewed for the insight it might provide on the need for, and the use of, various policy instruments (including R & D).
- (iv) Policy Studies - seek to indicate the possible directions that technological innovation might take and the means by which it might be guided. (In most cases, the emphasis is on the policy measures rather than the possible or preferred directions). Studies of possible directions include those of the US National Science Foundation; studies of directions and means include Owens and Shaw, "Development Re-considered", and publications of the Science Policy Research Unit of Sussex University; studies of means include those of Moseman, Graham Jones and Evenson. This is the genre into which this proposed study will fit, with equal emphasis on policy directions and appropriate instruments for technology guidance.
- (v) In addition, there exists a varied collection of studies and reviews of industrial innovation, both in general terms (Nadiri, Rosenberg, Salter, Cooper) and in connection with particular industrial processes (NIESR). While this literature may have no obvious relevance to

agricultural technology, such studies of industrial processes could provide useful insights into the mechanisms of, and influences on, adoption processes and suggest other issues worthy of consideration.

Organization and Timing

8. It is proposed that work would begin as soon as possible and be completed by the end of August 1977. The project will be undertaken jointly by Graham Donaldson and Dr. J.P. McInerney (consultant) of the University of Manchester, England, who will take a year's leave-of-absence to come to Washington for the purpose. Some work has been done already on exploring the literature and defining concepts during September 1975. The study team will have as input the material on the green revolution and agricultural R & D drafted by Professor F.G. Jarrett of the University of Adelaide, Australia during his stay at the EDI in 1975. It is proposed that use would be made of other short term consultants (at this stage unspecified) where necessary to advise on particular issues and to comment on drafts.

9. To draw on the first-hand experiences of LDC experts and the staff of the International Research Centers, two field trips are proposed - one to Asia, including visits to IRRI in the Philippines and ICRISAT in India; the other to Latin America, including visits to CIMMYT in Mexico and CIAT in Colombia.



Record Removal Notice



Research - Agriculture and Rural Development 1975 / 1977 Correspondence - Volume 1		Barcode No. 1064737		
Document Date 13 August, 1976	Document Type Budget			
Correspondents / Participants				
Subject / Title Budget Consultant Fees and Expenses				
Exception(s) Personal Information				
Additional Comments		<p>The item(s) identified above has/have been removed in accordance with The World Bank Policy on Access to Information or other disclosure policies of the World Bank Group.</p> <table border="1"> <tr> <td>Withdrawn by Sherrine M. Thompson</td> <td>Date December 28, 2017</td> </tr> </table>	Withdrawn by Sherrine M. Thompson	Date December 28, 2017
Withdrawn by Sherrine M. Thompson	Date December 28, 2017			

Note: The word "innovation" is susceptible to differing interpretations by different people depending, among other things, on which of the science or social science disciplines one associates oneself with. To many it implies merely new discovery through research and development; to others it means the first practical use or exploitation of a discovery; others still class something as an innovation as long as it has not become widespread and in common use; finally, others continue to call a development an innovation, even if commonplace, because it differs from older established and outmoded practices. "Innovation" is used herein to convey a very particular, but broad, idea of "the introduction of something new" (Merriam-Webster 7th Edition) covering the whole range of activities from the introduction of new knowledge to society ("discovery"), the making available of new resources/methods/products to the farming sector ("innovative development"), the practical implementation of the new technology by target groups of farmers ("adoption"), and the spread and establishment of the practice throughout agriculture ("diffusion").

Innovation is, therefore, not a particular thing, nor an event, but is a process. Furthermore, it is a process which encompasses a wide array of adjustments to the rural system and is an ongoing and dynamic phenomenon rather than a single discrete change in the production process.

OFFICE MEMORANDUM

TO: All Division Chiefs for Agriculture and
Rural Development

FROM: Ted J. Davis *TJD*

SUBJECT: Slide Show and Seminar on Semi-Nomadic Sheep Production

DATE: August 9, 1976

Winrock International Livestock Research and Training Center, set up as a foundation by the late Winthrop Rockefeller, is focusing on "Small-holder Livestock Development". Don Stoops, the livestock advisor of CPS is a member of the Board of Directors. The Center has had a major project under contract with the Navaho Indian Nation located in New Mexico and Arizona. Navahoes are among the poorest and least developed of all the Indian tribes in America. Their tribally owned land covers some three million acres and has an annual rainfall of less than 400 millimeters.

Practically the only productive activity for the land has been sheep raising which has suffered from serious neglect to proper husbandry practices and an exploitive marketing system. Recently the U.S. Bureau of Reclamation has provided irrigation water from the Colorado River to an area of 10,000 acres in the Reservation.

The Center has focused its attention on:

- a) improvement of husbandry practices;
- b) developing a competitive marketing system;
- c) planning the organization of a part of the irrigated area for fodder production and lamb fattening; and
- d) instituted a major training program for youn Navaho men.

Dr. Richard O. Wheeler and Dr. Hudson Glimp will present a slide show and seminar in the Bank on August 25 and 10:00 AM to 12 Noon in Room D-556.

While the Winrock Center's experience is most similar to those areas of Africa, EMENA and Mexico, the training program would be of interest to those dealing with livestock programs in all regions.

Since space is limited I suggest that you may want to designate 2 or 3 of your concerned operational staff to attend. Please call my secretary on extension 3294 with names of persons who will be attending.

TDavis/cc

cc: Messrs. Christoffersen
Turnham
Darnell/Pickering
Stoops
Rural Development Division
Nutrition Unit
RORSU

R search Ag.

August 9, 1976

Mr. E.J.W. Henry
Wallace Evans & Partners
Plymouth House
Penarth
Glamorgan CF6 2YF
United Kingdom

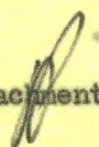
Dear Mr. Henry,

In response to your letter of July 20, we have attempted to pull together such available information as may be relevant. As you will be aware, this is a difficult subject closely linked to the soils, crops and quality of the sewage effluent involved. Dr. Milton Fireman, the Bank's Soils Specialist, suggests the attached extracts of literature may be of value, if only to point you in the direction of scientists who have specialized in the subject.

I hope that the foregoing will be of value.

Yours sincerely,

Donald C. Pickering
Tropical Agricultural Adviser
Agriculture and Rural Development Department


Attachments

cc: Mr. Fireman

Res. Agriculture

August 9, 1976

The Sales Director
Cherwell Valley Silos Ltd.
Twyford, Banbury
Oxon, U.K.

Dear Sir,

The July/August 1976 number of World Crops, page 177, makes brief reference to a new type of portable seed silo developed recently by your company. As you may be aware, the World Bank is deeply involved in financing agriculture and rural development. Consequently, we are interested in advances in post harvest technology. Accordingly, I should be interested to receive additional information on the equipment in question with particular reference to technical specifications, indicative prices and details of such tests as may have been conducted in course of its development.

Yours sincerely,

Donald C. Pickering
Tropical Agricultural Adviser
Agriculture and Rural Development Department

David Turnham

August 5, 1976

Michael Cernea

Re: Topics for Thursday Lunch Meetings

- 1. Undesirable consequences of transition from subsistence to cash crops agriculture.

The design of rural development projects for very traditional areas tends to replace subsistence crops with cash crops. When both coexist, the projects tend at least to change the current equilibrium between the two, favoring the latter. Is the implied assumption that such a substitution will improve farmers' income unquestionable? Which are -- or may be -- the social, nutritional, economic and employment consequences of such a transition? Can we identify, on the basis of existing project experiences, a typology of undesirable consequences? Can we formulate ways of arresting them, so as to incorporate in future projects a mechanism apt to prevent such consequences and to reinforce the positive effects?

- 2. How can REPLICATION of new style projects become possible?

All the Rural Development projects of the Bank at large can reach at most only 2-3% of the world rural poor. Our impact is thus limited. It can be amplified only if Bank projects set the stage for significant local replications. What is the current situation regarding replication? What is expected from national governments? Can we formulate a definite set of replicability prerequisites, to be built into the design of the initial project?

- 3. The absorption capability: building physical infrastructure in a vacuum of social organization.

The orientation toward the rural poor seems to be running against a latent contradiction: massive investments are provided for infrastructural facilities meant to benefit a category of people who are the least organized (socially) to take over and run these new facilities. Relationship: infrastructure versus social structure. Which should be the guidelines to the minimal requirements for accompanying new infrastructure with creation of matching forms of absorption-capable social organization?

MC/cc

*yellow
Research
Logue*

OFFICE MEMORANDUM

TO: Leif E. Christoffersen

DATE: August 4, 1976

FROM: Michael Cernea *M.C.*SUBJECT: A Forecasting Study on Rural Development in LDC Countries

Recently I received a very interesting (attached) study on the "Future of Agriculture in Year 2000". This study is confined to European agriculture, but while reading it I started to wonder about whether a parallel study, but focused on the agriculture of developing countries, would not be of interest to the Bank. In particular, such a study could be oriented toward some specific aspects of rural development in LDCs, as opposed to conventional agricultural and economic forecasting.

The attached study, whose experience and approach could be taken as a starting point for a new research project, is the product of a cross national research project concerned with forecasting the possible "futures" of European Agriculture in Year 2000. The project was carried out by a group of sociologists and agricultural economists under the general sponsorship of the European Foundation in Amsterdam and the Gulbenkian Foundation in Lisbon. Several national workshops and one European Workshop were organized prior to publication, to discuss the central question: What should be the role and functions of farming in future Western Europe?

Basically, the study develops 4 alternative scenarios or "images", which take implicitly into consideration various political alternatives for development and their impact on agriculture. They depict 4 possible futures for farming, using a standardized framework consisting of 5 sections:

- a) The normative premises of each scenario;
- b) Goals stated for the future development of society;
- c) Specific goal statements for the structure of society (political structures, economic structures, communal and cultural structures);
- d) Definition of situation of agriculture in society;
- e) First consideration of possible structures of agriculture.

The last section in each scenario is of particular interest dealing with the following issues:

- the nature of the agricultural enterprise in year 2000;
- the relation between agriculture in LDC and Europe;
- agriculture and use of resources;
- environment control and management;
- regional development.

The study is undoubtedly very imaginative. Though various methodological or substantive aspects may still be controversial, its approach could be refined and strengthened. Of particular interest for rural development strategies is the fact that the study explores not only the future of agriculture but of the rural society within the social-cultural context of the global society.

I believe that it is worthwhile examining the possibility of expanding such an approach to the study of agriculture in the LDCs. Graham Donaldson and Francois Falloux, with whom I discussed this study, seem to think that the utility of such a study should be explored. Developing alternative scenarios for agriculture and rural development on a country or regional basis may be of direct benefit for the Bank's general program work. It can also help in the Bank's relationship with various governments, taking into account national and local political, economic, sociological and possibly ideological variables. Of course, such a study should not be seen as a substitute for the economic models or forecasting studies on the prospects of agricultural production per se. It will be rather a complement to them by focusing on rural development aspects with which the former studies do not deal explicitly.

If you concur that the attached study warrants further exploration with its authors for a possible research proposal, I can explore this matter informally with the Project Director during the next rural sociological meeting.

Attachment:

Messrs. Turnham
Davis
Donaldson
MacLeod
Falloux
Ahmad

MC/cc

Leif E. Christoffersen

August 4, 1976

Michael Cernea

Research on Future of European Agriculture in Year 2000

The attached study is the product of a very interesting cross national research project concerned with forecasting the possible "futures" of European Agriculture in Year 2000. The project was carried out by a group of sociologists and agricultural economists with the participation of a large number of European scholars, under the general sponsorship of the European Foundation in Amsterdam and the Gulbenkian Foundation in Lisbon. Several national workshops and one European Workshop were organized prior to publication, to discuss the central question: What should be the role and functions of farming in future Western Europe?

Basically, the study develops 4 alternative scenarios or images. They depict 4 possible futures for farming using a standardized framework consisting of 5 sections:

- a) The normative premises of each scenario;
- b) Goals stated for the future development of society;
- c) Specific goal statements for the structure of society (political structures, economic structures, communal and cultural structures);
- d) Definition of situation of agriculture in society;
- e) First consideration of possible structures of agriculture.

The last section is of particular interest in each one of the scenarios reporting on selected specific issues:

- the nature of the agricultural enterprise in year 2000;
- the relation between agriculture in LDC and Europe;
- agriculture and use of resources;
- control and management of the environment;
- regional development.

The study is undoubtedly very imaginative, though various methodological or substantive aspects may still be controversial, its approach could be refined and strengthened. Of particular interest for rural development strategies is the fact that the study explores not only the future of agriculture but of the rural society within the social-cultural context of the global society. I believe that it is worthwhile examining the possibility of expanding such an approach to the study of agriculture in the LDCs. Developing alternative scenarios for agriculture and rural development on a country or regional basis may be of direct benefit for the Bank's general program work. It can also help in the Bank's relationships with various governments, taking into account national and local political, economic, sociological and possibly ideological variables.

If you concur that the attached study warrants further exploration with its authors for a possible research proposal, I can take up this matter with the Project Director during the next rural sociological meeting.

Attachment:

cc: Messrs. Turnham
Davis
MacLeod
Falloux

MC/cc

T. King

August 4, 1976

M. Cernea

Your Memo on Financing the Research Project Proposal:
"Rural Women and Development"

Just before leaving on mission, Ted Davis discussed with Mary Elmendorf her draft research proposal on rural women in Mexico. A final examination will be undertaken in September, when both Mrs. Elmendorf and Mr. Davis will be back in Washington. Mr. Scott MacLeod, acting Division Chief, informed LAC Program I in that respect.

Cleared and cc: Scott MacLeod

cc: Ted Davis
David Turnham
R. Moran
Mrs. M. Elmendorf

MC/cc

See Distribution List

July 30, 1976

G.F. Donaldson *GFD*

Agricultural Innovation Study

1. When the study proposal on "Agricultural Innovation and Rural Development" was submitted to the Research Committee, reference was made to the "peer group" that had been formed in relation to the "Issues Paper on Farm Technology", with the suggestion that the group's interests might be expanded to advise the members of the study team. This proposal was endorsed by the Research Committee.

2. Accordingly, you are hereby cordially invited to join the aforesaid "peer group". We hope that it will operate on a relatively informal basis. The major task will be to read and comment on draft sections as they are generated. Previous members will note that the group has been strengthened by the addition of some colleagues known to have interests and concerns in this subject area.

3. Further to their endorsement of the "peer group", the Research Committee enjoined that "the proposed peer group" might be enlisted to help clarify the project's scope and design". In keeping with the proposed modus operandi of the "group" I have done some redrafting which is herewith submitted for your comments. The changes are described in the draft cover memo addressed to Mr. B.B. King. The comments of the Research Committee are also attached for your information.

4. Comments received after close of business Tuesday, August 3, 1976 will not be very helpful.

cc: C. Bruce
S. Burki
J. Coulter
M. Leiserson
D. Turnham
C. Weiss
C. Downing
S. Gafsi
P. Hazell
R. Hofmeister
H. Kaneda
D. Pickering

cc for information:
W. Thalwitz
J. Waelbroesch
O. Grimes

GFDonaldson:mt

Mr. Benjamin B. King (through Mr. Colin Bruce)

July 30, 1976

Graham F. Donaldson *GFD*

Research Proposal - "Agricultural Innovation and Rural Development"

1. In accordance with the directions of the Research Committee, I herewith submit a revised version of this proposal.
2. The proposal has been modified by (i) dropping the outlines for the Issues Paper and monograph, and (ii) the addition of several paragraphs which (a) delineate the scope and nature of the study (paras. (b) outline some general hypothesis to be clarified and tested (paras. and (c) characterize the relevant literature, at least in general terms (paras.
3. The chapter outlines have been dropped because (i) they tend to be cryptic and open to misinterpretation; and (ii) they are unlikely to be the final chapter headings that will be used. Although this was recognized at the outset, the outlines were included to indicate the subjects that were to be addressed and the sequence in which we would hope to explore them - but this has proved counter productive.
4. It is also proposed that the expected output from the study would be: (i) draft sections for the "Issues Paper on Farm Technology", and (ii) a Staff Working Paper tentatively called "Managing Innovation for Rural Development".

cc: M. Yudelman

GFDonaldson:mt

OFFICE MEMORANDUM

TO: See Distribution List

FROM: G.F. Donaldson *G.F.D.*

SUBJECT: Agricultural Innovation Study

DATE: July 30, 1976

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	J. Coulter	P. Hazell
	M. Leiserson	R. Hofmeister
	D. Turnham	H. Kaneda
	C. Weiss	D. Pickering

cc for information:

W. Thalwitz

J. Waelbroech

O. Grimes

GFDonaldson:mt

OFFICE MEMORANDUM

TO: Mr. Benjamin B. King (through Mr. Colin Bruce) DATE: July 30, 1976

FROM: Graham F. Donaldson

SUBJECT: Research Proposal - "Agricultural Innovation and Rural Development"

1. In accordance with the directions of the Research Committee, I herewith submit a revised version of this proposal.
2. The proposal has been modified by (i) dropping the outlines for the Issues Paper and monograph, and (ii) the addition of several paragraphs which (a) delineate the scope and nature of the study (paras. 8-10) (b) outline some general hypothesis to be clarified and tested (paras. 11-14) and (c) characterize the relevant literature, at least in general terms (paras. 15-17)
3. The chapter outlines have been dropped because (i) they tend to be cryptic and open to misinterpretation; and (ii) they are unlikely to be the final chapter headings that will be used. Although this was recognized at the outset, the outlines were included to indicate the subjects that were to be addressed and the sequence in which we would hope to explore them - but this has proved counter productive.
4. It is also proposed that the expected output from the study would be: (i) draft sections for the "Issues Paper on Farm Technology", and (ii) a Staff Working Paper tentatively called "Managing Innovation for Rural Development".

cc: M. Yudelman

GFDonaldson:mt

OBJECTIVES AND STRATEGY

1. Nature and Purpose of Study: The purpose of this study is to provide theoretical and empirical support for the preparation of an Issues Paper on Farm Technology and Staff Working Paper to be entitled Managing Agricultural Innovation for Rural Development. The objective of both publications will be to raise issues and advocate positions with regard to the promotion and control of technical innovation in the rural sectors of less developed countries. In this respect the study is not intended to produce new knowledge about the economic nature or the impact of technological innovation (though this possibility should not be ruled out); rather it is proposed to provide a new synthesis from the existing knowledge base in order to provide insights as to how the process of innovation can be shaped and channelled in order to maximize development benefits in a rural setting. The Issues Paper will be prepared for a Bank audience; the Working Paper will be oriented toward researchers, students, policy makers and administrators, especially in the less developed countries.
2. Both the Issues Paper and the Working Paper will be concerned with the management of agricultural innovation for rural development. The basic proposition is that technological innovation can be regarded as a directed process and can, therefore, be treated as an instrument of development policy which should be consistent with or designed to meet particular development goals. This thesis contrasts with the view that innovation is an inexorable phenomenon determined largely, if not wholly, by happenstance - the effects of which, both favorable and unfavorable, must be met through social adjustments. Instead, innovation is perceived as involving a spectrum of possible activities including, among other things, phenomena labelled as learning-by-doing, improvization, discovery, invention, experimentation, research and development, testing, transfer,

adaptation, adoption, manufacturing, extension, and diffusion, which may be combined variously into a sequence. These are considered to be shaped by circumstances determined by the interaction of economic forces, institutional arrangements and infrastructure. The study will examine the ways in which economic conditions, institutions, and infrastructure influence different kinds of innovations and how they may be modified so as to channel technological change in preferred directions, in terms of specified development goals.

Reasons for the Study:

3. The World Bank's rural development strategy emphasizes increased productivity and output as the means of improving incomes and employment opportunities for the most impoverished groups in rural situations - including small farmers, tenants and the landless. A key role is implied for changing technology as the primary means of shifting from the existing static to a dynamic rural economy. The exact nature of this technology is nowhere specified, except in terms of the transfer of existing known technology (HYV seeds and fertilizers). More significant perhaps is that the means and criteria for the management of innovation as a continuing process have not been addressed. While it is accepted that rural development necessitates varying degrees of institutional change and improved intervention in policy formulation and program implementation, the kind of adjustments necessary to foster the key dynamic element of the strategy has not yet been assessed in any depth.

4. The Bank is also involved in promoting programs of research and extension, both through Bank projects and the activities of the Consultative Group on International Agricultural Research. At this stage, these activities are pursued along lines based on the judgement of informed professionals who are specialists in the natural sciences or applied social sciences. They must act without any

established policies or guidelines for managed technological innovation. In most cases their proposed institutional arrangements and management assumptions relate to intuitive models based on experience derived from modern agriculture in developed economies. There is too little systematic reference to the specific technological needs and constraints of the rural development strategy and less developed country situations. A central purpose of this project is to provide systematic guidance relating to the management of innovation, or to at least provoke informed discussion of the issues.

5. Bank management is currently concerned about the performance and cost effectiveness of the International Agricultural Research Centers, and an assessment is underway of the effectiveness of recent research activities and of proposed directions for the future (being undertaken by the CGIAR secretariat). Because of a lack of specific insight as to what constitutes appropriate technology and how innovation can be managed in a rural development context, great difficulty is being experienced in making this assessment. In particular the assessment of future directions is being made on criteria that are recognized to be somewhat tentative. While research policy is but a small part of the sequential process of technical innovation, this study is intended to provide some guidelines and criteria appropriate to assessing such current programs.

6. International organizations are currently showing an active concern about technological innovation in terms of the "new world economic order". Both UNCTAD and ILO have, at recent conferences, discussed issues and begun new initiatives. These include the proposal for a "Consultative Group on Appropriate Technology". This implies, without benefit of any analysis, that appropriate technology is something distinct from technology in general. This study should give the Bank a comprehensive framework from which it can better contribute to these initiatives and the ensuing international debate.

7. There is a substantial literature which deals with technological change in agriculture. In most cases, however, it deals with a specific aspect of the process and views it from a narrow standpoint. Hence, economists view technological change largely in macro or aggregate terms as it effects resource use and economic performance in terms of induced embodied technical change; sociologists examine the local level adjustments in terms of societal and institutional adjustments and individual welfare effects; extension specialists look to the support systems and rate of farmer adoption, and so on. There have been few inter-disciplinary studies of agricultural innovation. Similarly, there is little work that examines the micro economic characteristics of different kinds of innovation in different institutional settings. Further, there are virtually no recent studies that have taken a holistic approach to the study of this complex phenomenon of innovation. Only rarely has the sequential process of technological innovation been examined in a way which would permit insights and generalizations about its management in terms of the policy variables of economic incentives, institutional arrangements, and infrastructure. There is little systematic analysis of technological change as a fundamental determinant of development - which can contribute to an orderly incremental development process or wrench the development process into disruptive channels. Through this study we cannot pretend to correct this situation at a stroke; but the objective is to define problems and raise issues in a systematic manner so that there can be an immediate improvement in interim policies, and both research and serious discussion of the subject can be facilitated and stimulated.

TECHNICAL ASPECTS

Study Approach:

8. What is intended is an analytical synthesis (based on a critical assessment of available knowledge); concerned with fostering and influencing the directions of technological innovation in relation to the goals of rural development, and the constraints that prevail in rural development situations. Where necessary, the study will specify these goals and constraints - especially with regard to employment, income distribution and poverty redressal, on the one hand, and production uncertainty, technical and market risk, physical constraints and social dynamics, on the other.

9. The perspective we propose is very broad - deliberately. We perceive that technology cannot be understood by examining it in either an economic context (as a shift in a production function or some statistical residual) nor a technical one (by exploring the characteristics of some physical hardware package). Rather, the true character of technological innovation can be understood (and hence regulated or guided) only as a complex set of interactions and adjustments within society, between sectors, among sub-systems, in costs and prices, and so on. On the other hand, the study is less broad than all this might imply. It is specifically focussed:

- (i) on agriculture and related rural technological innovations;
- (ii) in a rural development context - with particular concern for income distribution and food production under conditions of uncertainty;
- (iii) on alternate pathways toward fulfilling the rural development goals, and

- (iv) on means and measures for guiding the process of technological innovation in this frame of reference.

10. The methodology to be used will be that of critically reviewing and sifting the available literature, and information from other sources, in order to provide a new synthesis of knowledge in relation to hypotheses outlined below. This is obviously a general statement, but it is not possible to honestly more narrowly specify the likely activities and methods to be used at this stage. However, it is possible to suggest some boundaries to the mode of investigation. In this respect it can be stated that this study is:

- (i) not an evaluation of the impact of technology as a statistical residual (after deducting returns to capital and labor);
- (ii) not an empirical study of the economic or social impact of any particular technology;
- (iii) not an impact study, in that it will not seek to review historical trends;
- (iv) not a normative model nor based on assessing any particular technology alternatives using any specified analytical tools such as linear programming or principle components analysis;
- (v) not a prescriptive study of the appropriate technology mix for any given situation, such as fertilizer levels or sizes of tractor;
- (vi) not an economic study per se, though it is primarily in the area of political economy, it also deals with aspects of technology and the role of man in the philosophical context of the natural sciences in contrast to the social sciences;

- (vii) not a study of any particular technology, since the inter-related characteristics of technology are considered critical - hence we cannot examine mechanization, separate from seeds, separate from irrigation, and so on; and
- (viii) not regionally specific, in that we will take examples from across regions, but the study group will (where appropriate) make use of a typology of country situations.

General Hypotheses:

11. The central hypotheses to be examined in this study are:
- (i) that technological change is an essential component of rural development through its role in increasing productivity and output using available resources;
 - (ii) that technological innovation can be managed (guided, channelled, or directed along particular lines) using conventional policy instruments such as licences, research and development, credit, pricing, training, and planning;
 - (iii) that all of the variety of manifestations of technology - labor saving, output increasing, or mechanical, biological, institutional - are equally amenable to management by the means available;
 - (iv) that technology comprises more than physical hardware so that understanding technological innovation necessitates the study of farming systems, irrigation systems, administrative arrangements and infrastructure;
 - (v) that technological innovation is not a linear sequence from research through adoption, but may involve a convoluted sequence through "research", "adaptation", "trial", "adoption", and may

include other than conventional activities or phases, such as "learning-by-doing", "improvization", "indigenous invention", "adjustment", "improvement" and so on; and

(vi) that if these hypotheses can be substantiated then it is possible to construct guidelines for the management of technological innovation in a sectoral and project context - based on decision analysis, design, appraisal and implementation.

12. A corollary of (vi) above is that the planning and scheduling of technological innovation is the core of medium and long-term sector planning.

13. A prerequisite to the clarifying and testing of these hypotheses is that the nature of innovation has to be fully understood as a complex of technical and socio-economic responses, and not as merely a shift in a production function. In drawing evidence from past experience it is therefore necessary to identify the exact nature of the changes that have occurred and their determinants, e.g., the extent to which the "green revolution" was a price response as opposed to HYV led adjustment, the kind and distribution of costs and benefits that were involved, and the institutional and other shifts that might have been precursors or consequences of the technological change itself.

14. The study will make use of the existing literature supplemented by additional information and undocumented experiences where useful - to clarify and test the hypotheses and provide a new synthesis of knowledge about technological innovation.

Characteristics of the Literature:

15. The available literature is quite extensive in quantity but of very variable quality in terms of accuracy and analysis. There are also many shortcomings in terms of coverage, both regional and subject-wise. For this reason the

work of the study team will largely involve an analytical and critical assessment of the literature in an attempt to interpret the reports and papers in a development economics context.

16. The literature falls into four broad categories:

- (i) Adjustment Studies - these include studies of economic adjustment using various kinds of quantitative and theoretical development models, (e.g., those of Thorbecke, Day and Singh, and Hayami and Ruttan, etc.). This literature is not large but is somewhat esoteric. In most cases the models cover much more than the subject matter of technological innovation. A comparison will be made of the results, conclusions and implications revealed by these studies
- (ii) Impact Studies - these include many ex post and some ex ante evaluations of the effects, benefits, costs and implications of changing technology. This literature is very extensive and its quality varies from good to indifferent. It is comprised almost wholly of empirical studies, though some are theoretical and conceptual in nature. There are several hundred items, alone, on the HYV technology as it has affected the Indian sub-continent in the past 10 years. However, many of these are repetitive and of poor quality in terms of accuracy and completeness. Many of the better studies have been drawn together and interpreted in various ways (e.g., Yudelman et al, Shand et al, Griffin). Most technological changes have, on the other hand, been inadequately evaluated, and many not studied at all. Consequently, coming up with some across the board insights is no small challenge.

- (iii) Possibility Studies - these studies are those that look for gaps in the current technology frontier, or in relation to a projected development pathway. A few are general in orientation (e.g., Marsden on Appropriate Technology) but most are situation specific (e.g., the reports of the Intermediate Technology Development Group). This literature is not extensive and often not readily accessible, but it will be scanned for the insights it might provide on the need for, and use of, various policy instruments (including R & D).
- (iv) Policy Studies - these studies seek to indicate the possible directions that technological innovation might take and the means by which it might be guided. (In most cases, the emphasis is on the policy measures rather than the possible or preferred directions). Studies of possible directions include those of the US National Science Foundation; studies of directions and means include Owens and Shaw, "Development Reconsidered", and publications of the Science Policy Research Unit of Sussex University; studies of means include those of Moseman, Graham Jones and Evenson. This is the genre into which this proposed study will fit, with equal emphasis on policy directions and appropriate instruments for technology guidance.

17. The references mentioned above are illustrative of types of studies only - the list is not exhaustive and those mentioned may not even be the best known or most useful. At this stage, a literature search is underway but incomplete.

ORGANIZATION AND PHASING

Activities and Sequence:

18. The study will adopt first an analytical and then a synthetic approach based on the existing subject literature and field experience, supplemented by additional microeconomic analysis of both a theoretical and empirical nature.

The final product of the study will be:

- (i) an Issues Paper on Farm Technology, currently scheduled for PRC Staff Level Review in the Bank Inventory of Policy Papers by the end of December 1976; and
- (ii) A Staff Working Paper, currently entitled Managing Agricultural Innovation for Rural Development. These publications will address much the same issues but in different contexts and for different audiences. The Issues Paper will examine the role of the Bank as an agent in aiding and abetting innovation, will emphasize implications for Bank policy, and be oriented primarily to a Bank audience. The Working Paper will develop arguments concerning the harnessing of technology for development in more detail and be aimed at a broader audience, especially policy-makers in less developed countries.

19. The research activity will be organized in three closely interrelated sub-projects (which will not lead to individual reports) under the headings:

- (i) "Technological Innovation and Agricultural Adjustment"; (ii) "Socio-economic and Institutional Factors Affecting Innovations"; and (iii) "Scenarios of Agricultural Innovation in Developing Countries". All of these sub-studies have been initiated and are in varying degrees of completion.

20. (i) Technological Innovation and Agricultural Adjustment. This sub-study will examine theoretical and conceptual characteristics of innovation in differing rural development contexts. It will mainly employ theoretical and conceptual analysis to explore observed and hypothetical adjustment effects associated with various kinds of technology in different development situations. To this end, extensive use will be made of comparative statics, but linear programming and systems concepts will also be considered (though no examples are expected to be computed). A small start was made in this direction in the context of the study reported in "The Consequences of Farm Tractors in Pakistan" and is partially reported as a section in the paper "Technological Change and Agricultural Adjustment", American Journal of Agricultural Economics, Vol. 55, No. 5, December 1973. This has been carried a step further as part of the preparation for writing the Issues Paper, but is far from complete.

21. In this sub-study, different types of technological change will be identified in terms of their factor augmenting features (land, labor, etc.) and their technical characteristics (biological, mechanical, managerial, infrastructural etc.). These will then be considered in an array of generalized country situations (in terms of farm size, land ownership patterns, service systems, production possibilities, terms of trade etc.). Particular attention will be given to the impact of production risk and to income distribution implications of different types and sequences of innovation under varying circumstances. To do this, use will be made of case material from the published literature, from field experience of Bank staff and hypothetical situations. A substantial literature exists relating to technological change, though it deals largely with high-yielding varieties (HYV) crop technology and tends to be descriptive in nature. For this reason, it is proposed to attempt an interpretation of the documented experiences in a formalized conceptual framework. This framework will be developed as part of

the study. Where the case material is incomplete, an attempt will be made (in conjunction with sub-study (ii)) to establish a full case description from various sources. A comprehensive literature search is currently underway.

22. (ii) Socio-economic and Institutional Factors Affecting Innovation. This study will examine the economic conditions, institutional framework, and infrastructure associated with the generation and spread of agricultural technology on a country, regional and global basis. In this respect, it will build on the Evenson and Kislev study financed by the Bank in 1973 which examined investment in and productivity of global agricultural research. It will also draw on the findings of the Pakistan Mechanization Study and the Indian Mechanization Study financed by the Research Committee. (In the process of doing this, a final report on the Indian Mechanization Study will be written - based on the reports of the two Indian institutes which undertook the field studies). Extensive use will also be made of case material from other sources.

23. This will be an empirical study insofar as it will examine the sequence of events, the impact of decisions and the circumstances concerning research and development, technology transfer and adoption, especially (but not exclusively) with respect to the HYV crop technology. This study began during the last part of 1975 and is perhaps half-way towards completion. Case situations will be built up from the published literature, unpublished reports, Bank documents, and the field experience of Bank staff. Particular attention will again be given to production risk and income distribution effects. The final phase will include an evaluation of experience with alternate R & D and technology transfer strategies used in the less developed countries.

24. (iii) Scenarios of Agricultural Innovation in Developing Countries. This will be a desk review of experience across countries. It will be essentially the collection of illustrative material to support and elaborate the findings of

sub-studies (i) and (ii), and will be closely integrated with those activities, but it will address more global issues in the context of current technology policy thinking. It will examine propositions such as: that the Japanese model and experience is significantly different from the Western model and has more relevance to LDC situations; and that appropriate technology has specific characteristics which make it appropriate for transfer from one LDC situation to another. It will also review the effects of HYV and farm mechanization technologies under different forms of social organization and alternate development strategies with a view to drawing conclusions relating to policy. It will seek to identify useful policy intervention measures for guiding technology, and will assess the scope for developing a technology assessment capability in development agencies and LDC's. Some of the preparatory work for these activities has also been initiated.

25. Timing: It is proposed that work will begin on August 1, 1976 and be completed by July 30, 1977, with the three sub-studies proceeding concurrently. The reason for this is that some progress on all three sub-studies is required to provide background material for the Issues Paper by December 1976. Apart from that, emphasis will be placed on completion of the three sub-studies in the order in which they are presented above.

26. To obtain the benefit of a cross-section of different technical specialties, and the insight of experienced Bank staff, a "peer group" has been established which will be consulted on a regular basis and which will review draft material as it is prepared. Advantage will be taken of their own country case experience and those of their respective network of contacts in their respective fields and regions. A formal staff level review will be required as part of the Issues Paper

* Annexes on farm mechanization and HYV technology respectively will be included in the Issues Papers.

clearance procedure. In addition, the study team will undertake to lead at least one staff seminar based on the "work to date" in February or March, 1977. A heavy weighting will be accorded the need to "carry in-house opinion" as the study develops.

27. Staffing: The project will be supervised by Graham Donaldson who will participate in all phases of the work and be responsible for the presentation of the final documents. Sub-project (i) will be the primary responsibility of Dr. J.P. McInerney, University of Manchester, England. Dr. McInerney will take 12 months leave-of-absence in order to come to Washington for this purpose. He is a first-class theoretician and methodologist with an established reputation and over 12 years experience in the field. He has previously worked in the Bank on the Pakistan Mechanization Study and on this project for one month in September, 1975.

28. Sub-project (ii) will be the primary responsibility of Professor F.G. Jarrett, University of Adelaide, Australia. Professor Jarrett has an established record in the area of agricultural development and has worked in LDC's with the Harvard Advisory Group. In particular, he has written about institutions affecting agricultural development. Professor Jarrett began work on this project during his six month stay with the EDI as a visiting lecturer (July-December 1975), prior to which he spent six months jointly with the Institute of Development Studies and Institute for Science Policy at Sussex University, in England. During this sabbatical he prepared extensive drafts on the subject of agricultural innovation.

29. Sub-project (iii) will be the primary responsibility of Graham Donaldson. All three team members will contribute to the activities associated with each of the three sub-studies and their integration. It is perhaps significant that all three participants earned basic degrees in agricultural science prior to taking post-graduate degrees in economics. All three have maintained an interest in and written about agricultural technology for more than 15 years.

30. Although the study will draw on country experiences, it is not proposed that there should be any country specific case studies. The nearest approach to a country case study will be the review of the diffusion and use of Japanese technology in South East Asia. To prepare this and to draw on the experiences of LDC personnel, a field trip is proposed, which will include several East Asian and South Asian countries. It is also proposed that visits be made to some of the International Agricultural Research Centers, including especially IRRI in the Philippines (with the Japanese case study), CIMMYT in Mexico and CIAT in Colombia. No specific collaboration with any outside institution is proposed at this time. However, an attempt will be made to specify a program of research in this subject area which should involve country institutions in the future.

31. Budget. A detailed budget is attached. A relatively small amount is included for expenses for the consultant McInerney in that if he were to come for 12 months we would expect to arrange a fixed fee contract for the period which would be less than the sum of the per diem.

July 30, 1976

Professor Dan Goldberg (CONS)

John H. Kalberston (Water and Wastes Adviser, ENTOR)

Agricultural Reuse of Waste Water - State of the Art
Paper of Reference

As water supply and water consumption increase, the disposal of waste water is becoming a problem in many areas. Because the cost of adequate municipal sewage collection and disposal is customarily greater than that of water supply the financial burden imposed on consumer and community is heavy. In addition, in many areas water resources are scarce and the search is on for additional, usually more expensive sources of fresh water. The reuse of waste water, therefore, offers the potential of adequate, environmentally acceptable disposal, the utilization of a scarce resource, and, especially, savings in the total cost of providing potable water, sewage disposal and irrigation water. Reuse of waste water with current techniques is primarily limited to industrial and agricultural applications.

You are invited to prepare for the Bank a State of the Art Paper of municipal waste water for agricultural use. The paper should include a review of existing practice, technology and cost of waste water reuse in agriculture and the preparation of specific proposals for studies and field trials to develop methods and techniques suited to the developing countries for the application of municipal waste water in agricultural uses.

You should keep in mind that your report is intended to familiarize the Bank's sanitary engineers with the topic. The emphasis should be on the effects the use of waste water has on plants, rather than in plant physiology and similar topics of interest primarily to the agriculturist. You should, however, identify those areas where research or pilot projects are needed to study the effect of waste water reuse on plant growth and productivity. Your report should, in particular, review the relationship between treatment levels and use, i.e., what crop and tolerance ranges with preliminary treatment (screening), primary treatment (screening and sedimentation) etc; and compare the cost and benefits of various treatment levels and crops. There is no need, however, to discuss treatment itself as our engineers are competent to design the required treatment once the effluent quality needed for agricultural reuse is known. Similarly, you should only identify and review health and environmental problems for future study, rather than to conduct research to find possible solutions as part of the present work.

You will spend initially three days (from July 28 through 30) in Washington to discuss your work with selected Bank staff. Thereafter you will continue the work described in these terms of reference and submit a draft report to the Bank by the end of October. The estimated time for this task is 50 working days. After approval of your draft you will travel to the Bank in January 1977, at a date to be named upon, to discuss Bank concerns, modify the report as required and present a workshop to Bank staff on the reuse of municipal waste water in agriculture. The estimated time for this activity is

Some Questions and Comments
in Reuse of Waste Water for Agriculture

1. Quality not depends upon quality into the system. About 300 mg/l of salts are added. Leads to more salts to manage.
2. Chlorides are usually quite high. Could lead to soil permeability problems. Or, need to add soil amendments. Not evaluated.
3. Borneo rinses, depending on detergent type and usage in the community. 0.5 mg/l added is not uncommon.
4. Trace metals in the effluent may accumulate and become toxic and reduce yields less productive or unproductive following a long period of use. May require source control and exclusion of water containing the trace metals.
5. Health authorities have strong reservations about recharge of underground as well as sale or use of crops grown with effluent. Crops restricted, land use restricted, land values may be affected.
6. Cadmium is one of trace metals now of considerable concern. Picked up by crop and may be toxic to people or animals eating contaminated crops. Copper and zinc are rather high. These are mostly problems of sludge. Less so of effluent.
7. Nutrients in effluent (N) are unreliable. Sometimes not there by the time the effluent gets to crop land. May be denitrified and lost. For some crops nitrogen may be too high.
8. What levels of residual chlorine can be tolerated by crop 1 mg/l probably O.K., 5 mg/l probably toxic. Chlorine treatment is usually required before use of effluent.
9. Transient plants sometimes are upset by something toxic or mechanical and wastes need through to crop land pure or less untreated. That fall-safe back-up or storage is needed to safeguard the area of use.
10. Effluent is utilized at near constant rate. Crop usage depends on water, soil, etc. and crop. Management or matching is tricky and demand is difficult. Storage or alternate disposal is needed.
11. Some plant operators are sometimes required to overuse a sewage farm or use facility. Plant operators are not farmers.
12. Effluent diverted upstream for recharge or reuse adds greatly to overall long-term salt balance of a water basin.
13. Effluent is used on new land and adds to the overall water shortage rate - then being used to replace or substitute for water that then might be used to improve general water supply and demand situation.

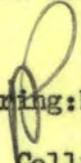
Distribution Below

July 26, 1976

D.C. Pickering

Raising Farmers' Incomes Through a Professional Extension Service

I attach a copy of the above draft paper by Daniel Benor and James Harrison. It was written in response to a request by Monty Yudelman for a general explanation of the principles and mechanics of the extension approach recommended by Mr. Benor. Bearing in mind that the anticipated readership of the paper would be quite diverse, I should be grateful for any comments you and your staff may have on the draft. As you will note from the covering letter, Mr. Benor has requested collection of all comments by August 20. Perhaps you could let me have your departments' reactions by c.o.b. August 17 so that they may be consolidated and forwarded as requested.


DCPickering:hrv

cc; Mr. Collins

Attachment

Messrs. Goffin
Haynes
Hendry
Rowe
van Gigch
Vergin
Christoffersen

Research Agriculture

Mrs. Margarita Amores, Research Files

July 22, 1976

Gajinder Ahuja, EPDCE

Foreign Agriculture Weekly

You are aware that we have not been receiving the above-mentioned publication for the last few months. When I called you a few times about this, you were good enough to assure me that you were looking into the matter and that you would let us know the results. Quite a few weeks have passed and we have still not received an issue. The periodical is useful to us in our day-to-day work and we would appreciate your urgent attention.

Kindly obtain the missing issues also.

cc: Mr. Foster
Ms. Hadler

GA:rc

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

NEW DELHI-1 19th July, 1976

Research - Agric. &
Rural

DO No.DG:PS:76/76

Prof. Y. Nayudamma
Secretary to the Govt. of India
& Director General, C.S.I.R.

Dear Mr. McNamara,

I send herewith a draft of a paper on Rural Development. Knowing as I do your personal interest and the interest of your organisation in this area, I venture to send this copy for your personal perusal, critical comments and suggestions.

Having had some experience in the U.N. system, this is one area where multi-agency could fruitfully cooperate in achieving the desired result. I would be grateful for your comments and advice.

With kind regards,

Yours sincerely,

(Y.NAYUDAMMA)

Mr. Robert McNamara,
President, World Bank,
1818 H. Street, N.W.
Washington DC 20433,
U.S.A.

Encl : AS above.

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1976 JUL 26 AM 11:42

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ENCL : 22 copies

U.S.A.
Washington DC 20543
1818 N. Street, N.W.
President, World Bank
Mr. Robert McNamara

(L. NALAGANNA)

Yours sincerely,

With kind regards,

Comments and advice
regarding the matter of the
cooperation in the field of
the World Bank - the
the U.S. Government, this is one area
having had some experience in

Comments and suggestions
for the various bodies, citizens
this area, I would like to send you copy
the interests of the organization in
as I do have various interests and
help on the development. Knowing
I send herewith a draft of a

Dear Mr. McNamara,

A Director General, C.S.I.B.
Secretary to the Govt. of India
Prof. L. Nalagananna



DO NO. DC:ES:26/76

NEW DELHI - 110 002

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

NEW DELHI - 110 002

Handwritten notes and signatures at the bottom right of the page.

28

Draft
(Not for publication)

CURRENT IMPERATIVES
FOR
RURAL DEVELOPMENT

- Y. Nayudamma

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CURRENT IMPERATIVES FOR RURAL DEVELOPMENT

1. Un-Arrested Poverty

- 1.1 In developing countries, especially the more populous ones, certain lessons are seen to be filtering through fast. The nations cannot register progress in significant terms unless their rural majorities are helped to take strides forward. It is also becoming increasingly clear that sporadic sectional measures go to serve only as palliatives, with limited and less-lasting contributions to the welfare of the rural poor. It is to be observed that in the ESCAP developing countries, "a generation of economic development has done little to improve the living conditions of a large population of people who still live in poverty and that employment opportunities have fallen considerably short of increases in the work-force, thus exacerbating the already high level of under-employment and unemployment" (1) *
- 1.2 Based on 1969 estimates, 415 million people (about 40% of population of Asia, excluding China and other centrally planned economies) lived in conditions of absolute poverty. Of these, nearly 86% people lived in rural areas. Bangladesh, India, Indonesia and Pakistan are said to account for almost two-thirds of total number of people living in absolute poverty in the developing world (1).
- 1.3 The labour-force in ESCAP developing countries, besides being under-utilised to the extent of 10 to 30% (the under-employment in agriculture being as high as 50% in slack seasons), is expected to grow further: an increase of 70 million in the sixties and estimated increases of 100 & 140 million respectively during seventies and eighties. An addition of 48 million is expected in the rural labour force in India during 1974-86. (2)

* List of references at the end

1.4 It would appear that poverty rate in the developing countries has been keeping pace, paradoxically, with the growth in the developed countries. The policies and procedures of the past seem to have brought about little distributive justice to the weaker sections, both nationally and internationally. It is thus seen that the situation calls for a review and reorientation of strategies in force hitherto.

2. Imperatives

- 2.1 What are the imperatives of the approach to be made for carrying out the task of rural development? It is believed that the corner-stone of the philosophy should be that all activities should basically centre round 'Man'. The aim should be to make him self-reliant and to create conditions so that he can live with dignity and his cherished values, in harmony with his environs. Also, science should play a key role and the approach should be an integrated one. These elements, which are most relevant, tend to get relegated in the efforts being made, generally (Section 5).
- 2.2 The 'Man' - the common-man in the under-developed rural areas - must be helped to become self-reliant through maximum benefits from resources with the use of science. The resources (human and natural) are to be identified and then coupled with the techniques of science for all-round and whole-some development. The role of science and technology and integration of development are discussed further in Sections 3 & 4 respectively.
- 2.3 This inter-action between science and society to be on intimate and effective basis, the rural society and the various aspects of funding and management are to be knitted in. For many of the activities, there are more or less regular sources of funding e.g. Governmental/public funds for utilities and social infrastructure, and entrepreneurship and financing institutions for

commercial ventures.

- 2.4 Besides the need for augmentation of in-puts from these sources, funds would be required also for activities for which there are no clear funding sources viz. survey and mapping of resources, demonstration of new techniques and technologies with multiplier effect, adaptative design and development work, science awareness programmes, towards seed-money for triggering development in certain directions, towards promotion of community participation in development work, etc. Business houses are seen to have a role to play too. Apart from the aspect of social obligation, these houses should, for two-way benefits, support the weaker communities around their establishments through vocational training, promotion of ancillary manufacture, and welfare works.
- 2.5 The management responsible for implementing rural development policies would also require reorientation in certain directions. The organisation should be essentially rural based for effective and expeditious implementation, watch on effects and inter-effects of development activities, and feed-back. The management should not only be pervious to change but should also be on the look-out for taking up new techniques for fair trial. [Management by participation and involvement of the people is the cardinal principle.] Imposition from above, by a technocrat or a bureaucrat, is bound to fail. X
- 2.6 Experience with rural development activities carried out in the past indicates that very little part of the benefits came to the weaker sections, which need the most help. One can possibly think of reducing the rich to a given size through such measures as taxes; but how does one prevent the intelligent exploiting the ignorant!

The question is not only to produce more but also to see that the produce is equitably distributed. That is why we talk of growth with social justice or economic development coupled with social development. Money leads to power & power leads to money, & somewhere this chain has to be broken.

There are several agencies that are honestly working in their own ways for rural development. Each one may think that it is doing its best, but the position viewed as a whole may not be found to be that satisfactory. One is reminded of the anecdote involving Abraham Lincoln who, when approached by a group of socialites for donation towards welfare of the poor, made a personal contribution of one plus ten dollars: one dollar for the needy & ten dollars to see that the needy is benefitted to the extent of one dollar. There is need to recognise that the guiding principle in preparing rural development programmes should be greatest good to the greatest number of people.

2.7 Change is resisted everywhere; but the task of bringing about change is particularly difficult in countries like India where exist the traditional orders. The factors coming in the way of change are many and varied: strong affiliations with family, caste, creed & groups; notions of false prestige & pride; resistance to change in occupation, locale, social setting; etc. These factors, coupled with the strangleholds of superstition & taboos, become strong obstacles, especially in a democratic frame-work.

The community development programmes, launched in the past in India, were intended to awaken the rural societies to the call of the day i.e. to enthuse them into action through programmes for their welfare & upliftment.

These programmes fell short of producing the desired results. One of the main reasons considered responsible for this short-fall is that the programmes & the people were not brought together: the people were not involved in the preparation & operation of the programmes. This leads one to the report by the team headed by Balwantray G. Mehta (3). The report brought out the lack of communication & coordination between the various development agencies & the rural-folk. The resulting need for decentralisation led to what is known as Panchayati Raj.

The Panchayati Raj (a system of local self-government) was introduced in India in 1959 and has gradually been implemented in all the States. It is essentially a three-tier system: the village Panchayat is the basic unit, the block-level organisation is the middle unit & the district-level organisation forms the apex. The Panchayati Raj provided for the above three units to be democratic, popular & organically linked institutions. These were intended as vehicles for decentralisation of power & responsibility & were to be provided with adequate resources and the development programmes at these levels were to be carried out through them. The main objective behind the establishment of Panchayati Raj was to 'mobilise the rural masses with a view to bringing about qualitative development of the rural population, and qualitative, & quantitative development change in their environment' (4).

The authority to distribute material resources became, in itself, a source for building up status & influence. The system could not help being riddled with status symbolism, feudalistic tendencies, and bias for kinsmen.

The results: leadership which is oriented towards material benefits rather than service, more interested in the exercise of power than to shoulder responsibility, involved more in distribution of patronage than in serving the people; and politics of bargaining and patronage rather than of service & sacrifice. As a result of inter-action between the power-climbers and the elitistic classes, there have arisen tensions and conflicts.

Pandya (4) has gone into the requirements of rural leadership. It is necessary that rural leadership be relatively modern and forward-looking. It will have to be open enough to receive and internalise the modern influences coming from above and pass them on to rural masses in a form which will make them acceptable. This will call for a great measure of capacity for interpreting these in the idiom of the masses, and a considerable amount of tact, persuasiveness and perseverance. This process will involve a complete understanding & grasp of the tradition, a clear idea as to how these traditions can be useful as carriers of new ideas. The leadership will have to have deep roots and moorings in the rural milieu and, at the same time, their minds will have to be open enough for new ideas to come in. The process of modernisation is not a process in which the traditional should be completely replaced by the modern. The task of new leadership is essentially to modernise the traditional & traditionalise the modern. The leadership should evoke maximum involvement and participation of every member in the group activities and in the determination of objectives. It should encourage & reinforce personal contacts & relations, reduce intra-group tensions & conflicts, avoid hierarchial group structure, etc.

2.8 It is also very imperative that the school becomes the hub of change. The following example would illustrate the point. Each class of students of the school, in a village of say one to two thousand population, may take off one hour a day to do community service. Children are given the brooms & they clean the streets and the courtyards. The wastes are collected and utilised for bio-gas, manure etc. The whole village sees that one can get wealth out of the wastes. The children would also do the cleaning of puddles, spray insecticides for checking mosquito breeding, & carry out activities for the control of rodents and making drinking water safe. The students are helped to understand, through participation in surveys, the flora & fauna around the village, local soils, and other features.

What would be the result when such a programme works? We would have a cleaner village, better drinking water & check on pests, insects, rodents & diseases. We have future citizens who know their environment, have developed enquiring minds, & who have imbibed the spirit of community service. Their parents observe what the children & their teachers have done and what they should do. The natural resources are better known & wastes within the village taken care of with advantage. Besides primary schools, the programmes are to include middle & high schools, & colleges.

Carrying out activities such as the above would not be without difficulties, of course. To start with, some of the parents may not allow their children to sweep the streets, much less handle all kinds of refuse. The programmes have to be sustained & teachers may consider some of the activities as extra load of work.

Therefore, there must be sufficient frame-work and motivation for the continuation of the programmes. It will be necessary to rope in some of the elders in the village, the head-master and the teachers. Suitable incentives may be provided for the teachers and students as also awards for the cleaner homes. The students may be admitted into schools on the condition that they would do manual work towards community service and the students with good service records would get preference for admission to higher schools etc. It is thus seen that for such programmes to be successful, the Government must take certain steps and the involvement of students, as well as their parents and teachers, must be ensured. The degree of success achieved would vary from village to village. Only balanced emphasis would need to be given on productivity and the programmes should have built-in flexibility.

It is believed that through such and other youth activities, the work of rural development would be speeded up and the next generation would be ready for a steeper take-off.

2.9 The gist of the above approach is presented schematically in Chart-I. What has such an approach in its hold for the people, the planners and policy makers, and the scientists?

To the people, it may mean:

- gainful employment;
- self-help, and competence to utilise their skills and other resources;
- inculcation of scientific temper with the associated cultural change, they may turn for help to science rather than to quackery;

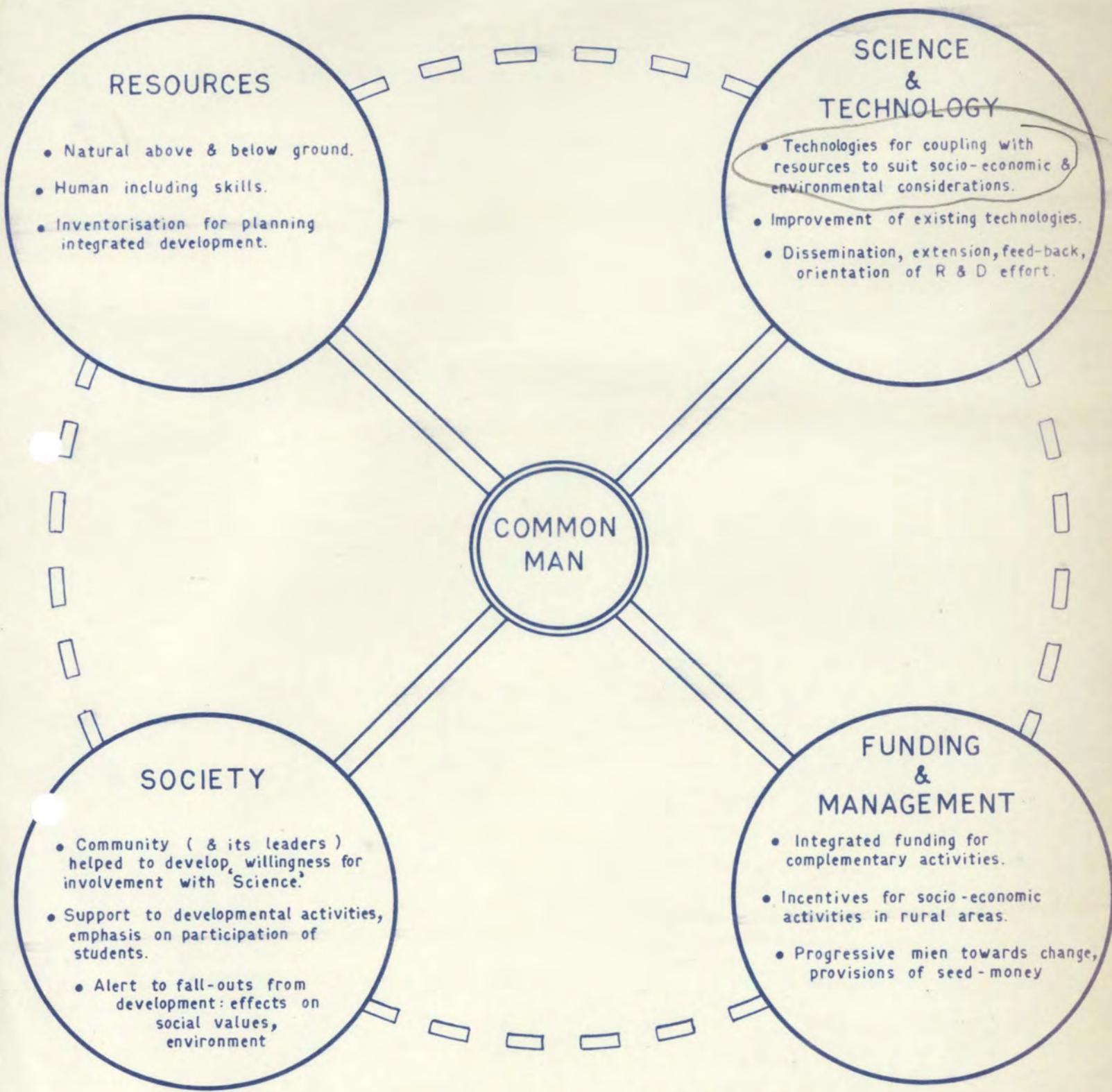


CHART - I

SUGGESTED APPROACH FOR RURAL DEVELOPMENT

- acceleration of development with multiplier effects; and
- a feeling of adventure and pride in achievement.

To the planners and policy makers, it may mean:

- a different approach to grass-root planning;
- science is used deliberately as a tool for growth and selective changes;
- better utilisation of resources (including wastes);
- more and better distributed employment opportunities with less movement of people;
- an integrated approach with flexibility of adjustment as per available resources; and
- maintenance of ecological balances.

To the scientists, it may mean:

- going to the villages, understanding the needs of the common-man, researches becoming more relevant to the needs;
- recognition of social responsibilities, and understanding of social factors that are related to the use of science; and
- keeping them close to the village & close to the soil, development of interest in facing challenges at home & check on brain-drain.

2.10 Discussed in the following sections are the further aspects of the role of science and technology and integrated development.

3. Role of Science & Technology

- 3.1 The rural societies in developing countries tend to be traditional societies, steeped in ignorance, taboos, inertia, and prides and prejudices. Any change sought is resisted by religious, political and social factors. It is believed that science can help the most in enabling the rural people to break away from these strangleholds. Through close interactions between science and society and using the principle of 'seeing is believing', science should be made to permeate the very fabric of the rural societies. The objective should be to fill these societies with hope and faith in science, so that scientific temper is imparted and thirst for science created.
- 3.2 For such a change to be possible, the science-end must become a dynamic instrument of change. The talents and techniques of science must be made available at the door-step of the common-man for applications at the gross-root level.
- 3.3 The technologies to be adopted in this case may or may not necessarily be the most advanced or productive but they should be best as a whole for the rural society and its environs, and thus both social & economic aspects should receive consideration in cost-benefit comparisons. These technologies (intermediate, alternative, appropriate, relevant, scaled-down) should be, as far as possible, labour-intensive with low requirements of capital and energy. They should also be such as can be readily assimilated. They may range all the way from the most sophisticated to the simplest e.g. remote-sensing techniques for mapping of natural resources and intensively manual

methods for road construction. Up-grading of traditional technologies should form an important activity. The traditional crafts and cottage industries should receive particular attention. The new technologies should not only be relevant but should be such as would go to contribute towards distributive justice through greatest good to the greatest number of people. It is to be expected that the science-backed and science-supported schemes and development programmes would eventually find better acceptance with the governments, communities, administrators, financiers, marketing people etc.

Technological change brings about cultural change and any change is resisted. Progress is made difficult further by ignorance, traditions, taboos, prejudices & the like. For example, the Central Building Research Institute (C.B.R.I.) was to construct, by way of a full-scale demonstration, some houses for families of low-income group, using new techniques. Dates were fixed by the district authorities for the start and completion of the construction. The CBRI staff was accordingly moved to the site; but the villagers did not allow the construction to proceed because they did not consider the day and the month auspicious for house-building. The scientists may laugh and proceed but would the families move into those houses and, if a child develops fever or gets hurt later, would it not be attributed to the inauspiciousness of the house? While the superstitions are to be dispelled, the scientists have to proceed with caution, taking into account the susceptibilities of the rural-folk.

Traditional technologies, based on empirical knowledge developed through ages, common-sense and observation, have great significance. These can be improved upon through the application of modern concepts and understanding of science underlying the traditional technology. There would be many cases where technology precedes and science follows. Here is an example. According to standard international text-books on leather making, raw-hide/skin is to be soaked in lime solution for 17 days for the removal of hair. Later researches have shown that this period can be reduced to 7 and even 3 days with the addition of sodium sulphide, sodium sulphahydrates etc. In India, a unique technique has been in use for a long time. Hide flashening/spoilt maida/starch powder is mixed with a few 'Aak' leaves (local tree) and allowed to be fermented; the skin soaked in this loses hair over-night. The researches at the Central Leather Research Institute showed that this was due to an enzyme which cuts hair roots. Based on this work, a new theory has been put forward, the enzyme isolated and put in the market, and a researcher gets a Ph D and a patent. A number of similar examples can be cited. There is the well known case of the use of local leaves and other materials in the famous lacquer-work of Hyderabad. One should however understand the science behind them and then improve upon it by making it easier, cheaper and quicker.

3.4. The science-end has to gear itself to discharge the above roles through initiative and comprehensive multi-disciplinary assistance in all phases from resource survey to implementation and evaluation of development. It would not be one-way traffic. The scientists, with a closer contact with the people (their needs and socio-economic factors) would be able to make their researches more need-based and would be able to derive satisfaction by watching their fuller utilisation.

3.5 How much of the above has been happening in the developing countries? Very little, one might say. Lack of S & T base may be the reason in a few cases. Passiveness of the S & T end and other factors might be said to be responsible in the case of others. India is credited with the third largest technical man-power in the world but the impact of S & T is yet to be felt to the desired extent. The reasons are quite apparent.

The scientists in the developing countries tend to undertake researches which are in fashion, internationally. This is not only because of the training and temperament developed, studies abroad, etc. but also because the incentives, awards and rewards are loaded in favour of this system. In these countries, a scientist may get judged by the papers he publishes in international journals and the number of international conferences he attends. It is only after getting recognition on the international platform that he is recognised in his own country.

Therefore, if the Indian scientific community has to be diverted to do research on technologies relevant to the needs of the Indian people, the award and reward systems have to be reoriented appropriately.

This is what is being attempted today in the country. The Indian scientist will then be more useful for India than in the international sphere and thus there will be a built-in curb on brain-drain. From the start of technical education to research in research institutions, the criteria for funding, incentives, etc. should thus change if the country wants its scientists to contribute towards the welfare of its people.

The Indian Science Congress Association, during its last annual session, deliberated on the various aspects of rural development vis-a-vis the role of science. It has identified the broad areas of thrust and a task force is engaged on follow-up activities.

4. Integrated Approach

- 4.1 Integration of activities is implied in the widest sense and there are a number of facets of the integrated approach. Basically, there is to be integration of resources, technologies and sociological factors. Science is to be integrated with society, and science and technology with natural resources, human resources and skills; thereafter, taking care of the motivational factors, the system is coupled with modern methods of management, marketing and finance.
- 4.2 Firstly, development to be wholesome must encompass all the various aspects with compatible and mutually-supporting programmes. The integrated programme may be divided for convenience into different sectors and may include such activities as: soil-water-crop management; land reforms, agricultural practices, processing of agricultural products and bye-products; public utility services like roads, housing, drinking water, sanitation; health care and delivery, nutrition, family planning; agro-, agro-waste, forest, mineral, animal-based industries; pollution, effluent and ecological systems and utilisation of wastes; education coupled with work-experience; etc. Multi-disciplinary teams must therefore be involved in preparing development plans for rural areas.

There is to be integration of a number of disciplines of science for achieving best results. Talents and skills are to be integrated with the tasks. This involves integration of a variety of agencies like ICAR, ICMR, CSIR, etc. to have inter-disciplinary and inter-organisational teams working in a co-operative and co-ordinated way.

Given in Table-1 are the percentage shares of major sectors in gross domestic products of various ESCAP countries for the years 1965, 1970 & 1974. Development of agriculture, forming the core sector, itself requires a variety of allied infra-structure. Also, the degree of dependence on agriculture must be arrived at judiciously in each case (refer columns 3 & 10 of Table-1). Agriculture, industry & employment are to be planned as one system and solution to the problem of under-employment in rural areas would largely be in the generation of activities in other sectors, especially the rural-based industries.

- 4.3 Secondly, the treatment of each resource/produce is to be on integrated basis e.g. soil-water-seeds and fertilisers-crop-harvesting-storage-marketing-further processing of the crop as industrial raw material and allied activities may essentially form as one system. For example, how to grow cotton of a particular quality with maximum yields and returns, and its storage and marketing is only one important part. Another important part starts when the constituents of this crop are used scientifically as raw materials: the cotton stalk for marketing particle-board; the leaf for extracting Vitamin C; cotton going to the textile mills, cotton lint for nitro-cellulose, etc; cotton-seed for oil, hydrogenated fats, fatty acids, and cake; extract further oil from the cake by solvent extraction, extract proteins, and use the residue for manure or animal fodder.

The case of chillies may be cited as another example. Chilly prices go up and down. If only to stabilise the prices, industries can be set up centring round chillies. The chillies have got four major components:

Table 1
Per Capita GNP (1973) & Shares of Major Sectors in GDP: 1965, 1970 & 1974
(in percentages)

	Agriculture			Manufacturing			Others			Per Capita GNP in 1973 (U.S.\$)
	1965	1970	1974	1965	1970	1974	1965	1970	1974	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Afghanistan	52.9	49.0	...	1.6	2.3	...	45.5	48.7	...	90
Bangladesh	...	61.4	59.6	...	8.3	7.8	...	30.3	32.6	80
Burma	37.7	37.2	37.0	10.2	10.7	10.0	52.1	52.1	53.0	90
Cambodia	40.1	38.3	...	10.8	...	...	49.1	...	...	..
Fiji	...	23.6	19.9a	...	11.5	11.1a	...	64.9	69.0a	..
Hong Kong	...	2.2	1.8b	...	33.3	28.5b	...	64.5	69.7b	1090
India	44.2c	45.1	43.2	23.6c	23.3	22.6	32.2c	31.6	34.2	120
Indonesia	52.4	47.4	42.9a	8.3	9.0	...	39.3	43.6	...	100
Laos	...	...	...	...	...	...	...	...	...	...
Malaysia	...	33.0	31.7	...	13.2	16.1	...	53.8	52.2	480
Nepal d	65.2	67.4	68.4a	8.0	8.9	9.6a	26.8	23.7	22.0a	88
Pakistan	42.1	38.9	35.6	15.9	16.0	16.0	42.0	45.1	48.4	140
Papua New Guinea	...	40.1	34.0b	...	5.3	6.3b	...	54.6	59.7b	370
Philippines	33.2	32.5	29.2	17.5	19.4	20.9	49.3	48.1	49.9	250
Republic of Korea	42.8	31.1	24.9	12.0	19.1	27.3	45.2	49.8	47.8	370
Republic of South Viet-Nam	29.1	38.1	34.7b	10.7	6.8	6.7b	60.2	55.1	58.6b	...
Singapore	3.3	2.5	1.7	15.3	19.3	21.0	81.4	78.2	78.3	1490
Solomon Islands	...	59.9	60.3b	...	3.4	1.4b	...	36.7	38.3b	...
Sri Lanka	36.7	34.9	33.1	12.4	13.6	12.6	50.9	51.5	54.3	120
Thailand	34.0	30.0	27.9	15.5	17.1	18.3	50.5	52.9	53.8	240
Tonga	...	55.7	...	...	2.2	...	...	42.1	...	...
Western Samoa	...	...	...	...	...	...	...	...	...	...

Source: Asian Development Bank, Key Indicators of Developing Member Countries of the ADB, Vol. VI No. 2, 1975

a 1973

b 1972

c 1966

d Manufacturing includes cottage industry.

Reference: "Economic and Social Survey of Asia and the Pacific, 1975"-Economic & Social Commission for Asia & the Pacific-Thirty-second session, 24 March-2 April 1976 Bangkok (E/CN.11/L.437/CONS)

oleo-resins, vitamin C, bactericide, and the hot pungent component. Besides extraction of vitamin C and oleo-resins, chillies could be more readily exported after removing the hot pungent component.

Such enterprises, centred round the use of rural produce/waste as industrial raw material will mean: better use of local resources; better dispersal of industries; reduced requirements of storage, transport and distribution; utilisation of profit-generating low-capital labour-intensive processes; starting a healthy economic chain leading to production of additional capital and more capital being ploughed into the industries sector from the agriculture sector.

- 4.4 Thirdly, there is to be over-all integration (and co-ordination) of various groups of activities viz. administration, S & T end, implementation infrastructure, local leadership, community participation, voluntary services, educational institutions, etc.
- 4.5 Students (& teachers) would need to be involved in a big way so that their involvement becomes an important instrument of change. Whereas students from urban centres may participate in the development activities, the local students should form an integral part of the system. Their activities may be oriented so as to:

- familiarise them with all aspects of rural life, including the developmental needs and related measures;
- provide them with work-experience as part of formal education;
- induce the parents to take to progressive practices through examples set by their children; and
- have in-puts of voluntary work-force for implementing community schemes.

4.6 Rural societies are likely to vary from region to region in their characteristics weaknesses and strengths, sociological factors, instruments of change. Sociologists, along with other experts, have to be constantly over-viewing the development activities so that: they are kept whole-some, there are multiplier effects, and there is continued acceptance, support and involvement of the community.

5. Development Styles

5.1 Of late, there seems to be a surge of interest in the work of rural development. Different activities are afoot in different countries. In India itself, a number of varied activities were launched during the last 2-3 years. Recently, the Council of Scientific & Industrial Research undertook survey and appraisal of these activities. The number of schemes going on is rather large but they can be grouped into 50 different projects from the point of approach methodology, size and scope, and the organisation(s) behind. These 50 projects may be again categorised broadly as under:

- (a) A number of academic institutions and professional organisations are making

in-puts of available (in-house) expertise, and man-power for small near-by rural communities (17 projects).

- (b) A few public-sector undertakings and business houses are taking up programmes for making in-puts for the welfare of rural and sub-urban communities, especially those around their establishments (5 projects).
- (c) There are a fairly good number of individuals, groups and organisations doing work of social welfare on voluntary basis (13 projects).
- (d) There is also a case of promotion of development in a rural pocket by a newspaper (1 project).
- (e) A number of government departments are carrying on programmes related to rural development (14 projects). Major R & D organisations like CSIR, ICMR, & ICAR are realigning their activities so as to make sizable in-puts towards science-applied rural development.

5.2 While these efforts (in groups a to d and many in e) are making their own contributions, question arises as to whether they reflect the best ways to tackle the massive problem of rural development. Soon after independence, India launched community development programmes. A number of lessons are to be learnt from these: these programmes should be free from bureaucratic fetters, they should be of integrated type and have good technology content, they should not be imposed but should emerge as people's own

programmes. While the activities categorised above (para 5.1) are well-intended, they lack in one or more of the following requisites:

- integrated and science-based,
- multiplier effect,
- involvement of the people.

- 5.3 Needs, potential and sociological and other factors tend to be different in different societies. To suit these local conditions, methodologies may need adjustments and relative emphasis may need to be shifted, but it is believed that the out-lined philosophy in its generalised form would have large-scale application.
- 5.4 This philosophy, with emphasis on extended use of science and integrated approach, is basically intended for comprehensive development at large scale. The concepts are no longer limited to paper. Based on these, the CSIR (with its 46 constituent units- national laboratories and research associations in varied disciplines) launched in 1972 a scheme of adoption of districts, wherein scientists take the initiative for making scientific and other inputs for accelerated all-round development of an under developed district. A district in India (354 in all) covers a fair-sized areal pocket (about 10,000 sq.km.) with distinct administrative entity, a population of about 2 million and 1000-1500 population centres (towns, villages, hamlets).
- 5.5 Karimnagar (Andhra Pradesh, India) was the first district adopted under the scheme. The scheme has already been extended to 5 districts and more and more regions are demanding its extension to their parts. In the context of the approach out-lined herein, it would be relevant to present briefly the methodology adopted and results achieved in the Karimnagar Project.

6. Karimnagar Project

6.1 Karimnagar district is located in the southern State of Andhra Pradesh (lat. 19° N and long. 79° E approx.). It has an area of 11,800 sq. km. and population of 1.96 million (1971). It had been classified as backward (salient particulars are given in Table 2). This district was identified in consultation with the State Government during July-August, 1972 and the project was launched in September 1972. The methodology followed and results achieved are broadly as under:-

- (1) Teams of scientists and experts studied the data available and carried out, in co-operation with local agencies, further surveys and assessments needed for preparing programmes for all-round development. For disciplines outside the scope of its activities, CSIR has been bringing in expertise from other organisations.
- (2) In the light of needs and potential for development, national norms, and considerations of integrated development, phased development programmes were prepared for various sectors. Interactions were held with multi-disciplinary groups, representatives of the district community, official agencies and the State Government for finalisation and approval of these programmes. The project then entered the implementation phase.
- (3) The implementation is being effected, as far as possible, through the normal infra-structure available. Inputs of experts are being made in all important operations of the implementation phase viz. detailed investigations and designs,

feasibility studies, campaigns, raising of funds, demonstrations and training for the use of new techniques, solutions to problems etc. There is a composite district-level Implementation Committee with representatives of the district community, official administrative and other agencies, and the expert groups. For policies, direction and over-view, there is a State-level Steering Committee. The CSIR has set up an office at Karimnagar for activities of liaison and coordination. Whereas normal public funds (governmental allocations to districts) are the source of funding utility activities (roads, water supply, housing etc.), funds for investments in industrial, agricultural and other activities are being raised through entrepreneurship and public loans.

(4) Natural Resources, Agriculture, Health, Family Planning and Allied Activities.

Using aerial photo-interpretation techniques, work was taken up for preparing maps on geology, geomorphology, geohydrology, forests, soils, etc. This work is nearing completion. An integrated land-use map is being prepared for optimal utilisation of the resources. Activities have been initiated for comprehensive inputs in agriculture e.g. soil-water-crop management, seeds, fertilisers, pesticides, post-harvest technologies, marketing etc. Besides the normal activities of health and family planning programmes, a study is under-way on the nutrition aspects.

Table 2

Some Salient Data on Karimnagar District

1. Per capita net domestic product (1968-69)	450 rupees
2. Area	11800 sq.km.
3. Population (1971)	1.96 million
4. Density of population (1971)	165 persons/ sq.km.
5. Rural population as percentage of total population (1971)	89.3%
6. Rate of growth of population (1961-71)	23.1%
7. Land use:	
(a) Net area sown	39.1%
(b) Forests	21.7%
8. Percentage of workers to total population (1971)	46.4
9. Gross irrigated area (1972-73)	131,244 hectares
10. Yields per hectare:	
(a) Paddy	1,412 kg.
(b) Jowar	429 kg.
(c) Ground-nut	581 kg.
(d) Sugar-cane	6,486 kg.
(e) Cotton (lint)	81 kg.
11. Live-stock (1972 provisional)	175 per sq.km.
12. Gross value of agricultural output per hectare (1967-68)	706 rupees
13. Per capita consumption of electricity (1968-69)	34 Kw-Hr.
14. No. of registered factories (1969)	102
15. Literacy (1971)	15.31%
16. Percentage enrolment of children of the age group 6-12 in primary schools (1972)	50.5%
17. No. of schools per million of population (primary, middle and high) (1972)	767
18. No. of hospitals and dispensaries per million of population	20.4

Contd.....

Table 2 continued

19. Infant mortality rate (1973) per 1000 live births	27.81
20. Maternal mortality rate (1973) per 1000 live and still births	4.44
21. Railways, route per 100 sq.km. of area (1971)	0.89 km.
22. Length of roads with near all weather surfacing per sq. km. of area (1972)	12.0 km.

(5) Industries & Allied Activities.

Based on natural and human resources and other related factors, a blue-print was prepared for industrial development of the district. In the first phase, an investment of Rs.56 million is envisaged. These include egg-powder plant, mini rice and maize plants, plantation of citronella, edible ground-nut flour plant, oil-milling complex, straw-board and speciality paper plants, mini-steel plant, engineering workshop, enamel-ware units. These are in various stages of fruition. Significant in-puts have already been made in the improvement of processes of existing industries: rice-milling, leather processing, pest-proofing for grain storage, poles for electrification, etc.

(6) Public Utilities (roads, water-supply, housing, sanitation) & Allied Activities.

- (i) Survey for assessment of requirements of approach-roads and streets with near-all-weather surfacing, adequate supply of reasonably safe drinking water, sanitation and handling of garbage and other wastes.
- (ii) Phased road development programme for access to centres of 2000/1500, 1000 & 500 population and inter-connections. Detailed investigations and effective and economical designs for the construction of about 500 km. of roads with the use of local materials and as per pertinent soil and traffic conditions. These works (500km. of roads) programmed to be completed in 2-3 years.

(iii) About a dozen schemes of rural water-supply already completed with scientific designs, treatments and lay-outs.

(iv) Based on local materials, skills and environmental factors, new technologies and designs introduced for houses (especially for low-cost types), and Govt. and community buildings. A few projects already implemented and a good number at hand.

(v) Programmes of rural sanitation are being launched with the association of teachers and students of local schools, social workers, and village communities.

(7) Integrated In-puts at Village-level.

Schemes are being launched for all-round development of villages: roads, streets and drainage; water-supply and sanitation; crafts, cottage industries and cooperatives; financing and banking facilities, community buildings, bio-gas plants etc. A number of progressive villages, through their panchayats (lowest tier of local self-government), have already availed themselves of these programmes.

(8) Instruments of Change & Evaluation of Activities.

Group activities have been initiated for multi-disciplinary review of project activities, their effects on the rural society, identification and roles of additional instruments of change.

6.2 The initial work of preparation of development plans was completed expeditiously, largely during 1972-73. Just as implementation was being taken up, there was a change in the national economic scene and public funds for development of utilities suddenly shrank considerably. This factor remained as a set-back upto 1974-75. The position has since been improving. Also, with time, as the barriers are breaking down, the acceptance of new concepts and technologies is improving everyday. Demands for in-puts have increased to such an extent now (about 100 schemes at hand) that the CSIR is restructuring its local office.

6.3 The experience gained point to the following:

- a) The science-end does have a very important role to play: its in-puts make significant contributions in a variety of ways: effectiveness and economy of processes, optimal use of local resources and skills, generation of employment.
- b) Through seeing and believing, faith in the role and capabilities of science does develop, and the various forces do gradually align themselves with the science-end in changing the quality of life of the common-man through integrated rural development. With this galvanising change, pace of development picks up and the process becomes self-accelerating.

7. Broad Set-up Needed

7.1 For out-lining the set-up needed for the work of rural development as per the concepts and approach enunciated above, three groups/sets of forces and their functions may be recognised as under:

Key Constituents

Key Functions

Public Group(P)

- | | |
|---|--|
| 1. Community, its representatives (lower tiers of local self-government), political leadership. | 1. Creation of awareness for better quality of life through use of science. |
| 2. Voluntary organisations, youth-groups, students and teachers and other community agencies. | 2. Understanding and support of and participation in development activities. |
| | 3. Community service. |

Infra-Structure Group(I)

- | | |
|---|---|
| 1. Normal govt. agencies for administration and implementation of various activities in the district. | 1. Understanding of needs of the rural poor. |
| 2. Special agencies available for financing/promoting activities of health, industries, housing, family planning etc. | 2. Understanding of new concepts and technologies with a progressive outlook and giving them fair trials. |
| | 3. Expeditious implementation of development schemes. |

Experts Group(E)

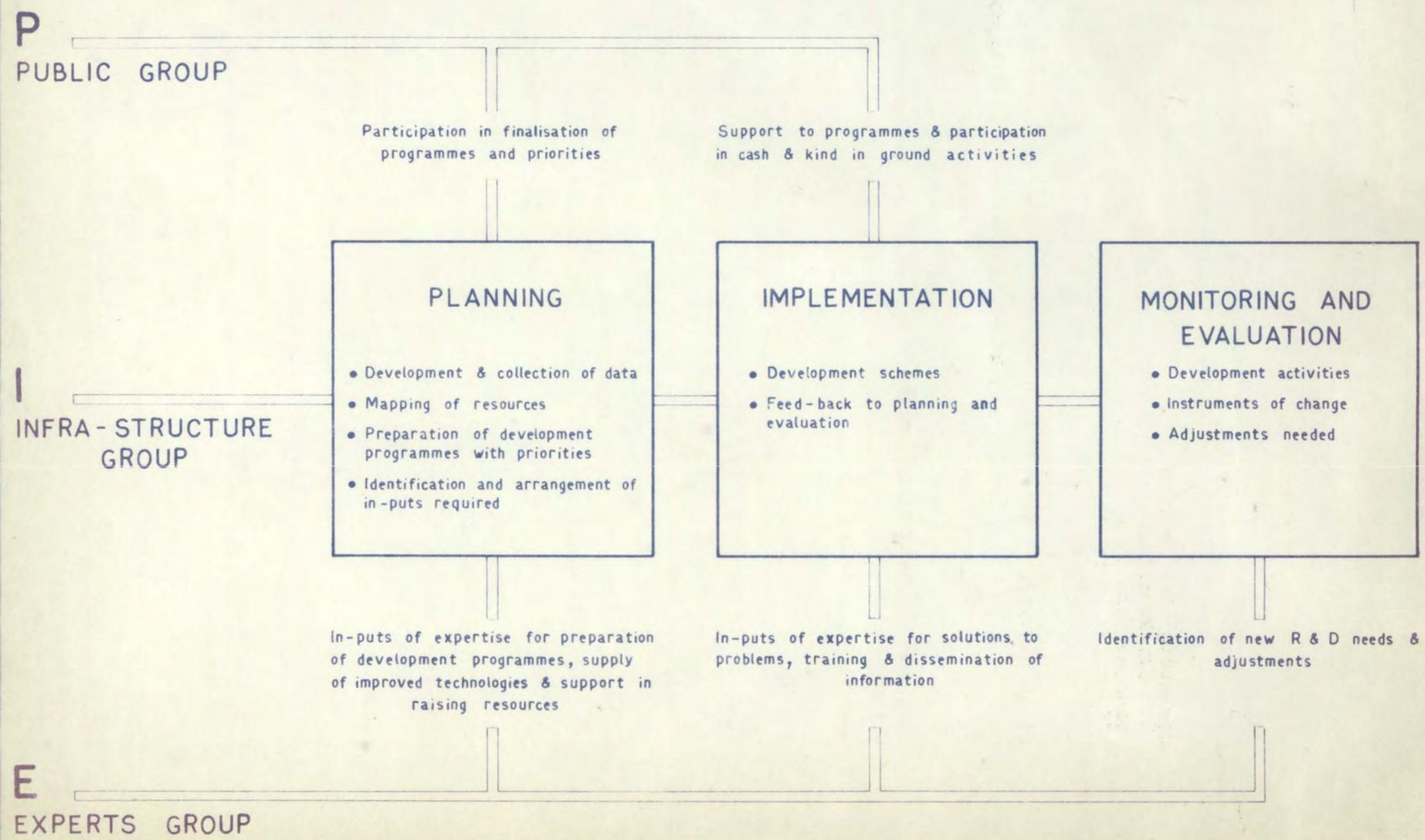
- | | |
|---|---|
| 1. Scientists and experts of all related disciplines. | 1. Assistance in mapping of resources and skills and preparation of programmes of integrated development. |
| | 2. Solution of technological and other related problems. |
| | 3. Monitoring and evaluation of activities and their effects on the rural society. Initiation of adjustments. |
| | 4. Promotion of permeation of science in the fabric of rural society. |

5. Scientists to press, with dedication, the facts and findings of science into the service of the rural folk.

The weaving-in, of the above three groups and their roles is schematically shown in Chart-2.

CHART - 2

OUT-LINE OF SUGGESTED SET-UP



8. International Aspects

- 8.1 Accelerated all-round development in a whole-some manner of vast rural areas requires massive effort and there are many ramifications. Nations can help each other significantly through co-operation and sharing of experiences.
- 8.2 There are some problems and aspects which have national or regional over-tones. Also, there are some issues which may not have as great significance for the developed countries. Some of the examples are: tropical climate, monsoons, floods; family planning, nutrition; drinking water, low-cost housing, sanitation, sewerage; new energy systems (solar, wind, bio-gas), production of energy in small quantities at the large number of dispersed locations.
- 8.3 It is also relevant to remember that the developing societies tend to have some basic differences with the developed societies. The value systems of the rural societies of the older civilisations are different from those now pervading the developed societies. These differences need to be recognised and accepted. Relative evaluations on arbitrary criteria and tendencies to impose new value systems can be erroneous and damaging.
- 8.4 It is thus clear that the developing countries must concern themselves seriously with the development of alternative ways of doing things with regard to value-systems, methodologies, and technologies. Distinctions should be made carefully between what is to be borrowed and what has to be developed indigenously. The reward and award systems need to be deliberately biased in favour of developments which are in the nature of more relevant alternatives. It is a case when you must find your own salvation & develop appropriate technologies to suit your own needs and your own resources and skills. No body else will do it for you. As for example, the developing countries of the region must themselves put in

concerted efforts, in-stead of looking up to-the western nations, for the tapping of sun-energy, so abundantly available in the tropical countries.

- 8.5 Whereas the nations may directly inter-act bilaterally, certain of the requirements can be met best through formal international arrangements. There would need to be agencies for study and analyses of different concepts, methodologies and technologies for rural development and for disseminating information and findings. Some experimentation and pilot-projects at the international level would also be helpful.
- 8.6 The United Nations Economic & Social Commission for Asia and the Pacific, during the 32nd Session held in March-April 1976, "called for a detailed programme of work on rural development and requested its Executive Secretary, J.B.P. Maramis, to draw up one". The said programme "would be the first comprehensive and all-embracing strategy to deal the basic needs of the rural poor in the ESCAP region". Several activities relating to rural development in different disciplines are already being implemented under the auspices of ESCAP. A Centre for Technology Transfer is being set up in India under the auspices of ESCAP.
- 8.7 A number of other UN agencies are also engaged on related activities-promotion of industrial and agricultural development, development of labour intensive technologies, manual aids etc. All these efforts are well-placed and, with the knitting together of various efforts, we can, hopefully, move towards more effective methodologies and speedier alleviation of poverty.

9. Concluding Remarks & Emerging Questions.

- 9.1 Improving the lot of the rural poor is a major task as it involves large populations. Efforts in this direction have been continuing over a considerable period but the progress made so far does not suggest that we are approaching the solution expeditiously. Set out in this paper is a philosophy for approaching the problem. The current imperatives have been out-lined and the various strategies and linkages needed have been brought out.
- 9.2 The task of healthy all-round development of rural areas tends to be complex with many ramifications. Those who share the concern for early and effective solutions must address themselves to certain major open questions:
1. How do we bring about change in a traditional society, burdened with inertia, taboos, prejudices and the like? How do we motivate the people to get involved in the process of development? How do we replace inertia and lethargy with the spirit of adventure and enterprise?
 2. Money leads to power and power leads to money. How do we break this chain for distributive justice? How do we stop intelligent people exploiting the ignorant and the rich exploiting the poor?
 3. How best can we avoid the tendencies of arrogance and benevalence in the elitistic classes? It is to be recognised that the traditional societies may lack in education and modern culture but they can distinguish between good and bad.
 4. Spirit of cooperation and sense of discipline are not the strong points of many of the societies.

- How do we generate the spirit of cooperation so that the involvement of all sections of the people & various groups and agencies is on effective and coordinated basis?
- Imposition of discipline from above in a democratic society has its own problems. How can individually clean people be turned into a clean community?
- 5. In traditional societies, the surficial value systems are required to be adjusted. The high disparity in the values attached to brain-work and manual-work needs to be curtailed. How do we get to the position of work-soiled fingers and clean minds?

References

1. " Economic & Social Survey of Asia & the Pacific, 1975", Economic & Social Commission for Asia & the Pacific.
 2. " Draft Fifth Five Year Plan, 1974-79", Planning Commission, Government of India.
 3. " Report of the Team for the Study of Community Projects & National Extension Service," Government of India, 1957.
 4. Hiren J. Pandya, " Development Administration & Rural Leadership in India," Social Change, Journal of the Council for Social Development, September- December, 1975.
-

Mr. A. R. Whyte, Division Chief, WAPA3

July 16, 1976

D. R. Steeds, WAPA3

Review "Developing Country Foodgrain Projections for 1985".

DRS

I have no major comments on this paper. The basic data source is USDA and, for rice and millet, FAO. However (page 4): "In the case of West Africa, neither the USDA nor the FAO data were considered reliable by the West African Regions and the projections are based, accordingly, on data supplied by the Region". Footnote 2, page 10, elaborated on how the Redfern study was modified to fit into their general methodology, i.e. introduction of income elasticities and expression of foodgrains other than paddy in gross terms.

I have two minor suggestions concerning consistency between the numerous studies on foodgrain projections.

- (a) Much confusion arises from the expression of quantities in gross and/or net terms (net of what?). The paper under review uses gross terms (gross of seed requirements even) for all grains except paddy, which is expressed as rice at 0.667. The use of gross or net terms depends on the final objective, production targets or nutritional intake targets for instance. Even so, I would prefer that all base data are expressed gross, i.e. as harvested, and that the assumption made with regard to quantities at any other phase in the distribution process be made explicit, and by reference to gross quantities.
- (b) Confusion also arises from different uses of the expression 'dependence on imports'. Redfern used this in the sense of imports divided by consumption; the paper under review uses imports divided by domestic production. I would prefer the former usage.

DRS:d1

Mr. H. van der Tak

July 15, 1976

C. Willoughby

Special Netherlands Contribution to UNDP for Assistance
to Least Developed

This is in response to your note of July 7 on the above subject.

In the transportation sector, I can only think of one candidate for the Dutch contribution - a testing program for a transportation vehicle designed for low-cost roads and on-farm use.

As you know, we are presently looking into the problem of appropriate transport systems for rural communities. A mission is in Kenya at the present time studying transport and on-farm mechanization needs of small- and medium-size farms. A pilot testing program of various designs of vehicles and farm implements (animal-drawn or engine-powered) is a second step. The timing of such an experimental program is uncertain until after the mission has prepared its report in August. Country selection could be made in cooperation with the Dutch.

I attach for your information, a status report of the study dated April 9, 1976, terms of reference for the mission to Kenya, and excerpts from a catalogue presently under preparation on available vehicle designs.

Of course, one might also propose a pilot program of labor-intensive construction techniques in a country of interest to the Dutch. However, we still have about \$1 million in uncommitted funds available in our research budget, and moreover, there are plenty of opportunities to widen this program through regular Bank operations.

CCarnemark:hm

Attachments (3)

See Distribution List

July 14, 1976

Wouter Tims, Director, EPDIR

Draft Working Paper on "Developing Country Foodgrain Projections for 1985"

The attached draft of the "Developing Country Foodgrain Projections for 1985" paper incorporates the comments and suggestions received from Bank Staff earlier this year. Before releasing this study as a Working Paper we would appreciate any additional comments you may have regarding the country and regional projections. Comments may be sent to Ms. Hadler (Room D-413, extension 4064) by July 19.

Attachment

Distribution:

Messrs.: Yudelman, Goering, Haq, G. Brown, Burki, Rautlinger, Picciotto,
Rowe, Jeffries, Vergin, Van Gigh, Goffin
Chief Economists, Senior Economists
Goreux (Fund)

SHadler:rc

Mr. Attila Karaosmanoglu, Office-V.P.,
Dev. Policy

July 14, 1976

through:

John Foster, Acting Chief, EPDCE
Wouter Tims, Director, EPDDR

Proposed Working Paper - Developing Country Foodgrain Projections for 1985

Attached is a copy of the latest draft of the "Developing Country Foodgrain Projections for 1985" prepared by Ms. Hadler of the Commodities and Export Projections Division. This report has been discussed thoroughly with the Regions and Central Projects Staff and their comments and suggestions on earlier drafts incorporated; final comments from them are to be received by July 19th. It is proposed that this report should now be released as a Bank Working Paper.

cc and cleared with: Mr. Waelbroeck
cc: Mr. B.B. King
Mr. Chung
Ms. Hadler

SHadler:rc

Mr. Jan Wallis (through Mr. Ted J. Davis)

July 14, 1976

Michael Cernea

Research Proposal for the Design of a Monitoring & Evaluation System for the Colombia Rural Development Project

1. Following your request, I reviewed the proposal to the Inter-American Development Bank on the technical assistance to the Government of Colombia in the design of a monitoring and evaluation system for the integrated rural development project.
2. The proposal is generally correct in outlining the typical steps which should be undertaken for designing an information system. However, it is extremely general; it contains a set of generalities about the definitions of monitoring, data collection and processing, etc.. Therefore, it doesn't help in creating a specific image about the author's views on how the monitoring system for this particular project should look. I believe that since the project's outline and components are already known, they should be used to provide substantial information for much more specific hypothesis for monitoring.
3. I would like to invite some attention to the important distinction between project reporting and project monitoring (aside from the distinction between monitoring and evaluation). In your draft Annex on monitoring and evaluation for the Colombia appraisal report, it is spelled out in great detail what each type of report, from various participating agencies, should cover. This is extremely helpful, but it refers primarily to the regular reporting system within the project. I would tend to suggest that it is important to require the consultant to study and evaluate critically the currently existing reporting systems within the Colombian line-agencies involved in the project and to come up with proposals for improving the routine reporting system inside the project system. The monitoring exercise, to be undertaken by the project management, should be additional to the reporting system and should focus only on the key aspects, on the critical junctures of project work (not necessarily on all the aspects which are routinely reported by the line-agencies), thus improving management control and implicitly checking the accuracy of the general reporting system.
4. The most essential elements in the consultant's proposed research are points 4 and 5 of the paragraph "System Design Scheduling", which refer to the design of monitoring indicators and of evaluation indicators. The field level collection instruments should be designed accordingly (point 7). However, I am not sure I understand what the consultant means by testing these indicators and instruments: testing them by himself, or testing them under project conditions? It is also not clear who would do the "four to six week adequate field testing of data collection instruments", as required in his proposal. These 6 weeks represent exactly the period which separates the first stage from the second stage of the consultant's involvement.

5. What would be the product to be delivered to IDB after the first stage? No such product is presently mentioned in the consultant's proposal. I suggest that a draft report, containing the sets of indicators and the design of the data collection systems, might be presented and discussed with IDB and the Colombian authorities.

6. In fact, I do not see clearly the reason for splitting the consultant's work into 2 stages at this time. The core of the "second stage" is, as described, points 3 and 4 (pg. 3, first paragraph), which refers to the preparation of the statistical methodology for analysing the data. But, as it is well known from any research design, the analysis methodology is normally prepared simultaneously with the design of the data collection instruments, i.e. in the first stage of any such approach. Wouldn't it be possible, then, to merge the two stages in one, comprising the field study, the small scale testing by the consultant, and the preparation of his report (or "manual")?

7. I would, however, favor indeed a real second stage, but much later in time: after about 8-12 months of operating the proposed monitoring and evaluation system under real-life project conditions. The consultant may then be invited to come back, to evaluate the actual effectiveness of the system and to propose appropriate improvements.

MC/co

cc: Messrs. M. Ahmad
G. Deboeck
G. Schwacher

July 14, 1976

Mr. P.J. Goddard
Managing Director
ULG Consultants (Warwick) Ltd.
2 Church Street
Warwick CV34 4AJ
England

Dear Jack:

Thank you for sparing me your time on July 2, and for your hospitality during my visit to Warwick. It was useful to be able to talk with yourself, Mike Rayner and John Fulbrook.

I have delayed writing till now in the hope that I might have been able to report a break-through in our arrangements over Turkey. Unfortunately, nothing has come through from them yet. However, there have been further discussions here with senior officials from Turkey visiting Washington over the past week, and there is a possibility that we may get the go-ahead within a week or so. Being realistic on the other hand, I would judge that an August 1 start is not going to be possible, though a mid-August might be. Be assured that we are pushing ahead on this matter as fast as possible, and that we will advise you as soon as we hear from the Turkish Government.

I enclose copies of our "Guidelines for Consultants" working on the Prices and Subsidies case studies. This includes a revised outline and a statement of our expectations and reservations. I will also send a copy to Economic Consultants Ltd.

There seems no reason why Gordon Temple could not accompany your field team to Ankara for a week in August or early September, and I think that might be a very useful arrangement along the lines we discussed.

I will leave it to Colin Bruce to resolve with you the issue of per diem rates. As I see it, however, we have a fixed upper limit of US\$225 per day on a 26-day month basis. Regarding the time required, I think that on the basis of our experience with the Argentina case and given you get field support from us at the beginning of both of your cases, there should be no difficulty in doing each one within 4 man months, over, say 5 months lapsed time. Again, on this matter, our budget is very restrictive.

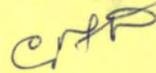
Mr. P.J. Goddard

July 14, 1976

I regret the difficulties that these various matters may cause for you but hope that you are able to get on with the job as early as possible.

Best regards,

Yours sincerely



Graham F. Donaldson
Acting Chief
Economics & Resources Div.
Agriculture & Rural Development Department

Enc:

GFDonaldson:mt

OFFICE MEMORANDUM

TO: Distribution

FROM: Charles Weiss

SUBJECT: Research Needs in Pest Control for Small Farmer Food Crops

DATE: July 12, 1976

Interesting. Did we pay any attention to these problems in Malaysian and Indonesian Research Projects?

The attached draft report was written by a steering group created at the request of the OECD Expert Planning Group on Science and Technology, of which I am a member. It is intended as a general framework for international action. I would be grateful for your comments by August 1, and will pass them on to the Steering Committee unless you wish otherwise. ??

Distribution

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CWeiss/rc

Attachment

MARDI has a plant protection component in each of its commodity research programs, plus plant protection equipment would be an important component of the Agric Engineering Program. [Signature]

OECD PLANNING GROUP ON SCIENCE AND TECHNOLOGY

STEERING GROUP ON PEST CONTROL IN SMALL FARMER FOOD CROPS
IN DEVELOPING COUNTRIES

RESEARCH NEEDS IN PEST CONTROL
FOR SMALL FARMER FOOD CROPS

DRAFT REPORT

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OECD PLANNING GROUP ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT COUNTRIES

STEERING GROUP ON PEST CONTROL IN SMALL FARMER FOOD CROPS

DRAFT REPORT

1. INTRODUCTION

This report has been prompted by the increasing global recognition of the need for greater effort to reduce the loss of food production in developing countries caused by a wide diversity of pest organisms.

The general term pests includes viral, microplasm, bacterial and fungal diseases of plants, nematodes, numerous species of insects and other arthropods, vertebrate pests including birds and rodents and a wide variety of weed species.

In developing countries of Latin America, Africa, the Near East, Asia and the Far East, between 70 and 90 per cent of the population is engaged in farming or is directly dependent on agriculture. More than 50 per cent of the food grown in these countries is produced by small farmers but a very large proportion of their produce, mainly cereals, pulses and root crops, is destroyed by pests. The result is that practically nowhere in the developing countries are man's minimum calorie and protein requirements satisfied. It has been estimated that in these countries about 200 million children under the age of five suffer from nutritional deficiencies.

Although substantial progress has been made in controlling many pests of crops grown by large-scale cultivation the damage is still extensive and at the small farmer level the resultant loss of food and injury to health are major contributions to human suffering.

The gravity of the situation can be summed up in the following figures: the developing countries produce only 30 per cent of the food consumed in the world as a whole, whereas they contain 50 per cent of

the world's population which reached 4000 million by March 1976. At the present rate of increase, it is estimated that at the turn of the century, the world population will be 8000 million of which 6000 million will be in developing countries.

The urgency of the problem has been highlighted by the oil crisis which has placed a heavy financial burden on developing countries engaged in rural development programmes including increased food production. Additionally, tragedies such as the Sahelian drought have aroused international concern over food crop production in disaster-prone areas.

The World Food Council, the World Bank, UN agencies, donor countries and their institutes and other international bodies have stressed the need for accelerated effort to increase food crop production in the developing countries. Such efforts must focus on small farmer food crops and must be based on the realization that prevention of losses caused by pests is equivalent to greatly increased food production.

The aims of this report are:

1. To review the extent of the problem and to identify the factors responsible for low food crop production by small farmers in developing countries, in particular the losses caused by pests.
2. To review the activities of UN agencies, national and international institutes and others, in the general area of crop protection in developing countries and particularly at the small farmer level.
3. To identify the gaps in knowledge and to define needs for additional research necessary for improved crop protection.
4. To propose specific projects for demonstration/research/training that will provide guidelines for similar work in other areas of the countries selected for these projects and in other regions.

II SOCIO-ECONOMIC BACKGROUND TO THE PROBLEM

(a) Crop losses

Although the magnitude of losses caused by pests has not been adequately measured, even in the most highly developed countries, they are recognised as being most substantial, especially in the developing countries. Whereas most authorities have placed worldwide pest losses at a minimum of 35 per cent of agricultural production, in developing countries these losses may exceed 50 per cent because of continuous conditions favourable to pest development. The most comprehensive study on losses is by Cramer who investigated pre- and post-harvest losses and who found that annual crop losses in Latin America caused by insect pests, plant diseases and weeds totalled 33 per cent of the potential production. In Africa and Asia, crop losses caused by these three groups of pests were 42 per cent approximately.

Adequate quantitative data of rodent damage to crops in the developing countries is not available although agricultural production in many of these countries is seriously limited by these pests. When losses due to birds, especially those of the genus Quelca are also taken into consideration, the data given above can be considered as minimum percentage losses of potential production.

In some developing countries, 70 per cent or more of harvested crops never leave the farm. It is in this type of situation where the small farmer cultivates land often in close proximity to his store, that the problem of pre-harvest infestation of cereals and pulses is most acute. When the harvest is eventually taken into store, insects play the major role in further crop damage and loss. More than 100 species have been identified as responsible for losses in stored products. The estimated losses often amount to 15-20 per cent in the

first half of the storage season. It has been calculated that if the losses due to the lack and defectiveness of storage facilities could be eliminated it would be possible to feed over 10 per cent of the world population with the grain thus saved.

(b) Social and cultural aspects

Traditional agriculture is still characteristic of many developing nations. Despite important advances in seeds, fertilizers and pesticides, very little in the way of increased income or improved living conditions trickles down to the family farmers who make up the bulk of the population. Hence cultural practices at the small farmer level are those handed down from generation to generation and found by experience to present the least risk. Some of these practices are sound, such as hand weeding (although often ill timed). Other practices provide a suitable environment for plant pathogens.

Small farmer activities are closely tied to the cultural pattern of the people. Religious or semi-religious beliefs may determine planting and harvest times which often coincide with periods of peak pest attack. Taboos, magical beliefs or entire philosophies of life may prohibit action to remedy situations. The role of women may be strictly limited. If crop losses spare a bare minimum of food for survival there is little incentive for crop protection in those areas where the small farmer is left to his own resources and is without communication with those who could offer encouragement, guidance and assistance.

However, the small farmer is becoming increasingly exposed to new risks which may lead to change in attitudes. Paradoxically, as the agriculture of developing countries is intensified and modernized with expanded monoculture, larger use of fertilizers, multiple cropping, irrigation and higher crop densities, the potential of

increased losses from pests is also intensified. The small farmer must be involved in agricultural development as traditional methods of culture may not be able to cope with new populations of pests that assume increased importance as a result of ecological disturbance created by technology and against which the crops grown from local seed are no longer resistant.

III PROBLEMS OF PEST CONTROL FOR SMALL FARMERS

(a) Cash

Realization by the small farmer that pests can be 'managed' poses the problem of the means of payment for even the simplest innovations in technology and equipment. If his farm is located close to a government demonstration project, he will be familiar with crop yields that are enormous by his own standards. He will have heard of better seed with low germination loss, of chemicals applied as fertilizers and pesticides and of storage structures where uninfested harvests can be maintained with comparatively little loss. He may learn that cotton is a useful cash crop that would enable him to buy better seed, equipment and other supplies needed to produce more food. It is only in those countries where well planned and well managed rural development programmes and extension services are under way, that the small farmer will be able to combine his traditional skills with modern technology, and thus increase his income, whilst enjoying at the same time the benefits of finance, roads, transport, irrigation, education and training, all of which he presently lacks in most areas of developing countries.

(b) Endemic diseases of man and their effect on agricultural development and food production.

Endemic diseases, especially water and soil-associated parasitic diseases are widespread in developing countries. Malaria alone

affects almost two thirds of the world's population with 300 million cases and 3 million deaths per year. Schistosomiasis is prevalent in 71 countries with 200 million cases. Onchocerciasis, filariasis, trypanosomiasis, leishmaniasis, intestinal parasitic diseases and many others take their toll of human life and affect millions of people mainly in the rural areas, seriously interfering with agricultural development and food production, especially at the small farmer level.

Malnutrition is invariably associated with these diseases which are generally debilitating, producing chronic ailments and loss of vitality, often combined with anaemia and general weakness. In the rural areas, where these diseases are most prevalent and where health facilities and services are scanty and often inaccessible, seasons of high malaria incidence and transmission coincide with those of intense agricultural activity. Small farmers are hit and gravely disabled by the disease at a time when they need to be most active.

The impact of human endemic disease on the socioeconomic development of a community has yet to be correctly measured. Several estimates have been calculated by economists of losses due to individual diseases such as malaria and schistosomiasis or benefits derived from their control or eradication. These estimates are expressed in terms of dollars or in the extent of additional land made available for cultivation as a result of disease control, but they need to be considered with some caution if the impact of any particular disease is to be measured. It would be most unusual to find individuals in rural populations who do not suffer from a combination of at least three recognizable diseases in association with other conditions of ill-health. Thus production and protection of small farmer food crops is seen to be heavily dependent on human health. In developing countries where between 70 and 90 per cent of

the population are dependent on agriculture, the contribution of ill health to crop losses must be considerable and needs to be more accurately measured not only in terms of dollars and acreage gained by human disease control measures in large monoculture schemes but also in terms of the implications of improved health for small farmers. Apathy and lack of incentive towards improved food production could well be replaced by new attitudes as for example, a readiness to combine traditional practices with new techniques and to take an active part in integrated rural development programmes when these are initiated.

IV REVIEW OF CURRENT PROGRAMMES IN THE NATIONAL REGIONAL AND INTERNATIONAL FIELDS

(a) Background

The World Food Conference at its meeting in Rome in November 1974 called for increased food production in the developing countries which are heavily dependent on agriculture and whose economic prospects could be changed appreciably by more attention to development of their rural economies. Many of the poorer countries are also the developing world's major food importers. India, Bangladesh, Sri Lanka and the Sub-Saharan African countries are among the poorest countries which suffer most in periods of global food shortages and high food prices. The failure of the growth in food production (due largely to crop pests) to keep pace with the growth of population in developing countries as a whole, with the most serious short-falls occurring in South Asia and Africa, justifies retention of this problem in the forefront of priorities facing the international community. A more fundamental attack on the structural problems of rural and agricultural development remains urgent.

The need for a major increase of investment in agriculture to step up food production in the poorest developing countries is widely accepted. This is essential if they are to deal effectively with their basic development problems and avoid impossibly high requirements for food grain imports in the future. Economic assistance for agriculture and rural programmes must however, be in accordance with the priorities and requests of the developing countries where these are based on surveys made by their own national institutes. An important feature of the International Fund for Agricultural Development proposed by the World Food Conference will be the participation of developing countries in its policy direction and management.

A multiplicity of donors and agencies is involved in the struggle to maintain adequate food supplies in developing countries. In the past, a large proportion of traditional donors' assistance to the agricultural sector was geared to the development of tropical crops for export (in particular tea, cocoa, coffee, oil seeds, etc.) and only occasionally to food crops for the benefit of the local population. In the last few years, however, this trend has to some extent been reversed. Most of the donor countries and agencies now recognise the necessity of giving priority to the development of agricultural production in the developing countries and of stepping up their assistance in this sector to remedy the shortage of food. The small farmer must be a key figure in these schemes which in turn must give high priority to crop protection.

A rise in production implies in some cases an increase in the cultural area which would be possible nearly everywhere except in South-East Asia. However, to expose a larger growing area to uncontrolled pests would in the long run be comparatively less productive than the control of pests in existing small farmer cultivated areas. An

improvement in yields and/or cropping intensity will involve the development of new, stronger varieties, better adapted to climatic conditions and resistant to pests, proper use of fertilisers and pesticides, the development of training, credit and marketing facilities, and the extension of irrigation networks to small farmers; (the lack of irrigation being one of the chief bottlenecks hindering the spread of high-yield varieties of rice in Southern Asia). Now, in these respects, nearly everything remains to be done. Credit facilities have grown considerably but mainly for the benefit of the big land-owners, while the small farmers have only exceptionally been able to profit by them. Advisory services too often lack material resources, personnel, and appropriate extension methods and programmes. It has proved very difficult to integrate smallholders in the marketing system and secure remunerative prices for their produce. Furthermore, all these elements have too often been developed independently of each other, instead of forming parts of one whole. Lastly, the inadequate level of official investment in the agricultural sector, the fixing of prices at a level detrimental to the farmer, and the absence of effective land reform measures, have in different degrees checked the development of agricultural production.

(b) Development of Food Crops

The flow of aid has done much to expand wheat and rice-growing in the developing countries especially through the cultivation and propagation of high yield varieties, and the supply of seed, fertilizers, insecticides and other pesticides. On the other hand, it has done little for coarse grains (maize, sorghum, millet), starch roots (potatoes, cassava), or pulses (chick-peas, broad beans), although these products often represent the basic staple foods in developing countries, especially in semi arid zones. However, several countries and agencies are becoming aware of this deficiency and are taking steps to remedy it.

Past experience shows that the use of modern inputs (seed, fertilizers, pesticides, etc.) pays off quickly, as the tropical climate enables several crops of the high-yield varieties to be grown per year, and the small farmer's response to the new possibilities in a developing country seems to be just as positive as that of his counterpart in the developed countries once he has overcome his traditional suspicion of outside help and when motivation and incentive have been activated. However, such modern inputs can only produce the expected results if a number of conditions are fulfilled. In the case of high yield seeds, for example, these would be:

- (1) development of irrigation or appropriate moisture conservation procedures, as high-yield seeds need a minimum supply of water;
- (2) supply of seed and fertilizer in good time and in sufficient quantity, which implies the existence of suitable storage, transport, distribution, credit and marketing facilities
- (3) acquisition of the necessary know-how for the use of such sophisticated means of production, hence the importance of advisory and technical assistance services;
- (4) adaptation of new seeds to the type of soil and the vagaries of the climate, hence the need to develop applied research;
- (5) if necessary, prices for both inputs and crops to allow the farmer to cover his costs and make a profit. Some thought will also have to be given to creating markets for the sale of the produce.

Having regard to the many conditions to be fulfilled, the integrated development projects referred to above seem to provide the best framework for the provision of inputs. France and the United Kingdom provide small quantities of inputs, especially in the framework of integrated projects where these inputs represent only one element in the overall aid package. The United States has provided a large

proportion of its assistance in the form of means of production supplied under integrated agricultural sector loans. However, the bulk of US assistance in this sector has been given in the form of commodity loans. This is also true of Canadian and Japanese assistance. Norway, a minor donor, but a large-scale exporter of fertilizers, has granted part of its assistance to the agricultural sector in the form of fertilizer grants.

(c) Seeds

The provision of high-yield seeds raises some difficult problems the most important of which is the susceptibility of certain varieties to disease and insect pests. At the moment a large proportion of seeds are supplied by a few donor countries, mostly under project assistance. They are also supplied by international research institutes which helped to evolve high-yield varieties (such as the International Centre for the Improvement of Maize and Wheat in Mexico and the International Rice Research Institute in the Philippines). It should be possible to grow crops for seed-production in the developing countries themselves. Here, much remains to be done. Various initiatives have already been undertaken in Africa by research institutes of several donor countries, for example IRAT (Institut de recherches agronomiques et tropicales et de cultures vivrières - Institute of Agricultural, Tropical and Food Crop Research - in France). Some projects have already been launched with foreign assistance both at national level (e.g. the Uganda Seed Multiplication Scheme financed with United Kingdom assistance) and at regional level. As examples of the latter, a West African Rice Development Association (WARDA) was set up to provide germinating material and to test the new varieties in different areas; in the Middle East, under the Arid Lands Agricultural Development Programme (ALAD), seed is carefully selected to start nursery

seed plots, and young researchers are trained to follow the progress of each crop from sowing to harvest; they subsequently take home the seeds which they think most suitable for cultivation in their own country. Research is also conducted on the evolution of stronger varieties, better suited to the climate concerned and generally requiring less water and fertilizer.

(d) Cereals and pulses

These initiatives, which were originally confined to cereals such as rice, have increasingly been directed towards coarse grains (maize, barley, millet, sorghum) and to starchy roots and pulses. It should not be forgotten that improvement in food availabilities in some developing areas, especially in Africa, can only be achieved by increased production of these crops. Impetus has been given to their development by international research institutes set up specially for this purpose, such as the International Institute for Tropical Agriculture (in Nigeria), the International Centre for Tropical Agriculture (in Colombia), the International Potato Centre (in Peru) and the International Crops Research Institute for the Semi-Arid Tropics (in India) which is mainly responsible for a world research programme on sorghum-growing. The International Development Research Centre in Canada is also concentrating research on sorghum, millet, cassava, chick peas and broad beans, to list only a few, and is undertaking development projects for growing these various crops. A large proportion of the projects initiated by these institutes involves the training of young technicians who come from university research institutes, or from agricultural extension services in developing countries.

An International Board for Plant Genetic Resources, with headquarters in FAO, was created in 1974 to help in the creation of a network

of plant gene collections in order to conserve characteristics which would be of value in breeding plants with higher yields, better food values and greater resistance to pests and diseases.

As production technology improves subsistence farmers will, hopefully, find themselves with quantities of grain surplus to their needs. Therefore the problems of storage, distribution and utilisation will multiply. A scientific consortium known as the Group for Assistance on Storage of Grains in Africa (GASGA) has applied itself to these problems. The organisations that compose this group, IRAT; TPI; IITA and FAO have concentrated their efforts in the semi-arid tropics and have formulated project proposals to include research, training and demonstration.

(e) Pest Control

Much remains to be done in the matter of controlling crop pests. To understand fully the scourge represented by an invasion of locusts (for example) it should be remembered that a swarm can destroy up to 80,000 tons of plants in a single day - enough to feed half a million human beings in one year. Such rough calculations show how food supplies could be greatly increased if effective measures were taken to minimise the threat of locusts and other pests. A number of research institutions are already tackling these problems. For example, in the United Kingdom the Centre for Overseas Pest Research has set up four units specialising in the control of the principal types of pest among which: the Anti-Locust Research Centre, the Termite Research Unit and the Tropical Resticides Research Unit. In France, various institutes, concentrating on tropical research and grouped under GERDAT, pursue similar lines of research. Other countries also possess research units working on these problems. Assistance is granted to help spread the use of products developed by

the donor countries; it also supports the direct promotion of small local research centres in developing countries which are in close touch with the problems involved.

(f) Agricultural Equipment

Simple, well-adapted equipment needs to be evolved for use on a number of crops; several research institutes are currently looking into the possibilities: for example, a Research and Experimental Centre on Tropical Agricultural Machinery (CEEMAT) has been established in France. In the United Kingdom, the National Institute of Agricultural Engineering specialises in the conception and design of elementary agricultural machinery. The University of Wageningen in the Netherlands, in collaboration with FAO, is conducting research activities on the adaptation of agricultural tools to make them suitable for high-grade varieties of rice in India, Senegal and Nigeria. Japan contributes to the financing of agricultural technology and mechanisation centres (in particular in Malaysia and in Bangladesh). There are strong arguments, however, for improving existing types of equipment for different soils and climates and for less sophisticated equipment for small farmers. Certainly the problem of training users could be simplified.

(g) Development of Storage Facilities and Control of Stored Products Pests

Research is being carried out in a number of national and international institutes to determine the most effective way of combating each kind of pest (selective insecticides, irradiation, etc.), and of limiting the damage done by excessive mildew. In the United Kingdom, for example, a special centre (Tropical Stored Products Centre) was set up for this purpose, attached to the Tropical Products Institute.

At the international level, an Assistance Group on Storage in Africa (GASGA) has been set up with the assistance of France, the United Kingdom, the Canadian Research Centre for International Development, and the International Institute for Tropical Agriculture (IITA) in Nigeria. This group is studying, more specifically, present handling and storage systems for cereals in several English and French-speaking African countries. It also proposes to launch research and training programmes with a view to reducing losses.

Apart from research activities, assistance funds have furthered the growth of storage facilities in the developing countries. As an example, the CIDA (Canadian International Development Agency) has contributed to the construction of twelve silos in Algeria. This project, at a total cost of \$40 million, is the biggest of its type to be financed by a donor country. Smaller projects have been undertaken, especially by Canada in Senegal and Tanzania and by Sweden in India, Bangladesh and Tanzania. These are only a few examples but they show the directions in which assistance could usefully be extended.

(h) Main trends in research and training activities

The above statement of the position shows the importance attached by donor countries and agencies to research, with a view to increasing food production in the developing countries. With their help, international research institutes already mentioned here, specializing in the growing of certain crops or in the problems of cultivation in certain climatic regions, have been set up, most of them in developing countries. These institutes are concentrating on the chief bottlenecks and are stimulating research in the fields concerned, training research workers, evolving new means and methods of production, and testing the results on a large scale in one or more areas. The Institute receive support from the Consultative Group on International Agricultural

Research, which was established in 1971, under the co-sponsorship of the World Bank, FAO and the UNDP, to consider the financial and technical requirements for international and agricultural research and to organize the necessary financial support. The Consultative Group now has 29 members, including, in addition to the co-sponsors, governments, regional financial institutions and foundations. A small Technical Advisory Committee recommends programmes for acceptance and financing by the Group. Grants by the members of the Group amounted to \$33 million in 1974. This concentration of effort on well-defined subjects is a rather unique phenomenon in the history of development aid and represents an interesting attempt to make a "breakthrough" in a vital sector.

The donor countries and agencies have also done their best to bring the activities of their own research institutes more into line with the requirements of the developing countries in the food sector. New centres (e.g. the International Development Research Centre in Canada or special units in already established institutes) are focussing on the study of these problems. However, too large a proportion of the research work performed in the developed countries is concerned with cash crops for export rather than with food for domestic consumption.

Assistance has also done much to promote research in the developing countries themselves. Many regional or national institutes have been established in specialised fields (live-stock farming, fishing etc.) Much remains to be done, however, not only for the establishment of new institutes or the development of existing ones, but also for the promotion of more applied research work on a project basis especially on crop protection. It is also important to link the findings of research institutes and experimental laboratories more

closely with users' problems. The improvement of communication between researchers and users, scientists and farmers, represents one key problem which will have to be solved if food production as a whole is to be stepped up.

By comparison with the drive for innovation undertaken at the research level, assistance in the matter of training in food production techniques has remained traditional and limited. It is, of course, extremely difficult to decide what proportion of technical assistance is to be allotted to the food sector alone under technical assistance to an agriculture, but that proportion appears to be considerable. Account must be taken, in addition, of certain training activities in the spheres of health, education, transport, etc. within integrated projects.

V. TECHNOLOGY AND FARMING SYSTEMS

(a) Background

The race between food production and human population growth has resulted in a tremendous intensification of agriculture and the adoption of many practices which enhance the vulnerability of crops to pest attack. These modernised practices have often been introduced without proper attention to crop protection as a major component of agricultural development programmes. For example, heavy dependence on repeated applications of pesticides has resulted in resistance to pesticides among insects and other pests; emergence of secondary pests, resurgence of pest populations and environmental contamination.

(b) Integrated Control

Integrated pest management offers a solution to these difficult problems. Integrated control is defined as a pest management system that in the context of the associated environment and the population dynamics of the pest species, utilizes all suitable techniques and methods in as compatible a manner as possible and maintains the pest populations at levels below those causing economic injury. These techniques and methods are mainly concerned with cultural, biological and chemical control.

Integrated pest control cannot become generally applicable to small scale farming until considerably more research has been carried out in the disciplines most relevant to crop production such as entomology, plant pathology, weed science, nematology and plant breeding and until well-trained extension workers are available to give guidance at the small farmer level.

Meanwhile, a great deal more knowledge of small farmer traditional methods of culture and pest control must be gained through research.

(c) Research review

The need to continue agricultural research urgently is beyond any doubt. Current low levels of protein and calorie intake could be much improved by even better cereal varieties than exist now including those which are of great importance to the drier areas of the tropics, such as sorghum and millet. The World Food Conference has identified several subject gaps which will need to be filled. These include research on food legumes especially for the semi-arid regions. Crop protection must have high priority in this research.

Such a programme would require substantial financial and technical resources. Not only will the international research centres require strengthening, but also the national centres will need to be improved. National agricultural research in many developing countries is characterised by its dispersion among numerous ill-coordinated institutions, often understaffed and inadequately financed. The link with farmers and their problems is generally weak. Research programmes tend to focus on individual crops, and to neglect the farming system and the integration of improvements within that system. This neglect is of special importance in the case of poor farmers: an integrated approach to on-farm technological improvements, risk-reducing innovations, and small farm equipment has been lacking so far with respect to subsistence agriculture. The result has been that small farmer pest control has been largely overlooked.

Much research to date has been oriented toward monocropping and large farms, with the feeling that the methods so developed would trickle down to small farmers through demonstration effects and extension programmes. This approach has not worked well and frequently efforts and results of research are ineffectual in providing the means for an adequate living for large numbers of small farmers.

Research programmes that need support are those on farming systems, oriented to producing results which will be applicable to the small farmer. These efforts try to gain some insight into how the farmer feels and thinks about his production activities, why he hesitates to try new or different practices and whether, in fact, the new recommendations are worth his while, or risk, given all the other constraints under which he must work.

This approach is important in that small farmers in developing countries live and function in a world with many more limitations than that of the scientists who develop new technologies. The small tropical farmer's evaluation of risks and potential benefits from a new technology, such as a new plant variety or cropping system, may well differ from that of persons making the recommendations.

His concern and production behaviour are likely to be more strongly influenced by risk aversion and survival needs than by profit maximization. This does not mean that he does not wish to improve his lot in life but it does suggest that he has a different perspective on what is possible for him. Very few people understand the constraints he faces in his production activities nor do they recognize the ingenuity he often brings to bear in solving the problems facing him.

There is therefore a need for researchers and others who would improve small farmer production conditions, to consider and come to grips with the intricacies of existing production systems before trying

to change them. Specialized mono-culture farming systems oriented completely to market production often turn out to be too big a step all at once for small farmers. The complex network of supporting services and wide market connections necessary for this kind of production system are usually very poorly developed. Evidence from various quarters suggests that there is ample room for improvement in traditional inter-cropping systems which farmers are already using and that in many tropical areas they may be well superior to mono-cropping systems in terms of both economic return and volume of production.

There would appear to be a case for introducing recommendations of new technology in a step fashion rather than as a complete package. Such an approach may imply starting with changes which involve the least risk and effort on the part of the farmer and adapting technological recommendations to farmers' capabilities.

Researchers can learn much from the International Rice Research Institutes multiple cropping Programme in South and Southeast Asia where more than 80 per cent of the farms in the region are under three hectares in size and mostly engaged in rice production.

Studies have shown that ⁱⁿ Southeast Asia, traditional intensive cropping systems are based on a very efficient utilization of farm resources and that many of these systems can be adapted to respond to high levels of modern inputs. Farmers in this region have already developed cropping systems adapted to their physical, economic and social environment. An understanding of these currently used cropping systems will assist the multiple cropping programme to learn from the farmers what they have learned through trial and error over hundreds of years.

Research will include the gathering of information on cropping practices such as weed control and tillage and will probably show that

many of the traditional mixed cropping patterns have a high level of built-in stability toward insect populations. Plan⁺insect interactions must be understood as cropping patterns are intensified. Unwise or random use of insecticides can completely negate many of the existing pest control mechanisms.

Research oriented to small farmers must take into account the background of technical personnel of the countries concerned. Most technical personnel have been trained in a manner similar to that given in developed countries. Only a few have had the influence of training related to small farm problems. The idea of carrying out research trials on small farmer's fields and incorporating the farmer himself into the process is a particularly new one.

VI RESEARCH NEEDS IN SMALL-FARMER FOOD CROPS

(a) Basic research

Most basic research cannot yet be undertaken successfully in the developing countries. The absence of strong institutional infrastructures, the shortage of experienced research workers, the urgency for finding solutions to immediate local problems and the need to allocate scarce national talent to these problems are but a few of the difficulties to be overcome. Moreover, the high cost of funding basic research prohibits the embarking on a large number of these studies in institutions not yet equipped with the type of equipment and personnel already established in developed countries.

(b) Applied Research

As a whole, Asia and Latin America seem reasonably well endowed with trained scientific talent but in the vast areas of these countries, scientific personnel are best engaged in applied research. A good example of this is the research work carried out to date on weeds. Little effort has been made to improve, through breeding, the ability of crop plants to compete with weeds. This may be due to the reliance

on herbicides but also to the fact that plant breeders have not had suitable selection criteria with which to evaluate their plant progeny. In general, cultivars have been selected in weed-free nurseries and without specific regard to their ability to compete with weeds in natural situations.

In Africa there is a great shortage of trained scientists and basic research should not be considered outside the international research institutions already established in that continent. However a great deal of applied research can be done at the local level. Much of this often unsophisticated research can prove of inestimable value in pinpointing problems calling for more basic research.

Experience has shown that the best distribution of research effort is for the scientists of the developing world to devote themselves to the applied problems which have a specific relation to their own rural communities and for the scientists of the more developed world to support them in the solution of the interrelated yet more basic and fundamental research problems.

Under the headings that follow, research needs are presented that call both for basic and applied research. No time factor can be given for most basic research studies as these are a continuing process yielding information that can serve as inputs into applied research activities.

1. Cultural control practices

Identification of cultural practices relating to the three main food groups; cereals, pulses and rootcrops, with fruit and vegetables as an important fourth group. Studies to include:

(a) Field sanitation (destruction of crop residues), crop-free periods, crop rotation, tillage, trap crops. Times of planting, weeding, harvesting.

It is important that an analysis be made of current knowledge on the impact of these and other cultural practices on the development of major pest species attacking small farmer food crops. Which practices contribute to or intensify attack by pests? Which practices have a potential value in reducing losses due to pests? How can the best existing cultural control practices be modified, improved and demonstrated within the social and traditional environment?

(b) Population dynamics of the major pest species. These have not been completely investigated, particularly with regard to the conditions under which the crops are grown. Closing the gaps in our knowledge will be part of the research efforts needed in the general area of cultural control and pursued by an interdisciplinary team of workers.

2. Biological control

(a) Natural enemies of pests

In small farmer food crops not exposed to repeated heavy applications of synthetic organic pesticides, indigenous natural enemies play an important role in the maintenance of potentially destructive species at levels that allow the farmer to harvest a crop adequate to the simple needs of his family, in the absence of natural disasters such as drought.

Accelerated research is needed to identify indigenous parasites, predators and pathogens of pests to fully realize their potential as biological control agents for possible use in other areas and export to other countries, through studies on propagation and colonization. The biological control approach must be expanded to include research on pests others than insects and weeds. For example, nematodes and plant pathogens may have potential as both control agents and controllable pests.

(b) Maintenance of natural enemies

Research leading to methods for the preservation and augmentation of naturally occurring biological control agents.

(c) Safe use of pathogens

There is a need for expanded research on the safe use of pathogens (microbial control) which have at times been used effectively in pest control programmes because they are host-specific and often highly virulent but whose potential hazards to mammals and other organisms have not been fully investigated.

3. Breeding for Pest Resistance (Host Plant Resistance)

When it can be developed, no other single method of pest control is more ecologically sound, so inexpensive, so easy to use and less hazardous than host plant resistance. Pest resistant or tolerant varieties of plants are especially valuable for the subsistence farmer in developing countries as they require less financial inputs for pest control than conventional methods.

(a) Resistance against weeds

Although research has accelerated in recent years, support for breeding programmes is still far from adequate. For example, only a few attempts have been made to improve, through breeding, the ability of crop plants to compete with weeds; yet there is sufficient evidence to suggest that this would be a profitable field of research.

(b) Resistance against insects and pathogens

Despite the existing use of resistance as a major element in the control of certain pest insects, nematodes and plant pathogens, there is need for greatly expanded research that will enable host plant resistance to take a prominent place in integrated control programmes, in combination with other pest control tactics.

(c) Mechanism of host-plant resistance

Research is needed to define the scope and potential of horizontal resistance in comparison with that of vertical resistance. In the

former, the characters constituting resistance to pests are inherited in a highly complex manner which confers genetic diversity and thus greater stability in resistance than is the case in the simple inheritance of vertical resistance. Because of the highly complex genetics of horizontal resistance huge populations are necessary for progress in research and thus realistic breeding programmes must be long-term. Moreover, there is no certainty that horizontal resistance is permanent. Vertical resistance has proved successful for many decades against many pests viruses, soil-borne fungi and bacteria. Research on this type of resistance against insects should continue and be expanded.

Side by side with the development of high-yielding varieties, especially in wheat and rice, research has aimed at multiple pest resistance in these crops but it is essential to maintain and expand these efforts, not only with these crops but also with others.

Although high-yielding resistant varieties offer greatly increased food production in developing countries, traditional agriculture is in danger of increases in potential pest problems arising from the needs of the new varieties, such as changed tillage and irrigation practices.

Research is therefore necessary to work out how breeding of plants for pest resistance should be conducted, with a view to incorporating such varieties in sound integrated pest control systems.

This type of research demands a multidisciplinary approach. All too often a successful programme to produce resistance to one pest results in increased susceptibility to another. Entomologists, plant pathologists, nematologists and weed scientists must work as a team with breeders, agronomists, plant physiologists, soil scientists and other disciplines.

It is vital for a large part of the research on high-yield pest resistant crops to take place under the conditions where the local

pests and diseases are naturally present.

By ignoring or discarding the selective pressures of the pests, there is a risk of the emergence of high-yielding varieties that perform well under the care and protection afforded on the research station but fail when exposed in less protected conditions.

4. Chemical control

Food crop protection will best be achieved through an integrated control programme in which chemical pesticides, appropriately applied, will be one of the control measures.

Pending the results of research, there are no currently available alternatives to pesticides for many of the world's most destructive pests. The major disadvantages involved in the use of pesticides are their direct and indirect adverse effect on non-target organisms and their tendency to rapidly select populations that are resistant to them. There is thus an urgent need for expanded research that will lead to better use of these compounds. The main objectives of research should be:

(a) The improved use of presently available pesticides to reduce or eliminate their inherent hazards

It is appreciated that broad spectrum pesticides permit control of several pest species with a single application and that they are more economical in use as well as being cheaper to produce than narrowly specific insecticides affecting only a single insect family. However research is needed to indicate how the broad spectrum pesticides can be used in ways that enhance their ecological selectivity and thus make them environmentally more acceptable as well as more economical. Research is needed in

(b) Timing of Applications

Proper attention to timing of applications can ensure effective control of pest species with minimum amounts of pesticides and the

least possible adverse effects on natural enemy populations. More research is needed to develop techniques for accurately forecasting the development of potentially damaging pest populations. (There is a need for greatly expanded work on pheromones for this purpose).

Proper timing of insecticide applications can greatly reduce the number of insecticide applications required, at the same time permitting naturally occurring biological control and reducing hazards to the environment generally.

(c) Placement of Pesticides - Application Equipment

A greatly expanded research effort should be undertaken to develop methods of more precisely placing pesticides on their target, so that blanket treatment becomes unnecessary. Seed dressings are an example of selective treatment.

Research is needed that will enable only certain portions of a plant to be treated as for example the heads of sorghum where the pest attack is concentrated.

(d) Pesticide formulation

There is scope for expanded research in this field. It is well known that the manner in which a pesticide is formulated can have a pronounced influence on its effectiveness. For the small farmer simplicity and convenience of application are key factors, provided that such formulations also present reduced toxicity to non-target organisms whilst remaining sufficiently persistent to cope with the target pest.

(e) The Development of Pesticides not having the disadvantages of the conventional compounds

New types of pesticides include microbial pathogens, hormones, pheromones, hormone-mimicking compounds and chemosterilants for use

in integrated control programmes. Industry can play an important role in the development of these new pesticides which call for intensified research.

(f) The Development of Selective Pesticides

Narrowly specific insecticides affecting only a single insect family are not generally available although it is believed that Industry has carried out research in this field. For various reasons, little effort seems to have been devoted towards the development of these specific insecticides.

Testing of the selectivity of pesticides should be carried out to allow the combined use of pesticides and beneficial arthropods when needed.

5. Crop loss appraisal

(a) Collection of data A - Pre-harvest

Reliable information of crop losses due to insects, diseases, nematodes, weeds and other pests establishes the yield increases obtainable when these organisms are controlled. The value of such data is of fundamental importance to the regulatory agencies of national governments, to administrators of research and operative programmes in plant protection, to the pesticide industry, to international assistance agencies and last but not least, to the farmer in the fields.

(b) Pest/loss relationships

Very little is known of the quantitative pest/loss relationships resulting at different levels of pest densities and at different stages of crop development. It has been found in many cases that most of the damage occurs very early in the life of the crop plant and much prior to the normal period of hand weeding as commonly practised.

It has also been found that certain insects and diseases causing major damage at certain stages of crop development do not cause very great yield reductions as normally assumed because of the recovery capacity of the crop.

There is therefore great need for research to develop satisfactory methods of measuring pest losses on crops of major importance in order to effectively guide protective actions. The lack of reliable crop loss information has also affected past decisions on the selection of research priority areas.

Research must also identify the factors which can upset assessments e.g. economic, climate, unexpected pests resistance to pesticides, etc.

B - Post-harvest

(a) Collection of data

Classical basic data is required on losses in stored products. Although it is recognized that a significant reduction in post-harvest losses would have a powerful impact on world food supplies, there are few reliable estimates of losses resulting from the various causative factors. For cereals an annual storage loss of 100 million tons is accepted as realistic, the heaviest losses occurring at the small farmer level in tropical countries.

However, research is urgently needed to measure the extent of losses due to specific pests which must be identified within the three main pest groups; insects, rodents and fungi.

Research is also needed to measure the importance of pre-storage factors in determining the susceptibility of a crop to pest infestation during storage. This will be to a large degree influenced by the amount of pre-harvest infestation and the extent of damage caused by harvesting and threshing methods, by the efficiency of drying, both in

terms of adequate reduction in moisture content and damage caused by the drying process.

The basic characteristics of the grains themselves should be the subject of research with a view to develop, through breeding, seed varieties resistant to attack by stored products insect pests.

(b) Storage structures

Traditional small farmer storage structures are generally unable to prevent entry and damage by pests. There have been considerable improvements to the traditional storage methods, developed by a number of institutes and agencies. These need to be assessed according to their ability to best meet the requirements, (technical, climatic and socioeconomic) of a given area, region or country.

A serious constraint to the introduction of simple low cost storage techniques is the distribution and availability of materials, for example, suitably packaged insecticide dusts. Safe insecticides in small packs appropriate for stored grain in farmers granaries are rarely available in developing countries. Industry could well apply its research capacity to this problem as it could also to the development of a simple in-bag fumigant.

With regard to the heavy losses caused by rodents, research is needed to provide techniques for exclusion of the animals from store. Techniques developed through long experience need to be modified to be made applicable to varying situations.

6. Transfer of technology

(a) Role of small farmer in national development programmes.

Perhaps the most important research need is in the field of communication between man and man. In the context of this report, the urgent need is to find ways of extending existing knowledge in pre and post-harvest protection of crops, particularly cereals, pulses and root crops, down to the small farmer.

First priority is to identify the role of the small farmer in government agricultural planning. To what extent are agricultural policies dominated by monocultures and other well-organized farming systems? What are the lines of communication, if any, between the small acreage or subsistence farmer and the sources of help and guidance? Investigations are needed to indicate examples of countries where small farmers receive cash, equipment and supplies and above all, guidance at the local level. There is a need to know government priorities in marketing and storage facilities and hence official interest in communication with the small farmer.

} *assumed small*

Successful integrated rural development schemes need to be identified and analysed for use as models for other areas or countries.

Transfer of knowledge to the small farmer implies the existence of an agricultural extension service. Generally, in the developing countries, such services, if they exist, lack sufficiently well-trained manpower to overcome prejudice against 'the man from the ministry' and officialdom in general but if hunger is to be lessened or the quality of life improved for the large number of people in developing countries, it is on the family farm that change must be effected.

It should be realized that even a relatively minor increase in production on the farm itself can be the difference between hunger and satisfaction, or between debts and cash, when dealing with farmers at or near the subsistence level.

(b) Training programmes

Consequently the goal of training programmes should be to bring about positive changes at the grassroots level and the philosophic

basis for evaluation is whether farmers and their families in the areas affected are enjoying a higher standard of living than they did before.

A second major principle arises from recognition of the fact that training programmes for small farmers, even very short and wide-spread programmes, cannot affect an appreciable number of farmers in any given setting.

Programmes should therefore concentrate on training the agricultural extension agents, or officers, or the intermediate personnel (as they are variously called) who can be in touch with large numbers of farmers. The need for and effectiveness of such personnel has been well documented elsewhere. Their work should be based on two main groups of principles; principles of change and principles of training to create change. In assessing the value of training programmes the following principles could serve as useful criteria for this important aspect of research.

(c) Principles of Change

Change must be simple, feasible, inexpensive, and of direct benefit to the local farmer.

The changes which farmers are expected to undertake must not cut into their meagre resources; must not require knowledge or technology beyond their grasp and must show measurable results within a comparatively short time. Most farmers who are the targets of the proposed changes simply do not have the financial resources to buy supplies, equipment, or power, even if the eventual payoff will be many times the initial investment. Similarly, there is little value in proposing changes which are beyond the farmer's grasp, if this means keeping written records, or reading the instructions on a bag of seed, if the farmer is illiterate.

Changes should be geared to the situation in which they are to take place.

There are, for example, places where transition from human labour to machinery is indicated, and sufficient resources can be acquired - perhaps from outside - to make such a change feasible. There are other situations, however, where regardless of availability of resources, a shift from human labour to farm animals - oxen, for example, - is indicated for a number of reasons tied up with tradition, mechanical ability, readiness to change, etc. In still other situations only a modest increase in the efficiency of the farmer (sowing maize) in rows rather than broadcast for example - is achievable. In every case, what is achievable and desirable must be judged in light of the local situation. Making such judgements brings into play a third principle:

Local sources of information, resources, and innovation should be used as much as possible.

The local farmer may be aware of a particular problem, or want to make a certain change: and he may even assume, or be vaguely aware, that someone, somewhere, has faced a similar problem and overcome it, or made the same sort of change; yet he himself does not know where to turn for the relevant information. At the same time a nearby experimental station, agricultural school, government department, or even a neighbouring farmer has the necessary information or experience. Hence, it is a principle to assume that there is local knowledge available, and that the task of the worker is to locate it and disseminate it among the farmers. In short, the extension worker is not assumed to know everything, nor is he expected to devise solutions. Rather, he should be the liaison person between sources and users of information and experience. This is not merely

a tactical or time-saving move - it is predicted on the assumption that there should be constant communication between the local source of know-how and the farmer who must apply it, and that the research station or government department needs to know what the problems and situations are for which the farmer needs help.

Changes to be sought must be consonant with the experiences, traditions, and culture of the people concerned.

The literature of community development and extension work is replete with horror stories of workers who were ignorant of - or, ignored - the cultural patterns of the people among whom they worked, or who tried to foist onto others their own sets of values and prejudices.

For these reasons it is sometimes felt desirable to train local people as extension workers, but this is not always feasible, nor does it mean that the worker will stay in his home region forever. Therefore, the fifth principle is:

Use successful local farmers or innovators as examples and demonstrators for others.

The use of a local progressive or successful farmer has obvious advantages. It is easy to believe him or to identify with him because he is a living, locally-known person whose success is obviously not dependent upon different soil, climate, or social conditions. He rarely tries to convince others to do as he has done - on the contrary, he may be proud of being the most successful example - and therefore he creates no suspicion that he has an ulterior motive, or is trying to put something over on the local farmers. This contrasts with the feeling which may exist concerning official institutions.

Change should be attempted throughout a village, region, area, or country, rather than among isolated individuals.

Despite the avowed aim of the Department to affect the income of individual farmers, some of the changes sought require joint or cooperative activity on the part of several or many people. For example, the acquisition of needed equipment and supplies may not be possible on an individual basis. Equally important, the infrastructure which is needed to effect or support changes can rarely be provided for isolated farms or even groups of farms. Roads to market, inexpensive road transport, warehousing and packing facilities, all demand usage by relatively large aggregates to be feasible. Consequently, the more widespread the new situation, the more probable is its continuation. In order to achieve this goal, however, another principle must be considered:

Support must be created for the proposed changes among all the people and agencies affected.

Change must be looked at from an ecological point of view, since ? each change demands and creates others. Thus, spreading the results of training within an area or a region will require agreement among individual farmers, farm organizations, community agencies, neighbourhood groups, and even members of the farmer's family. The cooperation sought may range from mere consent not to actively oppose the proposals, to publicity, financial support, and active involvement. Changes may require involvement of religious leaders, political figures, educators, social workers, and many others. It is in this context that it has been pointed out that one of the factors which makes expansion in agricultural production notoriously difficult is the fact that not only economic, but social and institutional changes are usually required.

(d) Principles of training to create change

In addition to the ultimate goals of extension work - the changes which it is hoped will take place in the life of the farmers - there are also principles which guide the training of agricultural extension workers, and these are discussed below:

The quality of extension staff may well be a more important constraint on the diffusion of innovations than the farmers themselves. It is the extension agent who provides the link between existing local knowledge and the needy farmer. It is his job to uncover the knowledge of innovation which will be helpful to the farmer, to bring it to the latter's attention, to convince him that it is in his own self-interest to try it, to encourage and support him as he does so, to enlist - or help the farmer enlist - the additional help needed to produce maximum results from the change, to interpret reasons for failure, and to encourage further attempts if necessary. It is on the preparation of such people that training courses should concentrate.

In such training it is not the goal of the course to add greatly to the substantive knowledge of the trainee, who always comes with a certain amount - and sometimes a great deal - of knowledge and experience, but rather to multiply that knowledge and experience by teaching him to examine it, test and refine it and learn how best to pass it on to others.

To a much greater degree than substantive knowledge, therefore, the courses should place their emphasis on methodology and technique. Increasingly, courses must include pedagogic principles and methods of changing attitudes and behaviours, rather than factual knowledge. Although a certain amount of time will still be devoted to agricultural methods and changes, there should also be much emphasis on communication processes, teaching methods, and psychology.

Part of the move away from substantive knowledge arises from the desire to help trainees become questioning, exploring, creative people. There is only a certain amount of applicable knowledge and methods which can be extrapolated into future situations and unknown settings. The goal then becomes to stimulate the trainee to discover and invent new methods of performing routine or traditional tasks. The advantage of a four-pronged planting instrument over a simple pointed stick might be easily grasped, once seen, but the effectiveness of six, eight, or twelve-pointed instruments are left for the trainee to test. Differently shaped ploughs, different kinds of knives for chopping weeds, and variations in other hand tools can be experimented with, thereby encouraging the search for innovations.

Trainees should be taught not to replicate problem-solving efforts when the information is available for local sources. Learning to unearth needed facts and models is an important goal in training.

Experience indicates that teaching how to plan can be the most important aspect of the training course. This is taught both as a didactic exercise, to give the students an opportunity at the end of the course to apply what they have learned; as a guide to their own efforts and as something for the trainees to pass on to farmers.

In the final analysis, changes in the attitudes of extension workers are instrumental. It is the change in farmers' attitudes and activities which are important, and these may be most difficult to change. Living very precarious economic lives, most farmers lean toward conservatism: as bad as the situation might be, they have survived so far. Recognizing that a positive change might result in better conditions, they also realize that their margin for error is very thin, and a change which backfires, or has negative results, can bring real misery to themselves and their families. Again, the

attitude of farmers toward cooperation may be one of deep distrust, and unwillingness to put oneself even partially in the hands of others. There are also situations where the basic necessity is to break through apathy, or to change a deep belief that nothing can change. All of these attitudinal changes on the part of farmers require that the extension workers be honest, realistic, and nevertheless optimistic. They need both expertise and enthusiasm, and instilling these is seen as an important part of a training course.

It should be the goal of Foreign Aid to work itself out of a job - to create situations where training courses by outside experts are no longer necessary. This involves preparing people to mount and conduct training courses for extension workers in their own areas, so that the recipient country can continue the work with its own resources.

With the above review of the problems and principles involved in transfer of knowledge, the logical direction for research in this area is to identify situations in different countries where most of the problems described are being dealt with satisfactorily and to analyze situations where problems have proved difficult to solve. Experience gained in both types of situation can then be applied elsewhere in the same or in different countries as the underlying principles are the same.

Both in successful areas and in areas where small farmers have been left largely to their own devices and meagre resources there is urgent need for research on improved methods for reducing illiteracy, especially in women.

International Women's Year (1975) powerfully highlighted the potential role for women in rural areas in developing countries. Crop production and protection in general and nutrition, in particular, were priority subjects at conferences, after illiteracy and health.

Now that developing countries are alerted to the much greater contribution that women can make towards rural development, the prospects for carrying out further research leading to increased food crop production within the prevailing social and traditional environment are considerably improved.

Understanding and support for the proposed changes must be sought throughout the hierarchy and structure of the relevant organization.

Very few long-range, large-scale, or sustained changes can be achieved solely by the local farmers or the agricultural extension agent, without the understanding, support, cooperation, and help of superordinate individuals and agencies. How many well-planned and executed programmes have come to nought because somewhere up the organization someone did not understand, or did not approve or, or did not realize the importance of the programme? How much enthusiasm at the grass-roots level has been dissipated by a raised eyebrow at the official level! Nor is this simply a matter of needing tacit approval. Most agricultural changes, as noted above, require changes in buying, selling, budgeting, transport, etc. which entail full understanding and cooperation at the highest level.

Finally, there is the principle that the course must be suited to the needs it is expected to serve.

There is no point in discussing new hybrid seeds with farmers whose problem is lack of an adequate irrigation system. Consequently, the goals of training courses require careful investigation into the real needs and possibilities of the situation they are expected to change.

7. Health and the environment

(a) Prevention and control of endemic diseases

The small farmer can do little to control vectors of human endemic diseases which may seriously affect food crop production. He cannot afford mosquito nets to ward off malaria and he is equally

helpless against the other major endemic diseases of developing countries such as schistosomiasis and onchocerciasis.

The World Health Organization's intensive campaign against six major tropical diseases is thus seen to be timely. Research on the vectors and parasites and on treatment of the diseases is a built-in feature of the campaign.

It is obvious that the control and prevention of these diseases should form an integrated part of any plan for socioeconomic development but a primary requirement is further research at small farmer level, on the effect of endemic diseases of man on agricultural development and food production. Such studies are necessary to illustrate to governments the full impact of these diseases on crop production and are made more urgent in areas where development projects for agricultural extension or water resources are planned as such projects are especially vulnerable to malaria and the other parasitic diseases.

Many parasitic diseases can be prevented in development projects or their adverse effects reduced if the problems they will create are recognized and assessed in advance. Unfortunately only in recent years have the implications of agricultural and water resources development projects been given attention and hence many such schemes already completed are now facing severe health problems.

Studies in advance of these projects which may involve large numbers of small farmers would enable decisions to be made on choice of appropriate sites for human development and would include screening of new settlers, medical treatment and protection of the local population. These actions would go far in prevention or reduction of many parasitic diseases. Similarly, changes in the design and construction of planned irrigation schemes would result in unfavourable conditions for high vector densities. Such innovations, based

on research, would be possible at little or no extra costs at the time of project initiation but might require considerable expense and effort if done later.

All national development programmes should be interdisciplinary at the planning stage involving, in addition to agriculturalists and economists, ecologists and medical, engineering, educational and other specialists in the numerous aspects of the programmes that have a bearing on human health.

(b) Environmental Protection

Although small farmers in developing countries have for economic and other reasons, not been widespread users of pesticides, the plans of these countries for agricultural development will call for the greater use of chemical pesticides at all levels of farming.

Even in integrated control programmes where pesticides are used in the most effective way by proper application methods, there is an ever present danger of some degree of environmental contamination.

The concern of the environmental protection agencies such as UNEP and UNESCO (Ecological Sciences Division) and other agencies, is based on the serious contamination of the environment that has occurred in the past and on the threat for the future, resulting from the use of pesticides. Properly used in an integrated control programme, they can play an important role in controlling whole complexes of major agricultural pests. The major disadvantages associated with the use of pesticides are their adverse effects on non-target organisms and the development of pest populations resistant to them. The development of resistance has frequently led to heavy applications of more toxic materials, with consequent greater contamination of the environment. The development of small farmer food crops will call for further research on the measurement of contamination and its prevention.

(c) Hazards for small farmers in the storage and application of pesticides

but much higher rate

The hazards for small farmers in the storage and application of pesticides are similar to those facing all users of these compounds. The only distinction to be made in the case of small farmers is the difficulty of control at a very large number of storage and application points.

The two routes of exposure principally involved are ingestion and percutaneous absorption. Of these, the latter is the more important in the causation of cases of overt poisoning and occurs during the mixing and application of pesticides. The main factors determining the degree of hazard are:

- (a) the toxicity of the chemical in the formulation used;
- (b) the toxicity of the chemical vehicle used;
- (c) the integrity of the application equipment;
- (d) the technique of mixing and application;
- (e) the frequency of application; and
- (f) the availability and use of any protective equipment and clothing required.

high rate of exposure with any manual system of application

Of these factors, only (a) and (b) are amenable to control by regulation through registration of pesticides and limitation in use of toxic compounds to specially trained persons. The control of the remaining factors depends almost completely on education of the individual farmer and the difficulty of carrying this out is evident. Labelling of pesticides in the local language is important but its usefulness is in direct relation to the literacy of the society, which is frequently low in rural areas. It is not just a matter of being able to read, but also of being able to understand instructions which may be quite clear to those with a modicum of scientific background but completely obscure to anyone brought up in the empirical and traditional practices of small rural cultivation.

The means of communication with farmers, including the use of mass media, require considerable attention on both the research and practical levels. Allied to this is a closer definition of the type of protection required with specific pesticides. A series of field surveys will be necessary to arrive at this definition and WHO is actively stimulating this simple field research.

Exposure through ingestion, while less common, is an important route of poisoning as cases frequently occur in outbreaks involving a number of cases over a relatively short period of time. These are usually due either to the massive contamination of a staple foodstuff such as flour or sugar by a pesticide during transportation or storage, or to consumption of treated seed. The latter is more likely to occur in communities where other food sources are scarce. Both these hazards are amenable to regulation, backed up by education.

Although it is easy for national authorities to make regulations, it is not so easy for these to be enforced in rural areas. Therefore, as far as possible, the control should be applied at central points so that the farmer himself should not have to worry about regulation, the approach to him being only educational. Various systems of central control exist and governments should be assisted in examining these to see what points in them best suit their own administrative system. Scientific expertise is also needed at the control level in any system of pesticide registration and governments should be assisted in training their own staff for this purpose.

The points above concern the farmer himself. In rural areas, the whole family is often concerned in cultivation and children particularly are exposed to hazards from pesticides arising chiefly from carelessness or misuse of the compounds by the farmer. Hazardous practices include failure to store opened containers of concentrated pesticides in a safe manner, failure to dispose properly

of used containers, exposure of children to recently sprayed crops and foliage, the consumption by children or adults of recently sprayed produce, or even, on occasion the use of toxic pesticides as locally applied medicaments. The avoidance of these hazards depends on the same measures as outlined above, with particular emphasis on the nonavailability of the most toxic pesticides, except to those specially trained in their use, and on education.

The development of pesticides having very low mammalian toxicity is thus seen to be a priority research need. New pesticides that are developed should not affect non-target organisms.

Research on the biological control of pests and on host plant resistance breeding is again emphasized.

VII SUMMARY OF MAIN RESEARCH NEEDS IN SMALL FARMER FOOD CROPS

1. SOCIO-ECONOMICS

Improved methodology for measuring pre-harvest losses caused by pests in crops of major importance.

Investigations on quantitative pest/loss relationships at different levels of pest densities and at different stages of crop development.

Classical basic data on losses in stored products.

Measurement of the extent of losses due to specific pests in three main groups - insects, rodents, fungi.

Investigations on traditional social and cultural practices and beliefs as factors in low crop production and crop losses.

2. PROBLEMS OF PEST CONTROL FOR SMALL FARMERS

Studies on the role of the small farmer in agricultural development programmes in various developing countries.

The place of small farmer food crops in government priorities.

The extent to which needs for assistance in credits, equipment, seeds, fertilizers, pesticides and guidance are being met, in different countries.

The impact of human endemic disease on crop production and protection.
 Studies to measure the extent of crop losses due to major tropical diseases.

3. TECHNOLOGY AND FARMING SYSTEMS

Cultural control

Studies on traditional methods of crop production and pest control.

Cropping practices, weed control, tillage etc.

How to improve traditional inter-cropping systems. How to adapt these systems to respond to high levels of modern inputs.

Integrated pest management. Research on the scope for integrated control in small farmer food crops.

What are the restraints.

Adaptation of new seeds to the type of soil and vagaries of the climate.

Breeding drought-resistant plants.

Breeding new varieties of plants with higher yields, better food values and greater resistance to pests and diseases.

Breeding of crop plants to compete with weeds, through selection made in farmers' fields and not in weed free nurseries.

Accelerated research on multiple pest resistance.

Expanded studies on horizontal and vertical resistance.

Defining best situations for each of these modes of resistance

Plant/insect interactions. As cropping systems are intensified, there is an increased need for research in the disciplines most relevant to crop production, such as entomology, plant pathology, weed science and nematology.

Development of methods of early detection of new pest problems arising from changed tillage and irrigation practices etc. as technology advances in farmer's fields.

Biological control

Research on bionomics of pests.

Identification of indigenous natural enemies of pests - parasites, predators and pathogens - to fully realize their potential as biological control agents of insects, weeds and nematodes.

Accelerated studies on safe use of pathogens (microbial control)

Research on hormones as pest control agents to be intensified.

Chemical control

Review of agricultural pesticides in current use and the present status of insect susceptibility to insecticides.

The present status of insecticide resistance in pests of stored products.

Timing of applications of pesticides - develop techniques for accurately forecasting the development of potentially damaging pest populations. (There is a need for greatly expanded work on pheromones for this purpose).

Placement of pesticides - application equipment - development of methods for more precisely placing pesticides on their target so that blanket treatment becomes unnecessary.

The improved use of presently available pesticides to avert the rapid development of pest resistance.

The development of pesticides not having the disadvantages of the conventional compounds, to include research on hormones, pheromones hormone-mimicking compounds and chemosterilants.

The Development of selective pesticides narrowly specific against single insect families.

Agricultural equipment

Review of the work of research institutes on simple well-adapted equipment for use on a number of crops.

Continue research to improve existing types of equipment for different soils and climates.

Storage of small farmer food crops

Studies on the degree of pre-storage infestation in different countries.

Identification of all factors responsible for losses in storage - insects, fungi, inadequate protection against bad weather, rodents etc.

Determination of the most effective ways of combating each kind of pest (selective insecticides for example). Limiting the damage done by excessive mildew.

Storage structures

Review of the work done by various institutes to prevent access by pests and to improve ventilation. Methods for improving existing storage structures and techniques.

4. The Environment

Review the work of environmental protection agencies on hazards resulting from the use of pesticides and other chemicals. The dangers to non-target organisms. Preventive measures.

Research on knowledge of farming families of chemicals used in their fields and on attitudes to contamination of the environment and themselves.

5. Transfer of technology

Review of agricultural extension services in developing countries and their place in rural development schemes.

Collection of information on training programmes for farmers and training programmes for extension workers.

Identification of areas where extension services are successful.

What are the restraints to good results in other areas? Illiteracy?

The limited role of women in crop protection?

Develop methodology geared to local resources and traditions, for transfer of knowledge and technology to small farmers in different areas to effect changes in unproductive methods of crop production.

VIII SUGGESTED PROJECTS

(a) Basis for the projects

The report reviews the various aspects of pest control and indicates several lines of research necessary to close the still considerable gaps in our knowledge of the various factors responsible for crop losses and low food crop production generally. A most important research need is the transfer of existing knowledge down to the small farmer level.

Basic research on fundamental processes, such as the mechanisms of plant resistance to pests or drought can only be carried out in the developed countries or in the international research centres established in developing countries.

Applied research, directed to controlling pests in small farmer food crops in developing countries can only be completed meaningful when pursued on the land of these small farmers.

It is therefore proposed that the required research activities called for in this report be incorporated into a number of projects in developing countries. These projects would be of the demonstration/research/training type and should be planned and undertaken on the assumption that they would have a sufficiently high degree of success to convince governments that expansion of this work would go far to meeting basic food requirements as well as showing considerable socio-economic benefits.

In order to ensure success, it is proposed that three of the projects should be concerned with a major crop having a major pest problem, both in the pre-harvest and the post harvest phases of its production and protection.

Sorghum and rice (cereals), cassava (root crop) and cowpeas (legume) are crops that readily come to mind as subjects for these projects.

Many agencies, donor countries and international institutes are engaged in projects on these crops but in very few of these are small farmers closely involved. Sorghum and legumes, until very recently, have been neglected by international agricultural scientists, the tragedy of which is emphasized by the fact that they are grown by some of the poorest people of the world as in the Sahelian disaster zone.

In the projects suggested below, the small farmer would become an active participant in crop protection and not a mere observer of experts using his land for experimentation.

The suggested projects would complement on-going projects in the countries concerned so that there should be opportunities for cooperation between scientists of different institutes, national and international in the various disciplines involved in plant protection.

There are basic principles that can be applied to all these projects concerned with improving crop production and protection.

These are:

1. The selected trial area should be manageable in size but contain sufficient small farms to ensure the collection of reliable data.
2. There must be the nucleus of an extension service if one is not already well established.
3. The first phase of the project must be a survey to embrace all the aspects covered by this report, e.g. local cultural practices, identification of major pests, etc. During this phase, yields will be measured and losses will be estimated as a percentage of potential production.
4. In the second phase, three or four new varieties will be planted in farmer's fields and the increased yields will be compared with the initial survey crop and with succeeding crops grown from local seed in the traditional manner.

Concurrently with trials of new varieties, claimed to be resistant to pests and to have high yield, trials will be conducted with local seed but with inputs of improved technology, as a comparison study.

5. Research for selection of improved varieties will continue in farmer's fields throughout the lifespan of the project as will the search for improved technology designed to meet local resources and conditions.

6. As each of the problems outlined in this report is encountered action will be taken to overcome them through research determined by the needs of the situation some of which have been covered in the report. Others will call for action to meet specific and unexpected problems arising.

7. Each project must be backed up by national and regional institutions. International agencies and institutions of other countries will participate in the planning of the projects and in the analysis of the results.

Project I Sorghum production, and protection, in the Sahel.

II Reduction of rice losses in Bangladesh.

III Cassava production and protection in West Africa.

IV. Legumes in Latin America.

Numerous other projects are indicated by the research needs listed in Section VII of the report. Many of these will be the basis of studies within the ^{four} ~~two~~ projects proposed above but some will require separate projects to fully develop methodology for dealing with the needs described.

In particular a project on storage losses could lead to the development of protective measures that would be applicable in many countries. It would embrace studies on pre-storage infestation, would identify all the factors responsible for storage losses, would study and modify existing structures and would apply various methods of control, non chemical as far as possible. Equally important would be a

special project on transfer of technology - the need for a sound extension service and all that the establishment of such a service implies. This subject is fully covered by Section VI(b) of the report.

The selection of the project areas, the duration of the projects and the resources to implement the projects should be discussed by the Planning Group in conjunction with invited scientists from developed and developing countries.



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		<table border="1"><tr><td>Withdrawn by Sherrine M. Thompson</td><td>Date December 28, 2017</td></tr></table>	Withdrawn by Sherrine M. Thompson	Date December 28, 2017
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✓ Research Agriculture
cc RPO 1342

Mr. M. Yudelman, AGP

June 25, 1976

Benjamin B. King, VPD Signed B. B. King

Research Proposals

Agricultural Innovation and Rural Development

1. The Research Committee in a meeting on June 23 felt that this proposal's objectives are still overambitious and its methodology not yet adequately spelled out. While recognizing that to a certain extent these issues have to be dealt with as the research unfolds, it nevertheless suggested that the proposed "peer group" could be enlisted to help clarify the project's scope and design.

2. It accordingly recommends that the sponsors discuss with the peer group the means by which the proposal can be made still more specific and narrowly focused. A revised proposal, accompanied by a memorandum describing the revisions undertaken, could then be discussed with an ad hoc advisory group of the Research Committee composed of Messrs. Thalwitz and Waelbroeck. Based on their reaction, it could thereafter be circulated to all Research Committee members to determine whether the proposal as revised can be accepted.

Country Case Studies of Agricultural Prices and Subsidies

3. The Committee approved a total of \$157,000 for FY77 (on the assumption that Turkey will be excluded) under option (a) of Mr. Vergin's memorandum of June 10, according to which a detailed review in November 1976 will offer suggestions on research design, methodology, and the scope of the study based on a progress report summarizing results achieved up to November. The Committee doubted that a fuller investigation, using sector-wide general equilibrium models like those developed in the DRC, is feasible within the budget and time constraints outlined. It therefore urged that first priority be given to work on the "expected minimum results." If desirable, a separate proposal for research using DRC sector models could be considered at a future meeting.

4. If a case study in Turkey eventually proves feasible, the total (and FY77) authorization for this project would become \$187,000.

5. The identification code for this project is 671-42. Please use it in all financial documents and other communications, including the letter of appointment to Professor Bertrand. The first Status Report will be due in January.

cc: Messrs. Bruce, Donaldson
Mrs. Hazzah
OFGrimes:gm

Research - Agrie &
Rural

Turid Sato

June 24, 1976

Ted J. Davis, Chief Rural Operations Review
and Support Unit
Monitoring and Evaluation Mechanisms within Projects

Leif Christoffersen told me of your concern about bringing a rational approach to monitoring and evaluation of projects in Kenya.

My Unit is engaged in an intense effort at developing guidelines for project specific monitoring and evaluation mechanisms. He told me of your planned visit to Kenya in this connection. I am vitally interested in several projects in Kenya in terms of (a) investigating existing monitoring and evaluation mechanisms and (b) to assist project management in better and more consistent approaches to monitoring and evaluation.

I enclose a copy of a report done by Dennis Anderson which is the result of an investigation of monitoring and evaluation in rural development projects. I would very much like to talk with you on this whole subject at your earliest convenience.

In addition I am attaching a report on water supply systems in Kenya. This is a confidential report and must be returned to Mr. Christoffersen after you have read it.

Attachments:

cc: LEChristoffersen

Mr. Benjamin B. King

June 15, 1976

Barend A. de Vries
Barend A. de Vries

Research Proposal: "Agricultural Innovation in Rural Development"

The Panel, consisting of Messrs. C. Downing, J. Hendry, P. Scandizzo, C. Weiss and myself, met with Mr. Donaldson on June 10, 1976. Messrs. C. Bruce, D. Anderson, R. Hofmeister and O. Grimes were also present.

The Panel agreed to recommend to the Research Committee that it approve the proposal. While the project does not propose wholly new research but rather synthesis and dissemination, it deals with an important topic on which conceptual clarification and general guidance to Bank staff and LDC officials are needed and well worth the moderate cost. The Panel asked for clarification on a number of points which Mr. Donaldson is incorporating in a revised proposal; in particular, points concerning the project's objectives, its methodology and the way it proposes to synthesize existing research and to disseminate its findings. It made certain recommendations about the execution of the project and further follow-up.

The project proposes to arrive at a new synthesis of research on technological innovation in agriculture, review the sequential stages of the innovation process and arrive at new insights as to how the process of innovation can be managed more effectively. It would seek to arrive at conclusions as to what are appropriate technologies in different country situations. The project would provide a conceptual framework for the Bank's dealing with technological issues in project work. The project also includes the dissemination of findings, through a Bank Issues Paper and a book addressed primarily to LDC policy makers.

Although supporting the proposal, the Panel nevertheless feels that the project's objectives are quite ambitious and that it will be essential that issues be identified and discussed within the Bank as the work proceeds. For this purpose the researchers should be in close contact with their counterparts in various parts of the Bank through an appropriate mechanism.

While the project is one of synthesis and dissemination, the draft proposal was not sufficiently specific on how both these objectives are to be achieved. In synthesizing technological and socio-economic research results on this broad topic, the researchers should interact with a larger variety of disciplines (including engineers and scientists) than had been proposed. Dissemination would likely involve seminars or panel discussions inside and outside the Bank. Such panel discussions would also be a means of involving researchers in LDCs. Some of these may have to take place after the project is completed and not all of their cost is included in the proposal.

June 15, 1976

The proposal is not sufficiently clear about methodology, e.g., the meaning of an integrated approach, definition of technology, the role of case studies and the hypotheses to be tested. Moreover, the potential impact of the distribution of income and assets and of the uncertainty about farmers' estimates of future yields, seem not to have been adequately treated in the proposal.

The project is designed to provide conceptual and research background for the issues paper on innovation in agriculture. Some panel members felt, however, that the questions to be considered were too general to be useful in project work. Some issues which frequently arise in project appraisal -- e.g., levels of mechanization, tractors versus labor -- require more specific treatment than is foreseen in this project. On the other hand, it can be pointed out that work on the project, if properly discussed within the Bank, would make the Issues Paper itself more useful. The study would help Projects staff deal with technological questions in a broader sense. In judging the usefulness of this type of research one would have to allow for the fact that knowledge of technological innovation would bear fruit over a period of years -- 5 years or more.

Cleared with and cc: Mr. Downing
Mr. Hendry
Mr. Scandizzo
Mr. Weiss
Mr. Grimas

cc - Mr. Anderson
Mr. Bruce
Mr. Donaldson
Mr. Hofmeister

OFFICE MEMORANDUM

*Research - Agree
+ fund*

TO: Members of RORSU

DATE: April 22, 1976

FROM: Ted J. Davis *TJD*SUBJECT: Suggestions for Possible Research Proposals in Rural Development

Attached is the memo from Mr. Grimes which shows that we have missed the April 15 deadline for submitting research proposals to the Research Committee. He indicates that the next meeting will be in late July. Our goal is to have a research proposal on monitoring and evaluation in final form by June 30.

Also attached is a preliminary paper done by Tom Hexner which makes suggestions for possible research subjects. Of paramount concern is his proposal #1 on monitoring and evaluation. (I am not at all pleased with the concept of this proposal. I am doubtful that the analysis of consumer needs is the right approach. I am thinking that our research needs are primarily in the field of the appropriate indicators or criteria necessary for monitoring and methods of collection). We will in any case be discussing this subject in depth in the next week.

As to Mr. Hexner's proposals #2-7, I would like for you to give some considered analysis and be ready to discuss these proposals as well.

Attachment

TJD/cc

cc: Leif E. Christoffersen

OFFICE MEMORANDUM

TO: Mr. Douglas Keare

DATE: March 18, 1976

FROM: Ted J. Davis *TJ*

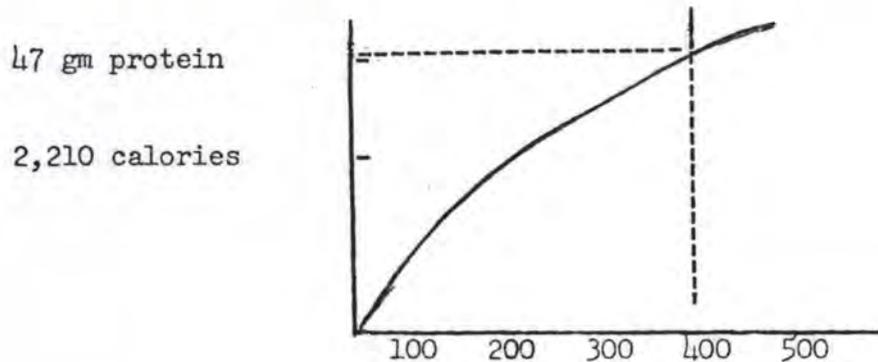
SUBJECT: Proposed Draft to Chief Economists/Senior Economists from Warren Baum - Improving the Definition or Measurement of Poverty Levels

1. I have some difficulty with the above draft dated March 4 submitted to me for clearance in regard to the methodology for measuring the upper level income of the target group for rural development projects. The draft should not go forward before we have another meeting with the drafters of this new proposal with Mr. Jaycox and Mr. Yudelman. Mr. Christoffersen, Mr. Turnham and I who have been most involved with Rural Development should be present. Perhaps Mr. van der Tak should be invited since he was involved in discussions last year on this subject.
2. Contrary to the title of the draft it is by no means clear to me that the proposed methodology improves on the existing definition. On the contrary, it seems more arbitrary than the previous exercise undertaken by the country economists for rural development.
3. The rationale for the original rural development exercise was based on an attempt to reflect reality by asking the economists to identify a typical food basket in rural areas in their respective countries, to determine quantities of the food items in the typical basket necessary for minimum nutritional requirements, to cost these items, to add an amount necessary for non-food needs and thus establish the upper level incomes of the absolute poor.
4. The new draft proposes to cost an all cereal diet at quantities necessary for minimal nutritional requirements and then suggest that by multiplying this cost by 2 we would arrive at the cost of the food portion of the absolute poverty level. The draft suggests thereafter that the non-food needs be established as the absolute expenditure on non-food items of families at the 20th percentile.
5. There are two obvious points against this approach:
 - a) Cereal diets are atypical for much of the diets in both rural and urban areas which vary greatly between rural and urban and among countries. Root crops play an important part in the diets in Africa, parts of Indonesia and Latin America;
 - b) The multiplication factor of 2 is not claimed to have any particular rationale. (Perhaps it was chosen to develop a comparable cost level between the new methodology and the old methodology in the Pakistan case. If this is so why not stay with the old methodology?)

The recommendation that costing the non-food needs as the absolute expenditure of a family at the 20th percentile does have a basis in reality but presumes such data to be generally available; if it is available why not extend the approach to food expenditures?

6. At a more general level, I wonder if we are seeking quite the same objective through these investigations. One objective is to better define the real cost of minimum requirements for nutritional and other family needs and to generate the national and/or regional data corresponding to the costs of those requirements. This is an interesting exercise in its own right and the "poverty boundary" so generated is clearly a significant one.

7. To do this properly would require a regression analysis to determine the level of family per capita expenditure necessary to achieve the minimum calorie and protein intake necessary to achieve minimum nutrition requirements. A figure to express this would appear thusly:



Rupees: Monthly family per capita expenditures on food.

In the absence of household expenditure surveys this analysis is not possible. Therefore some other approximation is necessary which is conceptually defensible. A more modest objective, and one that we in Rural Development have been pursuing, is to seek some consistent estimator of absolute poverty that when applied to our client countries, provides an overall estimate of poverty that corresponds to the Nairobi speech target group concept of the "lowest 40%". This approach recognizes two points: (a) that any "poverty line" does rough justice to a complex reality - i.e., that there is the unique discontinuity in nutritional or other status that separates those with inadequate resources from those with adequate resources and (b) that the size of a low income "target group" is itself a policy determination; among other considerations, there is little doubt that lowest 40% was adopted because, in some sense, 50% was too large a group and 30% too small a group. "Lowest 40%" has been widely accepted and there seems little point at this stage in tinkering with it.

8. In the Rural Development Policy Paper we sought to move away from the overly simplistic "lowest 40% in every client country" measure to one that allowed for the considerable differences in absolute poverty between countries. Thereafter we asked country economists to generate data on the basis of a locally determined minimum needs food basket (plus an overhead for non-food necessities). In overall terms, this approach gave results that are quite close to the estimates of the Rural Development Policy Paper -- and were in conformity with the lowest 40% criterion -- but clearly showed some considerable differences in the standards being applied at the country level. The next stage we envisaged as involving some

refinement of these estimates, utilizing more in depth analysis from country economic work, the objective being to obtain successively closer approximations to a more uniform measure consistent with the lowest 40% overall.

9. There are possible alternative methods which might not use any estimates of minimum caloric and protein requirements by use of proxies. One attractive possibility is the ratio of food expenditure to total expenditure. See the attached note (Annex 1) for explanation.

10. Even so, such shift to different methodologies should be tested in several countries. In the absence of such testing I would strongly urge the continuation of the "typical food basket" methodology until we can find more appropriate proxies for absolute poverty.

TJD/cc

cc: Messrs: Yudelman
Bruce
Leiserson
Turnham
Jaycox
Berg

FOOD EXPENDITURE/TOTAL EXPENDITURE RATIOA POSSIBLE METHOD OF DEFINING POVERTY LEVELS

There is a great deal of ambiguity in relating these poverty level indicators to nutritional status in any precise way, with palatable diet sometimes overriding apparent nutritional cost effective diets in terms of choices poor people actually make. We could consider a slightly different tack which would relate poverty estimation not to nutritional status as such but to the share of food related expenditures in total expenditures at different levels of total expenditure. It is recognized that applying, say, a 60% of total expenditures on food as the poverty cut off would imply acceptance that this 60% will be more or less nutritionally adequate depending on local diet patterns and the absolute real purchasing power of expenditure. On the other hand, "Engels law" has some validity, and with its "conventional necessities" criterion we might be able to eliminate a separate relative poverty criterion that bothers some people. The further advantage of this scheme is that it can be applied readily to rural and urban populations taken separately without computation of price differentials. Finally, whether the line is set at 60% or 70% or 50% would depend on the results generated -- the object being to choose that cut-off which gives in global terms a "lowest 40%" poverty target group.

Initially, work on this form of criterion could be done at headquarters, through a review of available budget surveys which provide information in the form needed -- i.e., a classification of family expenditure by level and type of expenditure. This done -- which should provide a better notion of where the cut-off expenditure share on food is likely to be -- more intensive data collection could be pursued through country economic missions. I feel though that if we took this route some initial work should be done before another approach to the Regions.

INTERNATIONAL BANK FOR
RECONSTRUCTION AND DEVELOPMENT

INTERNATIONAL DEVELOPMENT
ASSOCIATION

INTERNATIONAL FINANCE
CORPORATION

Feb. 4, 1975

Mr. Courbois:

I have set up an appointment for Mr. Hassan
to come to your office on your return from
mission as follows:

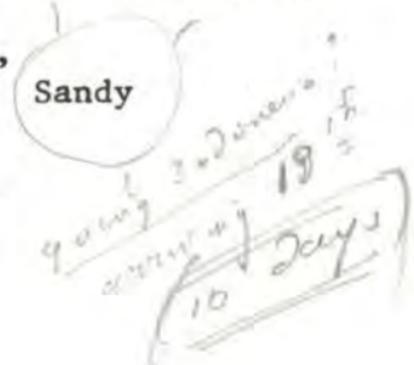
Tuesday, February 18 at 9.30 am

and he will discuss with you your proposed
study on Distribution of Agric. Credit to
Small Farmers (see cable attached from
Takahashi recommending that you contact Mr.
Hassan before he goes to Indonesia in April).

As I shall be on home leave at the above time,
it may be ^{an} idea if you could call Mr. Hassan's
office (X.2051) just to confirm the above
time.

Thanks,

Sandy



INTERNATIONAL BANK FOR
RECONSTRUCTION AND DEVELOPMENT

INTERNATIONAL DEVELOPMENT
ASSOCIATION

INTERNATIONAL FINANCE
CORPORATION

Feb. 5, 1975

Mr. Courbois:

As Mr. Kepper (X.5785)(D1249) is out of town until Feb. 7 (at which date I leave for home) and also shall be out of town on Feb. 18 onwards, I have left with his office a copy of the cable from Takahashi and a copy of your letter to Takahashi in order to give him an introduction to what you would need from him. I have also given George Darnell's name for Mr. Kepper to contact on Feb. 7 when he arrives in town and to whom he may give any information on the BRI Accounting and Information Systems.

Sandy

INCOMING TELEX

R. Sreasth Agie
Mr. Dar
Mrs. Jono ✓

RECEIVED

FROM: DJAKARTA

February 3, 1975

155 FEB -3 AM 1975

Distribution
Agriculture & Rural
Development
Mr. Sendberg

150 COURBOIS

AGRIC. CREDIT REURLET 60. SUGGEST YOU CONTACT KEPPER IFC
TEMPORARILY IN WASHINGTON. HE IS INVOLVED IN STUDY OF BRI
ACCOUNTING AND INFORMATION SYSTEMS. ALSO CHECK WITH ZAMIR HASSAN
WHO IS COMING HERE APRIL ON CREDIT RECONNAISSANCE. WILL DISCUSS
WITH BRI AND COMMENT FURTHER. REGARDS

A662
=

TAKAHASHI

2051

general
Research - Agriculture

Mr. Donald C. Pickering

February 2, 1976

Sydney A. Draper

Energy-Food Plantations for the Third World

Georgia Institute of Technology Project Proposal

1. The emphasis on maximizing sunshine for food and energy production tends to obscure the other necessary conditions of adequate soil and water. In the general case, at least one of the latter will be a constraint on the objective of obtaining a year-round sustained yield of bio-mass. The problem of significantly increasing the production of vegetative materials suitable for food and energy is likely to be the first obstacle to overcome, and besides the technical difficulties, is itself constrained by social/political considerations of what are regarded as acceptable products for consumption.

2. The general assumption regarding the quality of the land resource to be dealt with is too optimistic. The example on page 3 equates with top quality agricultural land capable of producing 2.5 tons maize + 1 ton groundnuts + about 6 m³ wood equivalent per acre per year. This compares, for example, with maize + groundnut yields of 0.5 ton/acre and 0.3 ton/acre respectively for Java, and depicts a much higher crop production propensity than is likely to be found in developing countries.

3. The expertise which Georgia Tech. has developed in pyrolytic converters (p. 28) could be very useful in some countries for early adaptation where there are unused agricultural residues, e.g., groundnut shells and coconut shells, which could be used as substitute fuels to supply the market. (The attached paper on charcoal production portrays a similar approach). This approach justifies testing on a wider range of agricultural residue which in some countries are presently burned as waste.

4. The work so far done by Georgia Tech. with anaerobic digesters (p. 28) is yet inconclusive.

5. To have any significant impact, I think the project would need to increase the emphasis given to raw material production. Given this reinforcement, there are two types of general situations in which it could operate with the possibility of developing new technologies:

- (1) Areas of intensive farming where crop production techniques are relatively sophisticated and crop and crop residue utilization could possibly be improved, e.g., S. Korea, Java, India.

- (2) Areas of extensive farming where cropping techniques are primitive and natural regeneration of wastelands and woodlands is being consumed, at a rate greater than replacement, to augment agricultural production, e.g., Africa, East and West.

SADraper:jd

January 24, 1975

show only

Mr. Shig Takahashi
World Bank
P.O. Box 324/DKT
Jakarta
Indonesia

Dear Shig:

I am responsible for carrying out a study of costs of distribution of agricultural credit (mostly to small farmers); this as a follow-up of the agricultural credit policy paper issued last summer.

Until now, the study was restricted to a review of the financial statements and other documentation available in the Bank. Now, we must make a more in-depth study and we are going to select a few countries in each Bank region and agencies and/or agricultural credit projects as grounds to pursue our investigations. I think that Indonesia would be a good choice for a short study of costs of lendings by Bank Rakjak, in general, and under the BIMAS project in particular. I would be much obliged if you could give me your views in this respect.

In case you consider my idea practicable, I would try to arrange for a reconnaissance visit sometime in April/May and see how the study can be made. The study would be of short duration (say 1 or 2 weeks at the most) and would not call for Bank Rakjak manpower.

Yours sincerely,

Pierre A. Courbois
Agricultural Credit Adviser
Agriculture and Rural Development
Department

PCourbois:sj

January 13, 1976

David Dichter & Associates
Consultants
Development Assistance Programmes
9, Rue de Vermont
1202 Geneva
Switzerland

Dear Mr. Dichter:

I have recently seen your cable of January 2 and have reviewed your General Proposal and accompanying cost figures.

While the theoretical time of 19+ weeks for two men is listed I assume this is the period of time you feel is required to ground-truth a complete ERTS frame of "average" complexity without going into the number of landuse categories which might be included. It is also assumed that the groundtruthing is done on existing topographic maps, a satellite film product of large scale or a computer categorized ERTS product. Is that correct? Needless-to-say the theoretical proposal is useful and would have to be modified in accord with specific jobs. While the rough time and cost estimates are most useful the actual methodology is determined by the base map materials at hand. Keeping this in mind let me say that we would indeed consider utilizing your services when a job requiring such work comes up again.

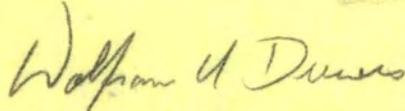
While groundtruthing activities will be carried out in the future there is at present no immediate need for such services. Also, I have checked with Brigitta Mitchell on the Yemen studies and she informs me that she has no funds for additional work in Yemen at this time. This is unfortunate since your staff is already there working in the field and obviously has gained considerable expertise in the field. But the Bank can only issue a contract when a specific job is called for - usually related to a specific development project.

I might also mention at this time that the landuse survey of the State of Orissa, India (including 12 images) has been tape processed to the scale of 1: 250,000 and categorized into 22 categories in a period of two weeks on the computer and in the film lab, three weeks for reconnaissance groundtruthing in the field using jeeps and government

helicopters and a fixed wing plane, and a week of travel time. Although the job is not yet completely finished since it must be reprocessed now to take into account our recent groundtruthing data, the whole job should run us about \$40,000 + travel expenses.

Undoubtedly the quality and detail of this type of reconnaissance survey is not as accurate as might be desired, /it is an attempt to /but utilize LANDSAT tape data as it was meant to be used, quickly and timely since the imagery now being processed is of the October 18-22, 1975 period - only three months old.

Sincerely,



Wolfram U. Drewes
Resource Planner
Agriculture and Rural Development
Department

File: THD / u / 1

AGRICULTURAL MANAGEMENT TRAINING CENTER

OFFICE MEMORANDUM Research - Agriculture

TO: All Participants (see list below) DATE: July 7, 1975
 plus Messrs. Ballantine, Yudelman, Chittleburgh
 FROM: R. W. Van Wagener, Training Officer, EDPDR
 SUBJECT: Meeting with Mr. Phillips, of Commonwealth Development Corporation

1. Mr. Tom Phillips, Assistant Agricultural Adviser to the CDC, met with two groups of Bank staff (see below) on June 30 and July 1 to allow us to pursue a question discussed earlier in the Bank: whether a training institution similar to the successful Mananga Agricultural Management Centre at Tshaneni, Swaziland, should be included in a future Bank loan to Indonesia and/or Nigeria.

2. Mr. Phillips described the Centre and its operations, after which the discussion focused on questions of feasibility:

a. Is such an institution needed?

There are no doubts that it is needed in Indonesia, and that a centre located there could also serve Malaysia without language difficulties. Nigeria (to include anglophone West African countries) would be a lower priority because some Nigerians already attend Mananga. There were doubts on the part of the Education Division West Africa Projects Department, that such a separate institution was needed until a closer examination of existing facilities (such as the Nigerian Centre for Management Development) could be made through Bank sector work that has already been recommended. Trainables exist in large enough numbers in both countries.

b. Could CDC provide the management and recruit the staff for development of a similar institution in the near future?

This would probably be done, but should be explored by attaching to a Bank mission on a consultancy basis the Principal of the Mananga Centre (Mr. Harry Smith).

(i) It would be difficult, but not impossible, to recruit suitable staff members, especially when instruction must be in the Indonesian language. Nigeria would present less of a problem as the medium of instruction would be English. It has been hard enough to recruit, mainly from British sources, for Mananga the type of staff member who had considerable non-academic experience and who could adapt to LDC conditions, though Mananga has been successful in doing so and currently has six professional staff members.

(ii) As to funding, Nigeria would probably have to mount its own finance, both for capital expenditure and current operating costs. In Indonesia, Bank finance would be available for capital development and technical assistance. Indonesia and Nigeria would be financed in a very different manner from Swaziland because of the fact that CDC is required to make a

cont. page 2

profit on its operations. Swaziland has been an exception, in that CDC has provided the capital input as a grant and has accepted the need for annual subvention necessary to cover shortfalls of income. CDC would not expect to repeat this in other countries, but it could assist by providing management or consultancy for a limited development period, at the expense of the training centre. In Swaziland, income came from fees (over 1,000 pounds per trainee, per course) and from farm revenue. Bursaries were provided for trainees sponsored by Governments through the Commonwealth Fund for Technical Cooperation (CFTC), with similar bursaries for non-Commonwealth participants coming through the British Council or from ODM in small numbers. Commercial companies sponsored their own students. Transportation to and from the Centre should be covered by the participant's country or included in the bursaries. In West African countries other than Nigeria, the Bank (or other institutions) would have to participate financially. CDC normally prefers to have a financial interest in anything for which it supplies management services, but it would need to study the situation in each case.

(iii) As to timing, probably 18 months to 2-years would be needed between acquisition of land and opening of courses, obviously depending upon conditions, one of which is mentioned in para c.

c. What would be the institutional status of such a Centre?

One problem would be the degree of host country involvement. The Mananga Centre is under no Governmental control in Swaziland, though CDC keeps Government informed of activities and progress. It was pointed out that in Indonesia and Nigeria this could not be the case; at the best a semi-autonomous status could be achieved. Also, CDC advised against attaching such a centre to any university, both because the instruction is truly practical in nature and because the Centre must be located near commercially-oriented estates so that participants could absorb the commercial orientation and observe a thoroughly efficient operation.

3. It was agreed that the following action should be taken:

a. Indonesia should be explored first, with a view to the possibility of including an agricultural management training centre in the next Estates project. It should be an Agriculture loan rather than an Education loan because (i) it should not be attached to a post-secondary institution and (ii) it should be constituted as independently of Government as possible. It could be attached to the State-owned enterprises (PNP or PTP), in which case the PNP or PTP could supply most of the funds. Specifically, the Centre might be located in the Medan area of Sumatra (oil palm and rubber), attached to PNP-VI. Education Division, East Asia and Pacific Projects Department, would determine, during appraisal of Education V, whether such a Centre would duplicate work already being done by any existing post-secondary institution.

1/ Initial capital costs of Mananga were roughly \$1.5 million (1972-73) exclusive of land, and annual operating costs are now roughly \$300,000. Mr. Phillips will supply more precise figures.

new to
check with
Edwin

b. Nigeria should be explored by Agriculture Division 1 and by Education Division of Western Africa Projects Department with a view to the feasibility and desirability of an agricultural management training centre.

c. The procedures would be: (i) Regional Projects Department, with as much assistance as needed from CPS Departments, will outline a feasible and desirable agricultural management training component for an appropriate loan or technical assistance project, (ii) Regional Projects Department will then ask Programs Department to approach the Government about their interest in such a training centre and to explore the terms and conditions for its establishment. Thereafter, (iii) the Bank would approach CDC to explore their interest in providing management services (technical assistance) and the means of funding the proposal.

d. Mr. Phillips will inform Mr. Swynnerton of these meetings and will send the latest material on the Mananga Centre to the Training Adviser, Education Department.

RWW:raz

List of Participants:

	<u>Indonesia</u>	<u>Nigeria</u>
Mr. T. Phillips (CDC)	x	x
Mr. G. Darnell (Agriculture & Rural Development, CPS)	x	x
Mr. J. Fransen (Agriculture & Rural Development, CPS)	x	
Mr. H. Thias (Education, East Asia & Pacific)	x	
Mr. R. Romain (Education, Western Africa)		x
Mr. R. Wadsworth (Agriculture, Western Africa)		x
Mr. C. Gilpin (Education, CPS)	x	x
Mr. R. Van Wageningen (TAO, Education, CPS)	x	x

W EHC

CABLES: VELOP LONDON WI
TELEGRAMS: VELOP LONDON TELEX

WEALTH DEVELOPMENT CORPORATION

33 HILL STREET
LONDON W1A 3AR

JUN 1. 1975

24th June, 1975

Mr E.H.Chittleburgh,
Training Adviser,
Education Department,
International Bank for Reconstruction
and Development,
1818 H Street, NW,
WASHINGTON, DC 20433,
USA.

Dear Mr. Chittleburgh

I am writing in response to your letter of 2nd June enquiring whether CDC has discussed the possibility of setting up a management training centre with the Indonesian Government and whether CDC would be prepared to provide technical assistance, possibly on a consultancy basis, in helping to establish a project financed by the Bank.

CDC has not discussed the possibility of setting up a management training centre with the Indonesian Government. We have discussed both with the Bank's Resident Mission in Jakarta and with interested departments in the Indonesian Ministry of Agriculture the possibility of sending students to courses at our management training centre in Swaziland. It was arising out of one such discussion that Mr Storrar considered that the need for management training in Indonesia was so great that either a complete course in Swaziland would have to be booked for Indonesians alone, or, preferably, the establishment of a training centre in Indonesia should be considered. In these circumstances, it would seem desirable for the Bank's Resident Mission in Jakarta to pursue the possibilities with the appropriate Ministries, particularly with the Director General of Estates and the Director General of Transmigration.

CDC would be prepared to express interest in principle in providing technical assistance, as you suggest, for a limited period in establishing a management training centre and providing or assembling staff and training materials to initiate the training programme. I think that we would see establishment of this project as being divided into two stages, the first being the identification and preparation by the Bank and

.../

Government and the second, after agreement on financing and management between the Bank and the Government of Indonesia, establishing the development and management on a consultancy basis.

If the Bank is sponsoring a mission to identify and prepare a project, you might wish to consider engaging Mr Harry Smith, Principal of the Mananga Agricultural Management Centre, Swaziland, as a member of that mission because his background experience should prove helpful. If the Bank and the Indonesia Government are reasonably firm in their wish that CDC might be asked to undertake subsequent management, then we think it would be desirable for CDC to attach one of its Senior Agriculturalists with a good background knowledge of Indonesian agricultural development to the mission also.

One of the reasons for the success of the Swaziland management training centre is that it is located in the centre of three or four large-scale and efficiently developed and managed projects which are under full CDC control and which are able to provide a good example and case studies on which to base management training. We would feel that a management training centre in Indonesia should be similarly located, that is in an area having a group of estates under the management of one of the good PTPs in which the World Bank and the Indonesia Government had put a substantial investment for rehabilitation and development and were monitoring performance. The vicinity of Medan in Sumatra suggests itself in this context but Phillip's could discuss this and other alternatives with you.

CDC's participation in the second stage, that is project implementation, would be dependent on our being satisfied that the project was being set up on a workable basis. We would wish the consultancy to be identified appropriately with IBRD and to be tax exempt. We have a tax complication in regard to CDC's own operations in Indonesia and we would wish to assess the impact of the assignment on overall CDC taxation in that country. Subject to these matters creating no substantial complication, we would confirm our interest in considering the assignment.

I cabled to advise you that Tom Phillips, our Assistant Agricultural Adviser, would be visiting the Bank next Monday and Tuesday, 30th June and 1st July, and that this might provide a good opportunity for you to discuss the Indonesian proposal in more detail with him. Tom Phillips has a very good knowledge of conditions in Indonesia and of the Bank's activities there. He was seconded by CDC to the World Bank Resident Mission in Jakarta from 1968 to 1970 as adviser on rehabilitation of export and plantation crops, including

.../

oil palms, rubber, tea, sugar, tobacco, etc. He has also been a leader or member of a number of missions involved in project identification and preparation for rehabilitation of PTP rubber and tea estates, crop diversification and for smallholder development. These involved advising on management structures.

I have written to the Principal of our Mananga Agricultural Management Centre and asked him to send me the further details which you ask for - space standards, curricula, etc - and I will forward these to you as soon as they come in.

With kind regards,

Yours sincerely,

Roger Swynnerton

R.J.M. SWYNNERTON
Agricultural Adviser

TAO/11/1
from Mr. Zedelman

To Mr. Zedelman

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MANANGA AGRICULTURAL MANAGEMENT CENTRE

An International Training Centre in Management for
Tropical Agriculturalists and Managers

PO Box 96, Tshaneni, Swaziland
Telephone Tshaneni 18: Telex 5MX 92



A project of the Commonwealth Development Corporation

TRAINING FOR MANAGEMENT

The Centre is owned and financed by the Commonwealth Development Corporation (CDC), a British statutory corporation which works as a commercial organisation, investing its funds in development schemes for the promotion or expansion of economic projects that will not only help to increase the wealth of developing countries but will also yield a reasonable return on the money invested. CDC has wide experience of operating in the agricultural sector and from this experience of establishing, financing and managing agricultural schemes it noted the absence of any proper facilities for training in management, extension or administration. It decided to set up and finance the Mananga Agricultural Management Centre (MAMC) to concentrate on the techniques of management, administration and financial control rather than on agricultural science which can be learnt elsewhere. The buildings were erected in 1972 and early 1973 and the first course started in April 1973. The Centre occupies an attractive campus at 1,000 feet above sea level on the lower slopes of Mananga Mountain, which rises to 2,639 feet behind.

The Training Programme

The primary object of the Centre is to provide courses in agricultural business management suited to the needs of managers of agricultural projects in tropical and sub-tropical countries. The courses are designed to develop and improve the ability of managers to plan, organise and control agricultural schemes, and to appreciate fully the financial and economic results of their actions. Training in agricultural technology is not provided; students are expected to be conversant with agricultural techniques, and to have had experience of actual management in the field.

Courses are carefully designed to meet the practical needs of managers in making decisions connected with their work. Staff members visit countries in Africa and elsewhere to ensure that the training meets the needs of practising managers. The basic course in general management is kept constantly under review, and other courses are organised as the need is identified and as staff and other facilities become available. General courses usually last three months, while specialist courses are usually of shorter duration. While the courses are not designed especially for them, accountants and managers of factory processes associated with agriculture have successfully attended courses, playing a full part in discussion and exercises with the agriculturalists.

Separate leaflets are prepared giving full details of each course and these are available from the Principal.

Teaching Method

MAMC teaches methods and procedures which can be applied to many situations. It sets out to build on the skill and experience a student already has in order to increase his confidence to grapple with his own difficulties. The need for private study and reading is built into the course, and this stimulates reflection by each student about his own approach to management and his function in his parent organisation.

Ample time is given to discussion, while exercises and field studies in small groups are an important part of the work. This group activity provides an exercise in itself in organising team work so that the management problems set can be solved in the time made available.

Formal lecturing is kept to a minimum and no attempt is made to provide set answers to all the problems which might face an agricultural manager in the tropics. The Centre does not tell the student how to do his job, but teaches him how to find out for himself how to do it better. Three large commercial CDC projects serve as a background to the MAMC training programme, and though the number of tropical crops grown in the area is limited, this is found to be no great disadvantage, even when the student is unfamiliar with some of them.

On their return home, students are able to apply the principles they learn in Swaziland conditions to their own farming system, development project or agricultural situation, whether with high rainfall tree crops, horticulture, large-scale mechanised arable crops, livestock, or irrigated farming in dry zones.

Evaluation of Student Performance

No formal examinations are held. The need to pass an examination can dominate the learning process, and all too easily supplant the true objective of becoming a better manager back on the job. With an intake of 20 students at a time (to increase to 30 late in 1975) and a staff to student ratio of one to six, a close relationship between staff and student is built up, and continuous assessment is possible.

At the conclusion of a course the student is handed a suitably engraved certificate of general proficiency. A few days later the student's employer is sent a report on the learning ability of his student in respect of each of the main sections of the curriculum. In addition a brief descriptive note is added about his general ability in exercises and discussions with his fellow students.

Conclusion of the Course

Each intake includes students with big differences in ability and experience on which the Centre builds to increase the management potential of every student. They start unequal, and they finish unequal - but each employer has a returning staff member with increased capacity for responsibility and decision making. There are no failures, only different levels of success, which it is for the employer to exploit if the training is to be justified.

The Buildings

Students are accommodated in individual study bedrooms, each with its own toilet and shower; there is a central dining room and common room/lounge. There is accommodation for 20 students on each course, which will be increased to 30 towards the end of 1975. The staff live in houses on the campus. Separate buildings house the administration offices and teaching rooms, the latter including a library and several small syndicate rooms in which students do much of their work.

Farms and Estates

The Centre has its own irrigated farm on which 600 acres of sugarcane are grown, with small acreages of cotton and other crops. The Centre is part of CDC's irrigated complex in the north east of Swaziland, comprising three other projects on 100,000 acres of which 30,000 acres are irrigated. A valuable feature of the teaching programme is the use that is made of these estates in addition to the Centre's own farm. Mhlume (Swaziland) Sugar Co Ltd produces some 100,000 tons of sugar annually, half of it from its own estate. Swaziland Irrigation Scheme not only provides the irrigated water throughout the area, but also has estates totalling several thousand acres under sugarcane, rice and citrus on irrigated land, together with a ranch carrying 7,000 head of cattle. Also important is the settlement scheme, Vuvulane Irrigated Farms, where some 300 Swazi farmers have holdings varying from 8 to 60 acres on about 3,000 acres of irrigated land.

Climate

The Centre is situated 26° south of the equator. During the period May to mid-August the day temperatures usually rise to 70°-75°F, although there may be a few cloudy days when 50°F is not exceeded. Temperatures gradually rise towards the end of the year, until by mid-December and in January and February very hot days may be experienced. Temperatures of 100°F can occur, while 85°-90°F is commonplace. The low elevation of 1,000 feet above sea level accounts for temperatures higher than are often experienced in many areas of Africa situated close to the equator.

The main rainfall occurs during the hot summer months, usually as heavy storms, and humidity is not high other than for short periods. Little rain is expected in the period April to September.

General Facilities

Many social and sports activities are arranged by local clubs, which are open to students as temporary members. In addition to such indoor activities as table tennis and darts, the Centre is developing facilities for outside sports like tennis, volley ball, swimming, etc. Film shows take place on the campus on two evenings each week. Local shops are limited, but every three or four weeks students are provided with free transport to Mbabane, the capital of Swaziland. Students are expected to bring with them sufficient spending money to enable them to join in social activities to which they are accustomed.

ENROLMENT ON COURSES

Entry Requirements

The aim is to maintain flexibility in admission to courses, with emphasis on experience in agricultural management. Normally it is expected that two years training at an agricultural college (or equivalent) will have been received, and three to five years experience in actual management, extension or administration. Students must have a good command of English and arithmetic.

Students can be accepted with a rather different training background (eg, irrigation engineer, accountant) providing they have experience directly connected with agriculture.

A list of courses on offer, with dates, will be found in a separate leaflet.

Provisional Booking

Places on courses are provisionally booked up for as much as a year or 18 months ahead, and it is essential that the Principal should be informed at the earliest possible moment of the intention to send a student even before the individual is actually chosen. A place can then be provisionally reserved while detailed arrangements are completed.

Confirmation of Places

When the name of the proposed student is known, it should be sent to the Principal, together with notes on his educational background and present responsibilities. This should normally be received at the Centre at least three months before the course is due to begin, when the Principal will confirm acceptance of the student.

Fees

The current fees are quoted in the course leaflet, and cover tuition, full board, laundry, stationery, and local transport. They do not include cost of travel to and from Swaziland.

Payment of fees can be made either in pounds sterling, in rands or in Emalangen, and either paid direct to the Centre, or to the Commonwealth Development Corporation, 33 Hill Street, London, W1A 3AR, England. This payment must be received 21 days before the course is due to start. Failure to do so may mean that the offer of a place is withdrawn and filled by another applicant.

The right is reserved to retain two-thirds of the fee if there is a late cancellation which precludes the possibility of filling it with another applicant.

Grants

MAMC ensures that various national and international agencies are aware of the training facilities available, and they may be prepared to consider an application for a grant to enable a student to attend. In Commonwealth countries, employers may obtain assistance from the Commonwealth Fund for Technical Co-operation (CFTC), which is administered by the Commonwealth Secretariat, Marlborough House, Pall Mall, London, SW1Y 5HX, England. A list of the CFTC agencies in each country is given in a separate leaflet.

In non-Commonwealth countries a grant may be available through the British Council, to whom enquiries should be made.

Travel Arrangements

Travel arrangements should be made as soon as the nomination is accepted. Air flights should be booked right through to Manzini (Matsapa) in Swaziland, and at the same time the return flight from Manzini should also be booked. International travellers to Swaziland have in the past normally arrived first in Johannesburg, where it has often been necessary to stay overnight. From December, 1974, a new international flight has been inaugurated direct to Manzini from Blantyre in Malawi, with connections from Dar es Salaam, Nairobi, etc. There is currently only one flight a week, and since it is likely that up to 30 MAMC students will want to book places on the same aircraft, early booking is essential. Starting and finishing dates of courses will be modified to fit in with this flight. On arrival at Manzini, some 70 miles from MAMC, students are collected by the Centre's transport.

If students travel via Johannesburg and it is necessary for them to stay overnight, they will be accommodated in the transit section of Jan Smuts Airport. This accommodation is of a very high standard, is multi-racial, and no visa is required. When travelling by whatever route, students should have with them about £10 sterling in actual cash to cover transit costs in addition to a sum in travellers' cheques for miscellaneous personal expenditure.

Sponsors and students are urged to send to the Principal well in advance details of travel arrangements (flight numbers, dates, and times of arrivals and departures). Failure to do so may mean that students are stranded without transport at Manzini Airport. It is the responsibility of the student to be at Manzini Airport on the date quoted for the start of the course. By prior arrangement, it is possible to collect students a day or so earlier.

Passports and Visas

All students must have passports valid for the whole period of the course, and return tickets to the point of departure.

Commonwealth citizens, US citizens and citizens of a number of European countries do not require visas to enter Swaziland. In all other cases, visas may be obtained through the local British Embassy or Consulate. It will be necessary for students to apply for a temporary residence permit after they arrive. For this purpose they should bring with them two passport-sized photographs of themselves, and a completed Health Certificate (which will be sent for completion when application is made for a place on a course).

Health

All students must have valid International Certificates of Vaccination against smallpox, yellow fever and cholera in addition to the general certificate mentioned above. Swaziland is free from malaria, and prophylactics are not required.

TAO/VI

looks like
early 1975MAMC AND THE DEMAND FOR AGRICULTURAL MANAGEMENT TRAINING1. Training generally available

It is probably not widely appreciated that the MAMC training programme is unique. While the principles of good management are the same in a steelworks, a pickle factory or a farm, a management training programme to be successful must be designed to meet the needs of the trainees in their own environment. Wherever farm management is taught at universities and colleges (including those in Africa) it is based on the expertise built up in North America, Europe and Australasia. Conferences, research papers and books, and therefore the teaching, on farm management are built around the problems of running the family farm, employing perhaps no more than two or three men. Almost no attention is given to the organisation of people; human relations, motivation, communication, problems of innovation and change are not part of the developed world's approach to farm management. Education in farm management is almost wholly in the hands of agricultural economists, and it is perhaps not surprising that most attention has been paid to farm planning and financial control, and too little to work study and organisation.

2. Training at MAMC

Clearly the family farmers of the developing countries (i.e. peasant farmers) would not travel to MAMC. From the outset it was obvious that MAMC must offer management training appropriate to large scale agricultural estates. In providing this training, a substantial amount of time needs to be devoted to human relations in all its aspects, and to problems of organisation. In addition, of course, the training has to be applied to the physical environment of developing countries. In this situation men trained in farm management in virtually any university in the world, and perhaps especially in UK, could only provide instruction for about half the course. MAMC has therefore recruited two out of four lecturers who have not themselves had university training in farm management, but have qualifications in management and interests in the area of human relations (one of them is a chemical engineer).

MAMC/--

MAMC is therefore unique in having welded together these aspects of management in agriculture and then applied them to Africa and other developing areas. As far as is known a balanced ~~of~~ training of this kind is not available elsewhere in the world, and certainly not in the business schools, universities or colleges in UK.

3. Current demand for MAMC management training

The success of MAMC is built on this new approach to management training in agriculture. It is supported by the use of teaching methods appropriate to mature men receiving post-experience training. Comments from organisations sending students here suggest that our efforts are successful in improving the performance of managers over a wide range of ability. There are very few organisations which, having sent one student, have not booked further places after the first trainee has returned to duty.

For months past we have had no vacant places out of the 70 available in 1975, while in 1976 there remain a dozen vacancies out of the 90 places available. Our "regulars" have booked 34 places in 1977, and one organisation that found itself squeezed out in 1975 has four places booked in 1978. Bookings in the two latter years do not include any from CDC or associated projects. Overall, we have on hand 170 requests for places, with a capacity (after expansion programme is completed) of 90 per annum.

During 1974 the Principal and one of the Senior Lecturers between them spent 20 days in West and East Africa visiting a couple of dozen organisations concerned with large scale production of food or fibre, and discussed with them their training needs. It is apparent that there are large numbers of agriculturalists in need of management training. On learning about the MAMC approach to such training, senior managers readily accept that it meets their requirements. It seems clear that the low level of publicity for MAMC courses will ensure a steady flow of students from the limited number of organisations which are aware of what we have to offer.

4. Total demand for agricultural management training

For the reasons stated, MAMC has pioneered management training which is effective in developing countries. A latent demand, which previously could not be met, has risen to the surface, and becomes visible as knowledge about MAMC training spreads. The question arises as to the total effective demand for training of this kind. The visits referred to above have clearly shown/-

shown that if a concentrated effort were made to explain MAMC-type training to senior people, there would be a substantial increase in the number of people nominated for training.

In several countries MAMC has made a start in recruiting students, but nowhere is the situation fully explored. Several countries are completely unaware of the training available, and these include countries like Sudan and Iran where very large development programmes are in hand. There is very little awareness in South-East Asia of what we have to offer. It is perhaps worthwhile to outline some of the development plans in a small country like Liberia, with which we have no contact:-

Rubber a) Up to about 200,000 acres of rubber in the hands of seven major companies, now faced with revised agreements requiring speedier localisation.

b) A World Bank scheme to replant 100,000 acres.

Rice a) Rubber companies moving into large scale rice to provide food for their workers.

b) The Ministry of Agriculture has started three major projects in 1974 costing £3 million.

c) A recent report stated "Some projects were dropped while others are grinding along with difficulty owing to poor management.

Iran
Crops

a) The Ministry of Agriculture has allocated over £30 million to tree crop development.

b) New development and re-habilitation is in hand for:

60,000 acres oil palm

120,000 acres coffee

20,000 acres cocoa

45,000 acres coconut.

Live-
stock

Nearly £2 million is earmarked for the development of 6,000 acres of improved pasture.

These developments are only the most recent, all of which require numbers of managers at the middle management level, virtually all of whom would benefit from management training. Similar information, gleaned from several sources, is available for many countries, and indicates a large need for management training.

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It is very difficult to hazard a guess at what the total number of managers might be, and how many of these might be available for training each year. It is probably a very conservative estimate to say that 250-300 middle managers would take advantage of management training annually if it were available, starting within the next two years, and continuing for very many years to come. This is about three times the number of managers which can be trained annually at MAMC when the 1975 expansion programme is complete.

5. Meeting the management training demand

Having made the training available and thereby sparking off the demand for it, there appears to be no overriding reason why CDC should seek to meet the total demand. However, having identified the need it is not unreasonable to expect that CDC might take steps to see that some means are found to meet it. The 1974 accounts show that Tuition and Administration at MAMC cost E170,015, income from course fees was E68,640, giving the cost to CDC of running MAMC training of E101,375. It is suggested that a realistic pricing policy could reduce this to about E30,000. Depreciation on buildings and equipment associated with the training programme was about E30,000 in 1974.

There are only small financial savings in costs per student by increasing the capacity of MAMC beyond 30 per course. This number represents the maximum size for a class, and additional student capacity would require a duplication of teaching staff, lecture rooms, etc. Looking to the future, it seems likely that one day the facilities will revert to the Swaziland Government, and a large institution might well be a white elephant.

More cogent is consideration of what the student 'catchment area' might be, and whether they should travel great distances to attend courses in Swaziland. It seems clear that up to 100 students per annum would come forward from West Africa, and probably a similar number from East Africa. There would thus appear to be some justification for setting up management training centres on the lines of MAMC in each of these areas.

With travel cost to such centres being sharply reduced, it would be economic for shorter courses to be run for more junior staff, thus opening up a whole new training field which cannot be catered for economically at MAMC. The more junior the trainee managers are, the more closely should the training conform to a familiar environment. With regional training centres, staff could be used for training in the field.

Experience/-

Mananga Agric. Management
Center

Curriculum, staff and
objectives.

Robert Leung

Received by hand of
W. H. Smith 9/4/75

Req.

MANANGA AGRICULTURAL MANAGEMENT CENTRE

COURSE PC 7

Planning and Control in
Agricultural Management

11th April - 4th July 1975

P R O G R A M M E

MANANGA AGRICULTURAL MANAGEMENT CENTRE

S T A F F

H.T.E. Smith B.Sc (Agricl).	Principal
Mrs E.M. Ross	Principal's Secretary

Teaching

F.N. Youdale B.Sc (Gen), B.Sc (Chem), D.M.S., A.M.B.I.M.	Senior Lecturer
E.W. Cobban B.Sc (Agric), M.Sc	Senior Lecturer
D.T. Johnson B.Sc (Agric), N.D.A., M.Sc.	Lecturer

Administration

J.P.W. Rowe, A.C.M.A., A.M.B.I.M.	Bursar
A.N. Collins, F.C.F.A.	Domestic Bursar
J.J. Morake	Chief Clerk

Farm

D.H. Ley	Farm Manager
J.L. Dlamini	Assistant Farm Manager

Works

D. Moniz	Workshops
D. Fraser	General Maintenance
Mrs. I.H.M. Smith	Campus
Mrs. B. Rowe	Library
Mrs. A. Cobban	Printing

ADMINISTRATION NOTES

1 Meals

Meal times are as follows:

	<u>Weekdays</u>	<u>Sundays</u>
Breakfast	7.00 a.m.	8.30 a.m.
Lunch	12.40 p.m.	1.00 p.m.
Dinner	7.00 p.m.	6.00 p.m.

Students are particularly requested to be punctual for meals.

On weekdays coffee will be served in the Common Room at 10.00 a.m. and tea at 4.30 p.m.

With many nationalities represented on all courses it is not easy to provide food precisely suited to everyone's tastes. Requests and suggestions are welcome, and should be made to the Domestic Bursar.

2 Laundry

Laundry is collected on Mondays and Thursdays from rooms at 7.00 a.m. and normally returned the following day. Articles should be placed in the plastic bag provided, together with a list of the items using the approved form. To avoid overloading the laundry, items should normally be limited to one pair underpants, one vest, one shirt, a pair of socks and one handkerchief per day. Shorts can be laundered twice per week; only lightweight long trousers can be accepted and not more than once per week. Arrangements can be made to send items to the dry cleaners, for which payment must be made in advance.

Enquiries concerning laundry or room cleaning should be made to the Domestic Bursar.

3 Medical Services

The Domestic Bursar, Mr. N. Collins, undertakes normal sick-bay services; he will also arrange for students to visit the local clinic for medical advice.

The times for sick-bay consultation are as follows:-

<u>Location</u>	<u>Monday - Friday</u>	<u>Saturday</u>
Mr. Collins' Office)	7.30am - 8.00am	7.30am - 8.00 a.m.
)		
)	2.00pm - 2.30pm	-----

Emergency cases can be attended to at any time by ringing 28 on the internal telephone or by contacting the Domestic Bursar.

4. Student Representation

It is the custom for each course to elect two or three Representatives, whose task is to maintain contact with a nominated staff member on matters such as transport, social activities, visits, general student welfare, suggestions for changes in domestic arrangements and generally watching over the well-being of all students, particularly in cases of sickness. Experience has shown that these Representatives have been a great help both to the course and our Centre.

5. Absence from Centre

Students may be absent overnight provided this does not interfere with studies. Permission for such absence must be sought before any arrangements are made, normally with the staff member responsible with the Student Representatives.

6. Transport

Free transport is provided each week to enable students to visit Mhlume or Tshaneni, normally on two evenings plus Saturday and Sunday. Requests for this service are made through the Student Representatives and should be submitted each Monday morning.

Once in each month free transport is available to take students to Manzini and Mbabane, and once during the three months to another place in Swaziland. These journeys will normally be at the weekend. At least one week's notice is required.

7. Social Activities

Students may join the social clubs at Mhlume or Tshaneni on payment of a temporary membership fee. Members have the use of club facilities and may attend weekly film shows for which an extra charge is made.

The MAMC Common Room is available for social activities and is equipped with radio, tape recorder, chess, darts, table-tennis and a number of adult games. Facilities for tennis and volley ball are in preparation.

Film shows are given twice weekly in the Common Room and these will normally be shown on:

Sundays	at	7.00 p.m.	- Commercial feature film	- Charge 35c
Tuesdays	at	8.00 p.m.	- Documentary films	- Free

Notices giving information about films will be posted on the noticeboard.

8. Visitors

Visitors are welcome and can be taken to meals (for which a charge is made) provided 48 hours notice is given to the Domestic Bursar. Under no circumstances may women be entertained in student study/bedrooms.

9. Stationery

Stationery is provided by the Centre and further supplies can be obtained on request. It is preferred for individual requirements to be notified to the Student Representatives who will draw supplies once a week.

10 Stamps

A supply of stamps and airmail letter forms to the value of £20 will be issued to one of the Student Representatives by the Bursar for sale to students as required.

- 11 In some cases personal funds are held by the Bursar on behalf of students. These can be made available on one agreed day each week. MAMC is not responsible for the safekeeping of anything belonging to students unless handed to the bursar with a specific request for safekeeping.

Guide to the Use of MAMC Library

A library is being built up, and students are encouraged to use it freely, since it contains much material on many topics not covered by the course. In the Common Room there is a small collection of fiction, and newspapers are also available.

Journals and Periodicals

A number of journals and periodicals are available; current issues are located on the far right hand side of the library, and may not be removed from the library. Back issues are available through a member of the teaching staff.

Classification and Loan of Books

Author Index and Subject Index

Both sets of catalogue cards are arranged alphabetically and recorded in the top right hand corner the subject covered by the book and which also indicates its place on the shelves.

If a particular book or pamphlet cannot be found on the shelves, it may already be on loan or held by a member of the teaching staff.

Borrowing Books

When borrowing a book write its title and the date on your personal library card, which must be left in the Library. When a book is returned to the library, write the date of return on your personal library card. Students are requested to leave books on the bottom shelf and not to replace them on the book shelves.

COURSE OBJECTIVES

You will already know that this course is not concerned with providing training in the technical problems of agriculture. We shall not discuss the relative merits of varieties of sugar cane, or what herbicides to use to control weeds in rice. We shall devote the time to considering how to make economic decisions to ensure profitable production; how to combine men, machinery and materials so that objectives can be reached efficiently; and how records can be designed to help in planning and control. In seeking how to organise other people better, you will find that you will be able to examine yourself in your role as a manager.

Our object in the three months that you are at MAMC is to create a situation in which you will develop and improve your ability as a manager in agriculture. We have in mind a picture of your work and responsibilities and the whole programme is related to this. We do not try to include everything in management, but only those methods and practices that you can probably use back home. Throughout the course we shall discuss principles, and then seek to see how these are applied on our own farm or on neighbouring estates. A real effort will be needed from you to perceive how you could apply the principles under your conditions. The staff will also help in discussion, but will not attempt to tell you exactly what you should do. Exercises based on field observations or case studies in which work is done in small groups are designed to help you to see how to apply new knowledge in practical situations.

You may find our approach to teaching different from what you expect. We do not attempt to tell you how to do your job, but help you to learn for yourself how to do it. This calls for a sustained effort from you to see how to use what you will learn about. We are not looking for the one correct answer, because it does not exist; by exercises, discussion and argument we seek to give you understanding.

Theory and Practice of Management

During this portion of the course, we will examine the theoretical and practical basis of management, so that course members may deepen their understanding of the processes of management. We will consider management, from the point of view, as the activity of controlling the structure and functioning of their work systems.

1. Managerial work) Concept of the role
2. Activities of Managers) of the Manager
3. Managerial relationships - superior, subordinate,
peer and external
relations
4. Decision-making and problem solving

Financial Analysis, Planning and Control

This part of the course is covered under three main headings, Financial, Control and Decision Accounting.

The first series of lectures is designed to give a broad appreciation of the Financial Accountant's function and requirements in the form of information supplied by the operating manager. The section under Control Accounting deals mainly with conventional cost accounting as applied to estate type agriculture, with emphasis placed on budgeting control and variance analysis.

The bulk of the material is given in the section on Decision Accounting where the concept of the Margin is introduced. Techniques such as partial budgeting, breakeven analysis and resource/enterprise selection, which rely upon this concept, are dealt with in some detail. Following this is a series of lectures and exercises on problems of cash flow estimation and investment appraisal.

1. Financial Accounting - Capital
Cash Analysis
Valuations, Depreciation, etc.
Profit and Loss Accounts
Balance Sheets
2. Control Accounting - Data collection, presentation and
analysis - physical, labour,
machinery, etc.
Cash Flow Budgets
Cost Accounting
Budgeting Control
Performance Analysis (Variance)
- 2 3. Decision Accounting - The Margin
Fixed and Variable Costs
Gross Margin
Partial Budgets
Breakeven Budgets and Charts
Planning in Resource Use
Investment Appraisal, D.C.F.
Techniques, Sensitivity Analysis

Economic Development and Commodity Marketing

This part of the course is made up of a small number of seminars designed to give background information rather than to provide training in expertise. The place of agriculture in economic development and efficient marketing are pivots upon which agricultural production in the field depend. But managers attending this course are not concerned with decision-making in this area, and the subjects will only be dealt with superficially.

Operations Management

This part of the course is concerned with concepts and techniques in managing the operational situation. We shall range over present ideas and concepts of planning and control of work and utilisation of resources. Recent thinking on problem solving, performance improvement and scheduling of work and projects will be taught.

1. Development of a System - View of organisation and work
2. Control Systems and Techniques - The Feedback Cycle. Graphs, Profiles, Bar and Z and Ghant Charts
3. Work Scheduling, Man/Machine Interface - Labour planning and control Machinery planning and control Methods of work allocation
4. Performance Improvement Techniques - Problem solving, method study, work measurement, incentive schemes.
5. Network analysis - Loading and scheduling techniques

Human Behaviour in Organisations

Human behaviour in organisations can be seen as the outcome of the interaction between both 'environmental' and individual variables. On the environmental side, there will be such influences as the nature of the organisation, the arrangement of work, the composition of work groups, and the cultural influences of national and local communities. Determinants at the individual level will include the attitudes, abilities, and personalities of the people concerned, as well as the wants and expectations that they bring to their work.

This part of the course will therefore:

- (a) examine the operations of small groups and the actions of individuals within such groups in such a way as to give course members the opportunity of obtaining further insight into their own behaviour;
 - (b) increase members' understanding of human behaviour in organisations by examining some of the major environmental and personal characteristics that influence the behaviour of people at work;
 - (c) provide members with an understanding of behavioural science concepts that will enable them to appreciate some of the determinants of human behaviour, and in particular, those that can be structured by the manager so as to improve the effectiveness of the organisation.
1. Individual and Group Behaviour
 2. Relationships at Work
 3. Leadership and Management Style
 4. Motivation and Reward Structures
 5. Co-ordination and Delegation
 6. Authority, Power and Influence
 7. Labour Relations

Communication, Innovation and Change

The presentation will emphasise the process of communication in decision-making, innovation and change and problem-solving.

The course is made up of a series of seminars designed to provide guidelines, practice and coaching in the skills of communication.

1. The communication process
2. Selective perception - problems of perception and interpretation
3. Group dynamics - conflict and co-operation in groups. Attitudes, norms, roles and group decision-making
4. Verbal and written presentation
5. Conduct of meetings
6. Negotiations - intergroup and inter-personal situations
7. Strategies of innovation and change

Training

This part of the course is designed to give an awareness of the range and practices in modern training management.

1. Training needs and analysis
2. Job analysis and evaluation
3. Training strategies and interventions
4. Training at Management, Supervisory, Skilled and Unskilled levels
5. Adult training

DAY	9.00am - 10.00am	10.30am - 12.30pm	2.00pm - 4.30pm
MONDAY 5th	EWC	Exercise in Partial Budgets →	Brief 3 - Relationships at Work FNY
TUESDAY 6th	TK	Functional Leadership →	
WEDNESDAY 7th	TK	Functional Leadership →	
THURSDAY 8th	Review of Brief 3 FNY	Control Accounting DTJ L 40	Physical Data Collection DTJ L 42
FRIDAY 9th	Managerial Styles and Leadership →	Labour Records DTJ L 43	Exercise in Labour Records DTJ L 43

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Week Beginning 5th

Week Number 4

DAY	8.00am - 10.00am		10.30am - 12.30pm		2.00pm - 4.30pm
MONDAY 12th	FNY	Brief 3 Relationships at Work	EWC	L 72	EWC Exercise in Break Even Analysis
TUESDAY 13th	HTES	Farm Records	FNY	E 307	
WEDNESDAY 14th	DTJ	Machinery Records L 44	Motivation and Reward Structures FNY	EWC	E 72 Visit Tambankulu Citrus Orchards
THURSDAY 15th	EWC	The Margin Review L 72	FNY EWC	E 313	Exercise Supervise
FRIDAY 16th	FNY	Superior/Subordinate Behaviour	DTJ	L 50	Individual Work

DAY	8.00am - 10.00am	10.30am - 12.30pm	2.00pm - 4.30pm
MONDAY 19th FNY	Authority Power and Influence DTJ	Cash Flow Budget Exercise E 50	Exercise Success FNY E 301
TUESDAY 20th	Brief 3 - Relationships at Work	Hand in Brief 3 EWC L 75	Planning in Resource Use - 1 DTJ Cash Flow Budget - Exercise
WEDNESDAY 21st EWC	Planning in Resource Use - 2 L 75	Exercise in Resource Use EWC E 75	Exercise Grievance FNY EWC E 31
THURSDAY 22nd	Visit Usutu Forest and Pulp Mill		
FRIDAY 23rd FNY	Seminar on Brief 3 		Exercise in Resource Use EWC

Week Beginning ...19th

Week Number

DAY	8.00am - 10.00am	10.30am - 12.30pm	2.00pm - 4.30pm
MONDAY 26th	Planning in Resource Use Review EWC L 75	System View of Work Organisation FNY L 110	Brief 4 - The Rational Manager Concepts of Decision and Control E 140
TUESDAY 27th	Control Systems and Techniques FNY L 120	Labour Planning DTJ L 132	Exercise in Labour Planning DTJ E 132
WEDNESDAY 28th	Labour Control DTJ L 133	Performance Improvement Techniques FNY L 162	Individual Work
HURSDAY 29th	Machinery Planning and Control DTJ L 135	Problem Solving in Management - 1 FNY L 163	Visit S.I.S. Citrus Orchards
FRIDAY 30th	The Business Game FNY EWC E 143		➔

Week Beginning 26th May
 Week number 7

DAY	8.00am - 10.00am	10.30am - 12.30pm	2.00pm - 4.30pm
MONDAY 2nd June	Methods of Allocating Work DTJ L 137	Network Analysis - 1 EWC L 170	Exercise in Network Analysis EWC E 170
TUESDAY 3rd	Problem Solving in Management - 2 FNY		➤
WEDNESDAY 4th	Incentive Schemes and Payment DTJ L 150	Problem Solving in Management - 3 Review and Seminar FNY	Individual Work
THURSDAY 5th	Visit Northern Rural Development Area ➤		
FRIDAY 6th	Network Analysis - 2 EWC	Seminar on Reward Structures Mr B. Milne	Individual Work

Week Beginning 2nd June
 Week Number 8

	8.00am - 10.00am		10.30am - 12.30pm		2.00pm - 4.30pm		
MONDAY 9th	Brief 4 The Rational Manager	Hand in Brief 4	DTJ	Investment Appraisal - 1 L 80	DTJ	Exercise in Investment Appraisal E 80	
TUESDAY 10th	Visit Ubombo Estates 						
WEDNESDAY 11th	Network Analysis - 3 EWC	Network Analysis Exercise EWC			Individual Work		
THURSDAY 12th	Investment Appraisal - 2 DTJ	Seminar on Brief 4 FNY				DTJ	Exercise in Investment Appraisal
FRIDAY 13th	Network 4 and Exercise Analysis 				DTJ	Exercise in Investment Appraisal	

Week Beginning ...9th June...

Week Number9.....

DAY	8.00am - 10.00am	10.30am - 12.30pm	2.00pm - 4.30pm
MONDAY 16th	Network Analysis Review EWC	Communication 5 Report Writing FNY L 520	Brief 5 Management and Change FNY E 515
TUESDAY 17th	Innovation and Change - 1 HTES L 510	Visit Mhlume, and SIS Sugar Mechanisation Scheme →	Exercise Attitudes FNY E 401
WEDNESDAY 18th	Economic Development - 1 DTJ	Management and Change FNY	Training - 1 TK
THURSDAY 19th	Visit to SIS Livestock →		Livestock Exercise
FRIDAY 20th	Innovation and Change - 2 HTES L 511	Economic Development - 2 DTJ	Economic Development Seminar Visiting Speaker Livestock Exercise

Week Beginning 16th June

Week Number 10

DAY	8.00am - 10.00am	10.30am - 12.30pm	2.00pm - 4.30pm
MONDAY 23rd	HTES Communication - 6 * Meetings	Visiting Speaker Training - 2	Visit Sihoya Swazi Nation Estates
TUESDAY 24th	Hand in Brief 5 HTES FNY	EWC/ Mr. M. Gillett Seminar on Livestock Exercise	FNY Exercise in Interviewing & Appraisal E 508
WEDNESDAY 25th	TK M.B.O.	UBLS Extension Systems Seminar	Individual Work
THURSDAY 26th	Visit <u>V.I.F.</u> 		Seminar on Settlement Schemes
FRIDAY 27th	FNY Seminar on Brief 5	Visiting Speaker Agricultural Marketing Seminar	Individual Work

Week Beginning 23rd June

Week Number 11

DAY	8.00am - 10.00am	10.30am - 12.30pm	2.00pm - 4.30pm
MONDAY 30th	Inter Group Exercise		→
TUESDAY July 1st	EWC FNY	Exercise Staffel E 204	→
WEDNESDAY 2nd	EWC DTJ	Financial Review Mr C. Kockett	"The Chief Executive" Seminar E 516
THURSDAY 3rd	FNY	Career Planning E 205	Application Session and Proposals for Action →
FRIDAY 4th	Individual Course Review		Course Evaluation and Review

Week Beginning ... 30th June

Week Number ... 12

MANANGA AGRICULTURAL MANAGEMENT CENTRE

TIMETABLE FOR FIRST WEEKEND

Friday	11th April		Arrival at MAMC
Saturday	12th April	8.00 am	Introduction to the course. Brief 1 - My Job and My Organisation
		9.30 am	Shopping in Tshaneni Village
Sunday	13th April	12.00 pm	Introduction to MAMC staff.
		1.00 pm	Lunch with staff.
		7.00 pm	Sunday film.

DAY	8.00am - 10.00am		10.30am - 12.30pm		2.00pm - 4.30pm	
MONDAY 14th	The Process of Management FNY	Introduction to Agricultural Management DTJ L 15	Working in Groups FNY L 500		Brief 1 - My Job and My Organisation FNY E 200	
TUESDAY 15th	The Managers Role FNY	Use of Calculators DTJ L 10	Calculators and Basic Mathematics DTJ E 1		Tour of MAMC Farm DTJ EWC	
WEDNESDAY 16th	Hand in Brief 1	Cost Accounting - 1 EWC L 45	Calculators and Basic Mathematics DTJ E 1		Individual Work	
THURSDAY 17th	Introduction to Financial Accounting DTJ L 20	Communication - 1 FNY EWC	Selective Perception E 502		Exercise in Cost Accounting EWC E 45	
FRIDAY 18th	Cost Accounting - 2 EWC L 45		Seminar on Brief 1 FNY		Brief 2 - On Being a Manager FNY E 201	

DAY	8.00am - 10.00am		10.30am - 12.30pm		2.00pm - 4.30pm	
MONDAY 21st	Capital DTJ L 22	Managerial Work FNY	Budgetary Control - 1 EWC L 45	Exercise in Budgeting EWC E 45		
TUESDAY 22nd	Budgetary Control Review EWC L 45	Communication - 2 One Way - Two Way FNY E 504		Brief 2 - On Being a Manager		
WEDNESDAY 23rd	Cash Analysis DTJ L 23		Exercise in Cash Analysis DTJ E 23		Individual Work	
THURSDAY 24th	African Enterprises - Planning Exercise EWC FNY		Depreciation and Valuation DTJ L 24		Visit Tambankulu Sugar Estates FNY	
FRIDAY 25th	Variance Analysis EWC L 45		Seminar on "The Estate Manager" Mr. N. Calder E 202		Brief 2 - On Being a Manager	

DAY	8.00am - 10.00am		10.30am - 12.30pm		2.00pm - 4.30pm
MONDAY 28th	Brief 2 On Being A Manager	Hand in Brief 2	Relationships at Work FNY E 300	The Margin Fixed and Variable Costs EWC L 62	Brief 3 - Relationships at Work FNY
TUESDAY 29th	Profit and Loss Accounts DTJ L 30	Communication - 3 Decision Making in Groups and in Restricted Networks FNY/EWC E 506		Exercise in Marginal Costing EWC E 65	
WEDNESDAY 30th	Balance Sheets DTJ L 34	Behaviour in Groups FNY	Exercise in Marginal Costing EWC E 65	Individual Work	
THURSDAY May 1st	Partial Budgets EWC L 68		Communication - 4 Listening and Responding FNY E 505	Visit Ricelands Estate	
FRIDAY 2nd	Seminar on Brief 2 FNY		Exercise Fishbowl FNY E 501	Exercise on Balance Sheets DTJ E 25	